



The Intensive Connection

27th ANNUAL CONGRESS—BARCELONA, SPAIN—27 SEPTEMBER–1 OCTOBER 2014



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Abstracts

ESICM LIVES 2014 27th Annual Congress

BARCELONA, SPAIN 27 SEPTEMBER–1 OCTOBER

This supplement issue of the official ESICM/ESPNIC journal *Intensive Care Medicine* contains abstracts of scientific papers presented at the 27th Annual Congress of the European Society of Intensive Care Medicine.

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Oral Sessions

ARDS: 0001–0005

0001

CONFRONTATION OF THE BERLIN DEFINITION FOR ARDS WITH THE OPEN LUNG BIOPSY PERFORMED IN THE ICU

C. Guérin¹, J.-C. Richard², F. Bayle², G. Bourdin², V. Leray², S. Debord², A. Stoian², E. Bucher³, S. Lantuejoul⁴, C. Phillipponnet⁵, J.L. Kemeny⁶, B. Souweine², M. Devouassoux-Shisboran⁷

¹Hôpital de la Croix Rousse, Réanimation Médicale, Lyon, France, ²Réanimation Médicale Hôpital Croix Rousse, Lyon, France, ³Département Information Médicale, Lyon, France, ⁴Service Anatomie Pathologique, Grenoble, France, ⁵Réanimation Médicale, Clermont-Ferrand, France, ⁶Service Anatomie Pathologique, Clermont-Ferrand, France, ⁷Service Anatomie Pathologique, Lyon, France

INTRODUCTION. Diffuse alveolar damage (DAD) on lung histology is the hallmark of ARDS.

OBJECTIVES. The goal of this study was to compare the Berlin definition of ARDS to the results of the open lung biopsy (OLB) in patients with a persistent ARDS.

METHODS. Firstly, the charts of patients who underwent OLB for acute hypoxemic respiratory failure in the medical ICU at Croix Rousse University Hospital (Lyon, France) from 1998 to 2013 were split into ARDS and no ARDS groups according to the Berlin definition. Two pathologists blinded to the ARDS group analyzed the lung samples independently and classified them with or without DAD. The diagnostic performance of Berlin definition for ARDS and its stages was tested by using DAD as the reference standard. The assessment was done for ARDS at inclusion, 24 h later (H24) and at time of OLB. Secondly, ARDS patients with OLB (cases) were compared to ARDS patients without OLB (controls) matched for age ± 5 years, gender and SAPSII ± 7 . Thirdly, the comparison of the Berlin definition to OLB was tested into the medical ICU at Clermont-Ferrand University Hospital, France for external validity.

RESULTS. During the study period, 113 patients underwent OLB in medical ICU in Lyon of who 83 had and 30 had not ARDS. DAD was present in 50 OLB (44 ARDS) and not present in 63 OLB (39 ARDS). Sensitivity and specificity of OLB for ARDS were 0.88 and 0.38, respectively.

Mild, moderate and severe ARDS were found in 8, 44 and 31 cases. Median times of OLB from ICU admission or ARDS onset were 10 and 9 days, respectively, not different across the three ARDS stages. The diagnostic performance of ARDS definition is summarized in table 1.

	Inclusion		H24		OLB	
	Se	Sp	Se	Sp	Se	Sp
Mild vs. moderate or severe	0.09	0.88	0.09	0.95	0.10	0.85
Mild or moderate vs. severe	0.63	0.38	0.77	0.21	0.79	0.12
Moderate vs. severe	0.60	0.43	0.75	0.22	0.77	0.14

[Table 1]

Cases and controls were not different for the proportion of ARDS severity stage, SOFA score, ventilator settings and ICU mortality (62.7 vs 50.6 %, $P = 0.16$). Reasons for no OLB in controls were: 45 resolute ARDS, 9 deaths before OLB, 8 OLB contra-indicated, 7 end-of-life decision, 6 ongoing steroids, 6 undetermined, 2 other reasons for persistent hypoxemia.

The external validity was performed over 33 patients with acute hypoxemic respiratory failure and OLB in Clermont-Ferrand medical ICU, of who 22 had ARDS criteria. Sensitivity and specificity of ARDS definition were 0.71 and 0.35, respectively.

CONCLUSIONS. Given the challenge imposed to the Berlin definition in this present setting of persistent ARDS the sensitivity to predict DAD was fair.

0002

ACUTE RESPIRATORY DISTRESS SYNDROME SUB-PHENOTYPES ACCORDING TO HISTOLOGICAL FINDINGS

P. Cardinal-Fernández^{1,2}, D.A. Muñoz-Rincón³, A.W. Thille⁴, C. Jaramillo¹, A. Ballén-Barragán⁵, R. Granados⁵, A. Lesmes¹, F. Frutos-Vivar^{1,2}, O. Peñuelas Rodríguez^{2,6}, R. Herrero^{1,2}, N. Nin^{7,8}, M.A. de la Cal^{1,2}, A. Esteban^{1,2}, J.A. Lorente^{1,2,9}

¹Hospital Universitario de Getafe, Intensive Care Service and Burn Unit, Getafe, Spain, ²Centro de Investigación Biomédica en Red de Enfermedades Respiratorias (CIBERES), Getafe, Spain, ³Pablo Tobón Uribe—CES University, Intensive Care Service, Medellín, Colombia, ⁴CHU Poitiers, Medical Intensive Care Service, Poitiers, France, ⁵Hospital Universitario de Getafe, Pathology Department, Getafe, Spain, ⁶Hospital Infanta Cristina, Intensive Care Service, Parla, Spain, ⁷Hospital de Torrejón, Intensive Care Service, Madrid, Spain, ⁸Hospital Español, Intensive Care Service, Montevideo, Uruguay, ⁹Universidad Europea de Madrid, Madrid, Spain

INTRODUCTION. The clinical diagnosis of ARDS embraces different histological findings.

OBJECTIVE. To demonstrate that among patients with the clinical diagnosis of ARDS, the presence of diffuse alveolar damage (DAD) at histological examination, as compared to its absence, defines a clinical sub-phenotype.

METHODS. We studied patients that died in our ICU from 2000 to 2012 with the diagnosis of ARDS according to the Berlin definition and had autopsy. We excluded patients dying >14 days after the diagnosis of ARDS. The diagnosis of DAD required the presence of

hyaline membranes plus at least one of the following: intra-alveolar edema, alveolar type I cell necrosis, alveolar type II cell proliferation, interstitial proliferation of fibroblasts or organizing interstitial fibrosis. Day 0 was the first day clinical criteria for the diagnosis of ARDS were met. Comorbidities as well as respiratory, hemodynamic and laboratory variables from day 0 to day 7 were registered. The cause of death was determined according to changes in the 6 h prior to death (shock if systolic blood pressure was <90 mmHg, hypoxemia if $\text{SaO}_2 < 85\%$, miscellaneous, and limitation of life sustaining treatment [LLST]). We compared the change over time in the different variables in patients with and without DAD using Generalized Estimating Equations. A predictive model for the presence of DAD was developed by multivariate logistic regression analysis using variables present on day 0. A p value <0.05 was considered statistically significant. Results are median (IQR), and odds ratio (OR [95 % confidence interval]).

RESULTS. We included 149 patients in this study (49 with DAD). In univariate analysis, patients with DAD were younger (64 [55–73] vs. 70 [62–72] years, $p = <0.01$), presented more often alcohol abuse (31 vs. 15 %, $p = 0.04$) and had over time a lower $\text{PaO}_2/\text{FiO}_2$ ratio ($p = <0.01$) and dynamic respiratory system compliance (C_{DYN}) ($p = <0.01$), and a higher SOFA score ($p = 0.04$) and INR ($p = <0.01$). Cause of death for patients with vs. patients without DAD, respectively, was hypoxemia (25 vs. 5 %), shock (29 vs. 55 %), hypoxemia and shock (18 vs. 12 %), miscellaneous (25 vs. 22 %), and LLST (4 vs. 6 %) ($p = <0.01$). In multivariate analysis, variables associated to DAD at day 0 were $\text{PaO}_2/\text{FiO}_2$ ratio (OR 0.988 [0.981–0.995]), C_{DYN} (OR 0.937 [0.892–0.984]) and age (OR 0.972 [0.946–0.991]). Areas under the ROC curve (95 % confidence interval) for the diagnosis of ARDS using the regression model or the Berlin definition were, respectively, 0.74 (0.65–0.82) and 0.64 (0.55–0.72) ($p = 0.03$).

CONCLUSIONS. Patients with the clinical diagnosis of ARDS and DAD have a different clinical sub-phenotype than those without DAD at autopsy examination. A predictive model based on age, $\text{PaO}_2/\text{FiO}_2$ ratio and C_{DYN} at the time of ARDS diagnosis predicts the presence of DAD more accurately than the Berlin definition.

GRANT ACKNOWLEDGMENT. FIS 12/02898, FIS 11/02791, FIS 12/02451, European Network (7th FP) ITN 264864.

0003

MECHANICAL VENTILATION MANAGEMENT DURING EXTRACORPORAL MEMBRANE OXYGENATION FOR ACUTE RESPIRATORY DISTRESS SYNDROME: A RETROSPECTIVE INTERNATIONAL MULTICENTER STUDY

M. Schmidt^{1,2}, C. Stewart³, M. Bailey², A. Nieszkowska¹, J. Kelly², L. Murphy³, D. Pilcher², D.J. Cooper², C. Scheinkestel², V. Pellegrino², P. Forrest², A. Combes¹, C. Hodgson²

¹Hôpital de la Pitié-Salpêtrière, Assistance Publique-Hôpitaux de Paris, Medical-Surgical Intensive Care Unit, iCAN, Institute of Cardiometabolism and Nutrition, Paris, France, ²Australian and New Zealand Intensive Care Research Centre, Department of Epidemiology and Preventive Medicine, School of Public Health, Monash University, Melbourne, Australia, ³Royal Prince Alfred Hospital, Department of Anaesthetics, Sydney, Australia

INTRODUCTION. Although high-level evidence supports low-tidal volume ventilation strategies to improve survival in non-ECMO patients with ARDS, ventilation management during ECMO has received scant attention. Consequently, consensus regarding the optimal ventilator management during ECMO does not exist.

OBJECTIVE. To describe mechanical ventilation (MV) settings in adult patients treated for an acute respiratory distress syndrome (ARDS) with extracorporeal membrane oxygenation (ECMO) and assess the potential impact of MV settings on ICU mortality.

DESIGN. Retrospective observational study.

SETTING. Three international high case volume ECMO centers (Melbourne, Sydney and Paris).

PATIENTS. 168 patients treated with ECMO for severe ARDS.

INTERVENTIONS. We analysed the association between MV settings (i.e. plateau pressure, tidal volume [VT] and positive end-expiratory pressure [PEEP]) and ICU mortality using multivariable logistic regression model and cox-proportional hazards model.

METHODS. Demographic, clinical and daily MV settings were collected once daily at 10 am (or nearest available result), from 24 h before ECMO support until support withdrawal, or death, or day 28 (whichever occurred first).

RESULTS. One hundred and sixty eight patients (41 \pm 14 years old, $\text{PaO}_2/\text{FiO}_2$ 67 ± 19 mmHg) fulfilled our inclusion criteria. Median duration on ECMO and in ICU was 10 (6–18) and 28 (16–42) days, respectively. Pre-ECMO VT and pre-ECMO plateau pressures were similar within the three ICUs. Lower PEEP levels were applied in the French center than in both Australian centers during ECMO, resulting to a significant lower plateau pressures (23.9 \pm 1.4 vs. 27.6 \pm 3.7 and 27.8 \pm 3.6; $p < 0.0001$). Overall ICU mortality was 29 %. Non-survivors received significant lower PEEP until day 7 and lower VT after 3 days on ECMO despite receiving targets of VT <6 mL/kg with plateau pressure <28 cmH₂O ($p < 0.05$). After adjustments, a higher PEEP during the first 3 days in ECMO was a protective factor of death in ICU (OR 0.75, 95 % confidence interval [0.64–0.88], $p = 0.0006$), whereas higher ICU-ECMO interval, plateau pressure before ECMO >30 cmH₂O, and higher lactate at ECMO day 3 were independent predictor of death in ICU.

CONCLUSIONS. Lung protective mechanical ventilation is being used in high case volume ECMO centers. A lower PEEP level during the first 3 days on ECMO is an independent risk factor of ICU mortality. Further interventional larger studies aimed at testing the optimal MV strategy, especially the benefit of high PEEP level during ECMO are now warranted.

0004

DYNAMICS OF END EXPIRATORY LUNG VOLUME AFTER CHANGING PEEP IN ARDS PATIENTS

A. Garnero^{1,2}, D. Tuxen³, N. Embriaco², D. Demory², S.Y. Donati², J. Durand-Gasselini², J.-M. Arnal^{2,4}

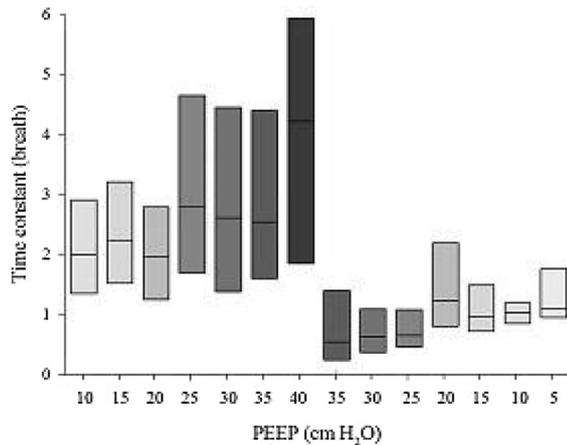
¹Australian and New Zealand Intensive Care Research, Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia, ²Hôpital Sainte Musse, Réanimation Polyvalente, Toulon, France, ³Alfred Hospital, Intensive Care and Hyperbaric Medicine, Prahan, Australia, ⁴Hamilton Medical, Medical Research, Bonaduz, Switzerland

INTRODUCTION. Lung recruitment maneuvers followed by an appropriate level of positive end-expiratory pressure (PEEP) are the key components of the open lung ventilation strategy in acute respiratory distress syndrome (ARDS). The staircase recruitment maneuver is a step by step increase of PEEP followed by a decreasing PEEP trial. The duration of each PEEP step is usually 2 min without strong physiologic rationale.

OBJECTIVES. This prospective physiological study measured the dynamic of end expiratory volume changes (Δ EELV) during a step increase and decrease in PEEP in order to determine the optimal duration for each step.

METHOD. The study was conducted in the general ICU of Hôpital Sainte Musse, Toulon, France. Eligible participants were adults aged 18 or over, with early onset (less than 24 h) moderate or severe ARDS, invasively ventilated for less than 72 h at the time of inclusion. Exclusion criteria were bronchopleural fistula, emphysema, pneumothorax, increased intracranial pressure, pulmonary arterial hypertension with right heart failure, hemodynamic instability, pregnancy. Patients were ventilated in pressure control with 15 cmH₂O of driving pressure, 15 breaths per minute and FiO₂ was adjusted to target a SpO₂ between 90 and 94 %. A staircase recruitment maneuver was performed: PEEP was increased from 5 to 40 cmH₂O by step of 5 cmH₂O every 2 min and then, PEEP was decreased from 40 to 5 cmH₂O by step of 5 cmH₂O every 2 min. The dynamic of Δ EELV was measured by direct spirometry as the difference between inspiratory and expiratory tidal volume (after correction for physiological volume change) for the 30 breaths following a step increase or decrease in PEEP. Because Δ EELV has an exponential increase or decrease, a time constant (time required to reach 63 % of the final value) was calculated for each patient and each PEEP step.

RESULTS. 28 patients were included between August 2012 and October 2013. The time constant of Δ EELV when PEEP was increased (2[1–3]breath; 8[5–14]s) was significantly longer than the time constant when PEEP was decreased (1[1–1]breath; 4[2–5]s; $p < 0.001$).



[Time constant according to PEEP step]

The Δ EELV measured during the first breath after the PEEP change was 67 ± 17 % of the total Δ EELV during the increase in PEEP and 72 ± 17 % during the decrease in PEEP and was well correlated with the change in volume expected from the respiratory system compliance ($r^2 = 0.71$ during the increase in PEEP, $r^2 = 0.59$ during the decrease in PEEP).

CONCLUSION. These results support the use of short duration for the PEEP step when using a staircase recruitment maneuver.

The trial is registered at ClinicalTrials.gov, number NCT01899560.

This study was promoted by the Centre Hospitalier Intercommunal de Toulon and funded by APARD (Association Pour l'Assistance Respiratoire à Domicile).

0005

VENTILATOR-ASSOCIATED PNEUMONIA IN SEVERE ARDS PATIENTS TREATED BY PRONE POSITION. RESULTS FROM A MULTICENTER RANDOMIZED CONTROLLED TRIAL

L. Ayzac¹, L. Baboi², P. Beuret³, R. Girard⁴, J.-C. Richard², C. Guérin², PROSEVA

¹C-CLIN Sud-Est, Saint-Genis Laval, France, ²Réanimation Médicale Hôpital Croix Rousse, Lyon, France, ³Réanimation Polyvalente, Roanne, France, ⁴Service d'Hygiène, Pierre Bénite, France

INTRODUCTION. Ventilator-associated pneumonia (VAP) is a frequent event in patients with acute respiratory distress syndrome (ARDS) and supports high mortality.

OBJECTIVES. To assess the incidence and impact on patient survival of VAP in PROSEVA trial in intubated and mechanically ventilated severe ARDS patients.

METHODS. Ancillary study of PROSEVA trial. VAP was part of the original protocol and done prospectively in each center. VAP was suspected from clinical-biological and radiological criteria obtained ≥ 48 h after inclusion and confirmed from positive quantitative cultures of broncho-alveolar lavage fluid or tracheal aspirate at 10^4 and 10^5 CFU/ml thresholds, respectively. Central adjudication of VAP cases was made by a member of the Data Safety Monitoring Board. The occurrence of the first VAP episode was expressed as attack rate and density of incidence [95 % Confidence Interval]. We used multistate model to assess the impact of VAP on mortality. From the status at ICU admission, VAP and ICU discharge, we defined three transitions: 1 from ICU admission to VAP, 2 from ICU admission to ICU discharge, 3 from VAP to ICU discharge. Furthermore, we applied Cox proportional hazard regression model fed with those covariates selected at $P < 0.20$ in the univariate comparison between patients with or without VAP. The proportional assumption of risk-effect of covariates on the different transitions was verified. The body position group was also entered into the Cox model.

RESULTS. Between supine and prone groups, VAP attack rate and density incidence amounted to 17.9 % (41/229) and 22.8 % (52/237) ($P = 0.19$), and 0.67 [0.49-0.91] and 1.68 [1.25-2.20] per 100 days of invasive mechanical ventilation ($P < 0.001$), respectively. Thirty-six patients with VAP died (36.7 %) vs 114 (30.6 %) for patients without VAP at day 90 ($P = 0.13$). At time of inclusion, patients with and without VAP differ for context of ICU admission, gender, SAPSII, SOFA, noradrenaline dosage, neuromuscular blockade agent use, PEEP and tidal volume. VAP did not significantly influence day 90 mortality after controlling for covariates. The time at which a patient got VAP also did not influence the subsequent fatality rate. Finally, the following covariates were significantly associated with either transition (Table 1).

	Transition 1 Odds ratio	Transition 1 P	Transition 2 Odds ratio	Transition 2 P	Transition 3 Odds ratio	Transition 3 P
Prone position	1.218	0.37	0.502	0.0025	0.95	0.89
Female gender	0.57	0.03	1.29	0.24	0.62	0.39
SOFA	0.97	0.39	1.14	0.00075	0.17	0.049
PEEP	0.93	0.02	1.05	0.17	0.94	0.36

[Table 1]

CONCLUSIONS. VAP is not associated with higher mortality in severe ARDS patients. Prone position is associated with a significant reduction in mortality without any reduction of VAP incidence.

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Outcomes of acute kidney injury: 0006–0010

0006

THREE-YEAR RISK OF CARDIOVASCULAR DISEASE AMONG INTENSIVE CARE PATIENTS WITH ACUTE KIDNEY INJURY: A POPULATION-BASED COHORT STUDY

H. Gammelager¹, C.F. Christiansen¹, M.B. Johansen¹, E. Tønnesen², B. Jespersen³, H.T. Sørensen¹

¹Aarhus University Hospital, Department of Clinical Epidemiology, Aarhus, Denmark, ²Aarhus University Hospital, Department of Anesthesiology and Intensive Care Medicine, Aarhus, Denmark, ³Aarhus University Hospital, Department of Renal Medicine, Aarhus, Denmark

INTRODUCTION. Acute kidney injury (AKI) is common among intensive care unit (ICU) patients, but follow-up data on subsequent risk of cardiovascular disease remain sparse.

OBJECTIVES. To examine the impact of AKI on 3-year risk of first-time heart failure, myocardial infarction (MI), and stroke among ICU patients surviving to hospital discharge, and to determine whether this risk is modified by renal recovery before hospital discharge.

METHODS. We used population-based medical registries to identify all adult patients admitted to an ICU in Northern Denmark during 2005–2010 who survived to hospital discharge and who had no previous or concurrent diagnosis of heart failure, MI, or stroke. AKI was defined according to the creatinine criteria in the Kidney Disease Improving Global Outcomes classification. Renal recovery was defined as without need of dialysis at hospital discharge and last plasma-creatinine measurement before discharge less than 50 % above baseline level. We computed the 3-year cumulative risk of hospitalization with heart failure, MI, and stroke for patients with and without AKI and hazard ratios (HRs), using a Cox model adjusted for potential confounders.

RESULTS. Among 21,556 ICU patients surviving to hospital discharge, 4,792 (22.2 %) had an AKI episode. Three-year cumulative risk of heart failure was 2.2 % in patients without AKI, 5.0 % for AKI stage 1, and 5.0 % for stages 2–3. The corresponding adjusted HRs were 1.34 (95 % confidence interval (CI), 1.08–1.69) for patients with AKI stage 1 and 1.46 (95 % CI, 1.15–1.87) for AKI stages 2–3, compared to patients without AKI. The 3-year cumulative MI risk was 1.0 % for patients without AKI, 1.8 % for patients with AKI stage 1 and 2.3 % for patients with AKI stages 2–3. The adjusted HR for MI was 1.05 (95 % CI, 0.72–1.52) for patients with AKI stage 1 and 1.49 (95 % CI, 1.04–2.15) for patients with AKI stages 2–3, compared with patients without AKI. We found no association between AKI and stroke. The increased risk of heart failure and MI persisted in patients with renal recovery before discharge, although less pronounced than in patients without renal recovery. The adjusted HR for heart failure among patients with AKI stage 1 that had recovered their renal function at hospital discharge was 1.29 (95 % CI, 1.02–1.63) compared to 1.80 (95 % CI, 1.07–3.04) in patients without renal recovery. For patients with AKI stages 2–3 the adjusted HRs for heart failure were 1.44 (95 % CI, 1.13–1.96) and 1.55 (95 % CI, 1.06–2.27) for patient with and without renal recovery, respectively.

CONCLUSIONS. ICU patients surviving any stage of AKI are at increased 3-year risk of heart failure, but not stroke. Only AKI stages 2–3 are associated with increased MI risk.

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0007

ACUTE KIDNEY INJURY IN CRITICALLY-ILL PATIENTS WITH HEMATOLOGICAL MALIGNANCIES: RESULTS OF A MULTICENTER COHORT STUDY

M. Darmon¹, F. Vincent², E. Canet³, D. Mokart⁴, F. Pène⁵, A. Kouatchet⁶, J. Mayaux⁷, M. Nyunga⁸, F. Bruneel⁹, A. Rabbat³, C. Lebert¹⁰, P. Perez¹¹, A. Renault¹², R. Hamidfar¹³, M. Jourdain¹⁴, A.-P. Meert¹⁵, D. Benoit¹⁶, B. Schlemmer², S. Chevret², E. Azoulay³, Groupe de Recherche en Réanimation Respiratoire et Onco-Hématologique

¹Saint-Etienne University Hospital, Saint-Etienne, France, ²Montfermeil Hospital, Montfermeil, France, ³Saint-Louis University Hospital, Paris, France, ⁴Institut Paoli Calmette, Marseille, France, ⁵Cochin Hospital, Paris, France, ⁶Angers Hospital, Angers University, Angers, France, ⁷Pitié-Salpêtrière Hospital, University Paris 6, Paris, France, ⁸Victor Provo Hospital, Roubaix, France, ⁹Mignot Hospital, Versailles, France, ¹⁰Montaigne Hospital, La Roche sur Yon, France, ¹¹Brabois Hospital, Nancy, France, ¹²Brest Hospital, Brest, France, ¹³Grenoble University Hospital, Grenoble, France, ¹⁴Salengro Hospital, Lille, France, ¹⁵Jules Bordet Institute, Brussels, Belgium, ¹⁶Ghent University Hospital, Ghent, Belgium

INTRODUCTION. Cancer patients are at high risk for acute kidney injury (AKI), which is associated with high morbidity and mortality. Most of the studies assessing prognosis in critically-ill cancer patients with AKI were however retrospective monocentre cohort studies raising doubt as regard to the external validity of their results.

OBJECTIVES. We sought to appraise incidence, risk factors, and outcome of AKI in a large multicentre cohort study of critically-ill patients with hematological malignancies.

METHODS. Retrospective analysis of prospectively collected database. The study was carried out in 17 university or university-affiliated centers in France and Belgium between 2010 and 2012. Acute Kidney Injury was defined according to AKIN definition [1].

RESULTS. 1009 of the 1011 patients admitted into the ICU during the study period were included in this study. According to AKIN definition, 671 patients (66.5 %) had an AKI during ICU stay, including respectively 258 patients (38.4 % of patients with AKI), 75 patients (11.2 % of patients with AKI) and 338 patients (50.4 %) with AKI stage 1, 2 and 3. Severe sepsis and septic shock were the main risk factors of AKI (210 patients with AKI; 31.3 %). Concomitant nephrotoxic agents were identified in 116 patients with AKI (17.3 %) and tumor lysis syndrome in 83 (12.4 %). One-hundred and one patients with AKI had a myeloma as underlying malignancy (15.1 %).

After adjustment for confounders, main risk factors of AKI were older age, initial severity, history of hypertension, tumor lysis syndrome, exposure to nephrotoxic agents, and myeloma.

Hospital mortality was of 44.3 % in patients with AKI and 25.4 % in patients without AKI ($P < 0.0001$). After adjustment for confounders, AKI was independently associated with hospital mortality (OR 1.65; 95 % CI 1.19–2.29). Overall, 271 patients required renal replacement therapy (RRT) of whom 57.2 % died during hospital stay (vs. 31.2 %; $P < 0.0001$).

CONCLUSIONS. Results of this large multicentre cohort study report a 67 % incidence of AKI in critically-ill patients with hematological malignancies. Half of the patients will experience a severe AKI according to AKIN classification and 27 % of the overall population required RRT. According to our findings, beside usual risk factors of AKI, myeloma and tumor lysis syndrome were the main specific factors associated with AKI in this population of patients. Although hospital mortality of critically-ill patients with AKI was in the similar range than the general ICU population with AKI, acute kidney injury was associated with poor outcome.

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0008

A MODEL TO PREDICT RECOVERY FROM ACUTE KIDNEY INJURY IN ICU PATIENTS

T.S. Itenov¹, J.-U. Jensen^{2,3}, J.D. Lundgren², M.H. Bestle¹, the Procalcitonin and Survival Study (PASS)-Group

¹Nordsjællands Hospital, University of Copenhagen, Department of Anesthesiology, Hillerød, Denmark, ²Rigshospitalet, University of Copenhagen, CHIP, Department of Infectious Diseases and Rheumatology, Copenhagen, Denmark, ³Hvidovre Hospital, Department of Microbiology, Copenhagen, Denmark

INTRODUCTION. Critically ill patients that present with acute kidney injury (AKI) can be separated into two groups; those who recover and those that have a persistent kidney dysfunction until death or discharge. Current risk stratification tools either predict mortality or are only applicable to patients treated with renal replacement therapy (RRT) (1). Reliable models that predict recovery from AKI and are applicable to all ICU patients with AKI are warranted.

OBJECTIVES. To develop a model for prediction of recovery after AKI.

METHODS. We included patients from a cohort of 1200 ICU patients enrolled as a part of the clinical trial 'The PASS' (2). From this broad cohort of mixed ICU patients we included patients with AKI on ICU admission. Exclusion criteria: 1. Known chronic kidney impairment, 2. End-stage renal disease, 3. Insufficient data for evaluation of AKI or recovery status and 4. Died within 24 h of ICU admission.

The KDIGO definition of AKI was used. Recovery was defined as five consecutive days with: 1. No RRT 2. Highest creatinine $<1.5 \times$ reference creatinine 3. Highest urea $<13/15.5$ mmol/L for females/males.

A prediction model was built by combining Cox regression models for recovery and death prior to recovery. Both models included: Elevation in creatinine, urea, oliguria, gender and age. The model was internally validated by bootstrap cross validation.

RESULTS. 505 patients were included (figure 1, table 1). All the variables were independent predictors of recovery, but only age and creatinine elevation independently predicted death prior to recovery (table 2). A clinically usable tool was developed (figure 2, example for non-oliguric, males, age 35–44). The predicted chance of recovery was median 46.5 % (IQR 25.4–60.2). The C-index was 70.1 % after internal validation. C-index range from 50 to 100 % and reflects the discrimination between recovery and non-recovery.

>70 % are generally considered good discrimination. In patients with a predicted chance of recovery <33 % ($n = 169$), 33–66 % ($n = 267$), >66 % ($n = 69$) the observed probability of recovery after 28 days was 25 % (95 %-CI 17–32), 52 % (95 %-CI 45–59) and 79 % (95 %-CI 67–91), respectively (figure 3).

CONCLUSIONS. Using only readily available measures it was possible to predict individual patients' chance of recovering kidney function after AKI with good precision. The model was transformed into a clinically usable tool.

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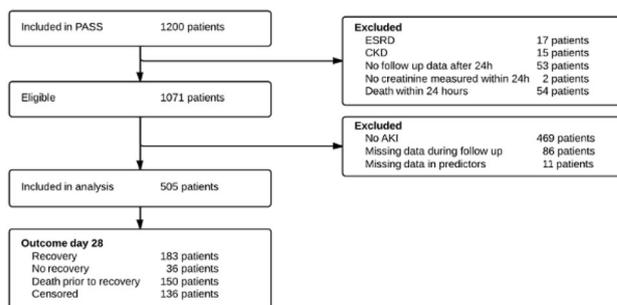
GRANT ACKNOWLEDGMENT. Dr. Itenov received grants from Nordsjællands Hospital, The Capital Region of Denmark and Fr. Olga Brydes Legat.

Variable	All patients in PASS-study (except CKD and ESRD) (n = 1175)	Included patients (n = 505)
Age, years, median (IQR)	67 (58–67)	67 (59–67)
Male gender, n (%)	648 (55)	295 (58)
Apache-II, median (IQR)	18 (13–24)	21 (15–27)
Severe sepsis or septic shock, n (%)	517 (44)	313 (62)
Vasoactive medication, n (%)	724 (62)	400 (79)
Mechanic ventilation, n (%)	877 (75)	415 (79)
Renal replacement therapy, n (%)	213 (18)	175 (35)

[Table 1: Baseline characteristics]

Cox regression models of recovery and death prior to recovery	Recovery HR (95 %-CI), p value	Death prior to recovery HR, (95 %-CI), p-value
Age, per 10 year increase	0.89 (0.80–0.99), <0.05	1.42 (1.22–1.65), <0.05
Gender, female	1.37 (1.01–1.85), <0.05	0.82 (0.58–1.15), 0.28
Fold elevation in creatinine, per 2 fold increase	0.47 (0.34–0.64), <0.05	0.69 (0.52–0.90), <0.05
Urea, per 10 mmol/L increase	0.84 (0.70–1.00), <0.05	1.05 (0.99–1.11), 0.11
Oliguria, present	0.32 (0.22–0.46), <0.05	1.32 (0.94–1.85), 0.11

[Table 2 Multivariate cox regression models]



[Patient flow]

Fig. 1

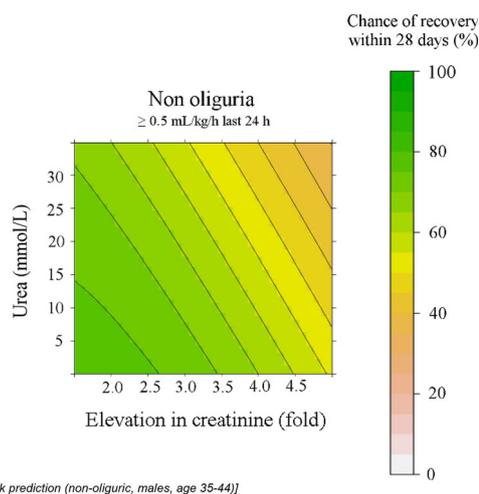


Fig. 2

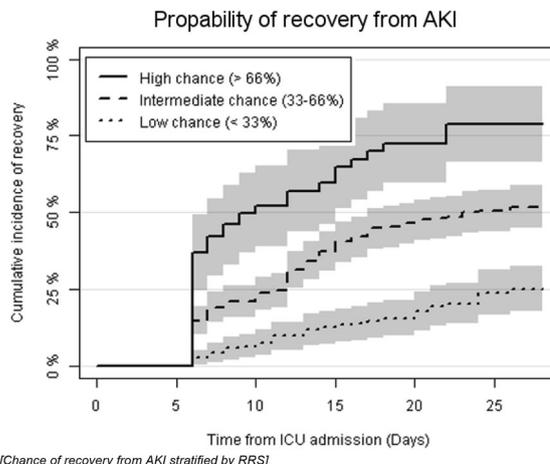


Fig. 3

0009

ASSOCIATION BETWEEN EARLY RECOVERY FROM ACUTE KIDNEY INJURY AND MORBIDITY AND MORTALITY AFTER LUNG TRANSPLANTATION: A POPULATION-BASED COHORT STUDY

P. Fidalgo^{1,2}, M. Ahmed¹, S.R. Meyer³, D. Lien⁴, J. Weinkauff⁴, A. Kapasi⁴, F.S. Cardoso^{1,5}, K. Jackson⁶, S.M. Bagshaw¹

¹Faculty of Medicine and Dentistry, University of Alberta, Division of Critical Care Medicine, Edmonton, Canada, ²Hospital Prof Dr Fernando Fonseca, Nephrology Department, Amadora, Portugal, ³Faculty of Medicine and Dentistry, University of Alberta, Division of Cardiac Surgery, Department of Surgery, Edmonton, Canada, ⁴Faculty of Medicine and Dentistry, University of Alberta, Division of Pulmonary Medicine, Department of Medicine, Edmonton, Canada, ⁵Hospital Prof Dr Fernando Fonseca, Gastroenterology Department, Amadora, Portugal, ⁶Lung Transplant Program, Alberta Health Services, Edmonton, Canada

INTRODUCTION. Acute kidney injury (AKI) is a common occurrence following lung transplantation (LTx) and portends an increased risk for short and long-term morbidity and mortality^{1,2}. Whether early recovery from AKI is associated with improved outcome is uncertain³.

OBJECTIVES. Our aim was to describe the incidence, risk factors and outcomes associated with early recovery from AKI following LTx.

METHODS. We performed a retrospective cohort study of all adult recipients of LTx at the University of Alberta between 1990 and 2011. Our primary outcome was early recovery after AKI, defined as return of serum creatinine below KDIGO AKI stage I within 7 days after LTx. Secondary outcomes included occurrence of post-operative complications, mortality and long-term kidney function.

RESULTS. Of 445 LTx patients enrolled, AKI occurred in 306 (68.8%) within the first week after LTx. Of these, early recovery occurred in 157 (51.3%). Early recovery was associated with fewer complications including tracheostomy (17.2 vs. 38.3%; $p < 0.001$), re-intubation (16.4 vs. 41.9%; $p < 0.001$), decreased duration of mechanical ventilation (median [IQR], 69 [41–142] vs. 189 [63–403] hours; $p < 0.001$) and lower rates of chronic kidney disease at 3-months (28.5 vs. 51.1%, $p < 0.001$) and 1-year (49.6 vs. 66.7%, $p = 0.01$) compared with non-recovery. Factors independently associated with non-recovery were higher body mass index (odds ratio [OR] 1.10; 95% CI, 1.0–1.2; $p = 0.01$), cyclosporine use (OR 2.93; 1.3–6.7; $p = 0.01$), longer duration of mechanical ventilation (per hour [log transformed], OR 2.40; 1.2–4.6; $p = 0.01$) and maximum AKI stage II–III (OR 6.65 [3.5–12.6], $p < 0.001$). Non-recovery was associated with higher adjusted hazard of death (hazard ratio 1.77 [1.08–2.93], $p = 0.02$) compared to early recovery (1.44 [0.93–2.19], $p = 0.09$) and no AKI (reference category).

CONCLUSIONS. Early recovery from AKI after LTx is associated with fewer complications and improved survival. Among survivors, non-recovery portends an increased risk for long-term chronic kidney disease.

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0010

LONG-TERM OUTCOME AND QUALITY OF LIFE IN ICU PATIENTS WITH ACUTE KIDNEY INJURY TREATED WITH RENAL REPLACEMENT THERAPY: A CASE CONTROL STUDY

W. De Corte^{1,2}, S. Oeyen², L. Annemans³, D. Benoit², A. Dhondt⁴, R. Vanholder⁴, J. Decruyenaere², E. Hoste²

¹AZ Groeninge Hospital, Department of Anesthesia and Intensive Care, Kortrijk, Belgium, ²Ghent University Hospital, Ghent University, Department of Intensive Care Medicine, Ghent, Belgium, ³Ghent University, I-CHEM Faculty of Medicine and Health Sciences, Ghent, Belgium, ⁴Ghent University Hospital, Ghent University, Department of Nephrology, Ghent, Belgium

INTRODUCTION. Acute kidney injury treated with renal replacement therapy (AKI-RRT) is a common complication in ICU patients and is associated with adverse outcomes.

OBJECTIVES. To compare long-term outcome and quality of life (QOL) in AKI-RRT patients with matched non-AKI patients.

METHODS. During a 1 year period all consecutive admitted adult patients to the surgical, medical or burns ICU in a tertiary care university hospital were included in a prospective observational cohort study. ICU patients who developed AKI treated with RRT and were alive at time of this study (5 years later) were defined as cases and matched with control patients without AKI in a 1:1 or 1:2 ratio on gender, age (± 5 years), APACHE II score (± 5) and admission category. Demographics, comorbidity, severity of illness, organ dysfunction and outcomes were analyzed. QOL was assessed by the EuroQoL-6D survey and the Medical Outcomes Study 36-item Short Form Health Survey by face-to-face interview, written questionnaires or telephone survey before ICU admission, and at 3 months, 1 and 5 years after ICU discharge.

RESULTS. 1953 patients were included. 121 AKI patients (6.2%) received RRT. Hospital survival was 44.6% ($N = 54$). Hospital survivors had a 5 year survival rate of 64.8% ($N = 35$). Of 35 long-term survivors 3 refused further cooperation, 3 were lost-to-follow-up, and 1 had no control. Finally, 28 cases were included and matched with 43 controls. Both had similar gender (57.1% males vs 60.5%, $P = 0.78$), age (54 yrs [IQR 45–66] vs 52 yrs [IQR 43–68], $P = 0.86$), APACHE II score (23 [IQR 20–28] vs 22 [IQR 18–25], $P = 0.19$) and admission category (medical 64.3 vs 60.5%, scheduled surgery 0 vs 16.3%, emergency surgery 25.0 vs 14.0%, burns 3.6 vs 2.3%, trauma 7.1 vs 7.3%, $P = 0.21$). During ICU stay, cases had higher SOFA score (6.6 [IQR 4.7–9.7] vs 4.2 [IQR 3.0–5.6], $P < 0.001$), a higher proportion was mechanically ventilated (85.7 vs. 39.5%, $P < 0.001$) for a longer time (18 days [IQR 4–31] vs. 0 days [IQR 0–4], $P < 0.001$), and more were treated with vasopressors (75.0 vs 30.2%, $P < 0.001$) for a longer period (3 days [IQR 0–10] vs 0 days [IQR 0–2], $P < 0.001$) compared to controls. Cases had longer ICU and hospital length of stay compared to control patients (24 days [IQR 13–49] vs 4 days [IQR 2–8], $P < 0.001$) and 62 days [IQR 20–130] vs 17 days [IQR 9–31], $P < 0.001$). QOL at baseline, after 3 months, 1 and 5 years was similar between groups. QOL was lower than in the general population. QOL decreased at 3 months, improved after 1 and 5 years but

remained under baseline level. After 5 years, 71% cases vs 81% controls ($P = 0.38$) were willing to undergo ICU admission again if needed.

CONCLUSIONS. After 5 years, 2/3 of AKI-RRT hospital survivors were still alive. AKI-RRT patients were more severely ill during ICU stay compared with matched non-AKI patients. This had no impact on long-term QOL which was similar for both groups.

Mechanical ventilation: 0011–0015

0011

RESPIRATORY MUSCLE RECRUITMENT DURING MECHANICAL VENTILATION: EFFECTS OF VENTILATOR SETTINGS

L.H. Roesthuis¹, J. Doorduyn¹, J.G. van der Hoeven¹, L.M.A. Heunks¹

¹Radboud University Medical Center, Intensive Care Medicine, Nijmegen, Netherlands

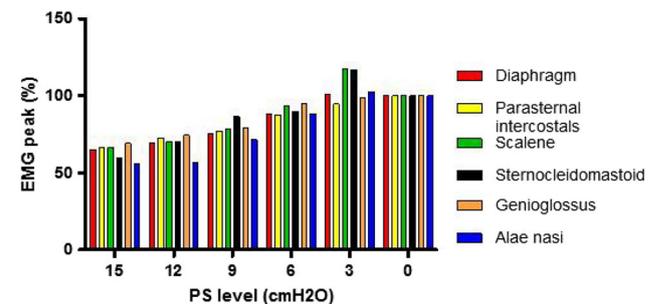
INTRODUCTION. Mechanical ventilation aims to unload the respiratory muscles during acute respiratory failure. Nevertheless, some patients still recruit accessory respiratory muscles during mechanical ventilation, which could be regarded as a sign of inadequate unloading. Monitoring accessory respiratory muscle activity might be helpful to optimize ventilator support.

OBJECTIVES. To evaluate the effect of ventilator settings during pressure support ventilation on accessory respiratory muscle recruitment in patients with acute respiratory failure.

METHODS. In seventeen mechanically ventilated patients, muscle electrical activity from the parasternal intercostals, scalene, sternocleidomastoid, genioglossus and alae nasi was measured using surface electromyography. Diaphragm electromyography was measured using esophageal electrodes. The pressure support level was reduced every 5 min with 3 cmH₂O, starting from 15 cmH₂O to CPAP. Muscle activity was expressed as the peak value of the electromyogram during inspiration. In addition, recruitment order and onset times of activity of the accessory respiratory muscles with respect to the diaphragm were determined.

RESULTS. Accessory respiratory muscle activity was significantly different for most muscles between combinations of high (15, 12 and 9 cmH₂O) versus low (6, 3 and 0 cmH₂O) support levels. Reducing pressure support level from 15 to 0 cmH₂O resulted in an increase in diaphragm activity of 47 \pm 26%, parasternal intercostal 39 \pm 22%, scalene 69 \pm 46%, sternocleidomastoid 81 \pm 81%, genioglossus 37 \pm 16% and alae nasi 59 \pm 21%; $p < 0.05$ (figure 1). The alae nasi recruited significantly earlier than the diaphragm (0.12 \pm 0.03 ms; $p < 0.05$). The same was observed for the peak and termination of muscle activity. The diaphragm recruited directly after the upper airway muscles, however the peak and termination of muscle activity occurred later than all the other muscles.

CONCLUSIONS. Accessory respiratory muscles are remarkable active during mechanical ventilation and their activity increases when patients receive less ventilator support. Although the upper airways are bypassed during invasive mechanical ventilation, the upper airway muscles recruit earlier than other respiratory muscles. Assessing accessory respiratory muscle recruitment by surface electromyography has the potential to be a novel and non-invasive tool to monitor inspiratory drive and thereby optimize ventilator support.



[Figure 1]

Accessory respiratory muscle activity increases when lower support levels are applied. The peak electromyography (EMG) values are normalized to activity at 0 cmH₂O pressure support.

0012

PREVENTING LOWER AIRWAY COLONIZATION USING ENDOTRACHEAL TUBES WITH A POLYURETHANE AND/OR CONICAL CUFF IN MECHANICALLY VENTILATED PATIENTS: THE MULTICENTER RANDOMIZED TOP-CUFF STUDY

F. Philippart¹, S. Gaudry², L. Quinquis³, N. Lau⁴, I. Ouane⁵, S. Touati⁴, X. Forceville⁴, F. Abroug³, S. Grabar³, J.D. Ricard², B. Misset¹, TOP-cuff Study Group

¹Hopital Saint Joseph, Paris, France, ²Hopital Louis Mourier, Colombes, France, ³Hopital Cochin, Paris, France, ⁴Hopital Général, Meaux, France, ⁵Hopital Universitaire, Monastir, Tunisia

INTRODUCTION. The occurrence of VAP is linked to pharyngeal colonization and aspiration of secretions around the tracheal tube. Pilot studies have documented that a conic shape (rather than cylindrical) and polyurethane (PU) material (rather than polyvinyl chloride (PVC)) reduce leakage across the cuff. Our aim was to test whether PU and/or conically shaped cuffs were able to reduce bacterial colonization of the trachea and VAP in patients with acute respiratory failure under mechanical ventilation (MV) for more than 2 days.

METHODS. Prospective randomized study in 4 parallel groups of clusters (to facilitate inclusion in emergency). Stratification per center. 64 clusters of 9 or 10 successive patients (pts). Inclusion criteria: 1. intubation with one of the 4 tested devices (order pre-determined by randomization), 7.5 or 8.0 mm diameter, for an estimated duration >48 h, 2. no intubation in the prior week. Groups (cuffs): (A, reference) cylinder PVC (Hi-Lo™), (B) cylinder PU (Microcuff™), (C) conical PVC (Taperguard™), (D) conical PU (Sealguard™) manufactured by Covidien (*) and Kimberley-Clark (**).

Principal end-point: tracheal colonization $>10^3$ cfu/ml on day 2.

Secondary end-points: VAP and post-extubation stridor. The prevention of VAP was done similarly in all 4 centers. No sub-glottic aspiration of the secretions. Intermittent monitoring of the cuff pressure. Expecting a tracheal colonization $>10^3$ cfu/ml in 30 % of the pts in the reference group, the number of pts to include to demonstrate a 50 % reduction in colonization in one of the other groups was 600. Intention to treat (ITT) analysis. Univariate and multivariate analyses to document risk factors for colonization.

RESULTS. 621 pts included, 17 secondary excluded (10 refused participation and 7 had a non-inclusion criterion. 604 pts analysed in ITT, 13 having received a different cuff than allocated. Data at inclusion (median [IQR]): age = 64.8 [52.7–77.1], male sex = 59.9 %, SAPS II = 43.0 [33.0–58.0]. Similar compliance to the prevention techniques against VAP in the 4 groups. Tracheal colonization ($>10^3$) at day 2 : A = 0.66 [0.58–0.74], B = 0.61 [0.53–0.70], C = 0.67 [0.60–0.76], D = 0.62 [0.55–0.70], (Logrank, $p = 0.55$). No difference with other colonization thresholds (10^4 , 10^5 , 10^6). No antibiotic use at inclusion was the only independent risk factor for colonization. 77 pts (12.7 %) had VAP and 30 (5.0 %) post-extubation stridor ($p = 0.20$ and 0.50 between groups respectively). Colonizing bacteria : *S. viridans* = 67 (11.1 %); *S. pneumoniae* = 9 (1.5 %); *Haemophilus* = 16 (2.6 %); *Neisseria* = 20 (3.3 %); *Staphylococci* = 86 (14.2 %); *Enterobacteriaceae* = 59 (9.8 %); *Pseudomonas* = 21 (3.5 %).

CONCLUSION. We could not demonstrate that PU or conically shaped cuffs were superior to conventional PVC and cylinder cuffs to prevent tracheal colonization and VAP in critically ill patients.

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0013

A NEW CLASSIFICATION FOR PATIENTS WEANING FROM MECHANICAL VENTILATION

G. Beduneau^{1,2}, T. Pham³, F. Schortgen⁴, J.M. Chretien⁵, J.C.M. Richard⁶, A. Mercat⁷, J. Mancebo⁸, L. Brochard⁹, on behalf of the WIND Study Group and the REVA Network

¹Rouen University Hospital, Medical Intensive Care, Rouen, France, ²UPRESS EA 3830, Rouen, France, ³Medical and Surgical Intensive Care, Hôpital Tenon, APHP, UMR 1153, Inserm, Sorbonne Paris Cité, ECSTRA Team, Université Paris Diderot, Paris, France, ⁴Medical ICU, CHU Henri Mondor, APHP Paris, Créteil, France, ⁵Clinical Research Institute Angers University Hospital, Angers, France, ⁶University Hospital of Geneva, Intensive Care Unit, Geneva, Switzerland, ⁷Medical Intensive Care, University Hospital Angers, Angers, France, ⁸Hospital de Sant Pau, Barcelona, Spain, ⁹Saint Michael's Hospital and Keenan Research Centre, Interdepartmental Division of Critical Care, University of Toronto, Toronto, Canada

INTRODUCTION. The previously proposed classification for weaning from mechanical ventilation (MV) in three groups (simple, prolonged and difficult weaning) is based on number, timing and results of spontaneous breathing trials (SBTs), and extubation outcomes. The "Weaning according to New Definition (WIND) study" prospectively collected epidemiologic data concerning MV and weaning, according to the classification into three groups. We hypothesized that many MV patients could not be classified according to this definition for a variety of reasons. We also wanted to better define the prolonged MV group by differentiating patients who will finally succeed from those who will never be weaned. We report here the results concerning the feasibility of applying the weaning classification and the results of a new modified approach.

METHODS. A prospective observational survey was run in 36 intensive care units in France, Spain and Switzerland over a 3 months period. All patients requiring intubation and MV were enrolled and followed until ICU discharge. Modality of MV, results of SBTs, extubations and outcome were collected daily allowing their classification according to the three previously described weaning groups.

RESULTS. 2729 patients were enrolled, among which 1342 (49 %) could not be classified using the previous classification for numerous reasons: no SBT performed before extubation, self extubation, noninvasive ventilation episodes or tracheostomy. We thus proposed a modified classification, and could analyse 2627 patients (102 were excluded from this analysis for intercurrent events). Results of the new definition are presented in table 1.

CONCLUSIONS. While the current classification did not permit to classify almost 50 % of the cohort, the modified weaning classification proposed in the present survey allows describing current ventilation and real weaning practices. Among 73 % of MV patients starting weaning, 65 % of them fall in the simple weaning category, with 19 % of them extubated without a SBT. The other 35 % have either difficult (less than a week or up to three weaning attempts, 48 %) or prolonged weaning (52 %). Two thirds of patients entering the "prolonged" category will never be weaned.

*GB and TP are considered both as first authors.

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Total N = 2627	G0 No weaning n = 704	G1 Simple weaning n = 1255	G2 Difficult weaning n = 319	G3 Prolonged weaning n = 349	
New definition	No SBT and no extubation (n = 635) [including need for tracheostomy for other reason than weaning (n = 69)]	Successful extubation <1 day after 1st SBT (n = 1016) or without SBT (n = 239)	Successful extubation 2–7 days after 1st SBT, or up to three weaning attempts, including extubation failure, and successful extubation within 7 days	G3a weaning success (successful extubation >7 days after 1st SBT or 1st extubation or after >3 SBT and extubation failure) n = 124	G3b Never weaned (extubation success never obtained) n = 225
Age, years (mean ± SD)	63 ± 16	59 ± 17	63 ± 15	66 ± 13	66 ± 14
SAPS II score (mean ± SD)	66 ± 23	44 ± 17	49 ± 17	54 ± 18	56 ± 19
MV days median [IQR]	3 [2–8]	2 [1–5]	7 [5–11]	14 [10–19]	11 [5–19]
ICU LOS days median [IQR]	2 [1–8]	4 [2–8]	9 [6–18]	27 [19–40]	14 [6–30]
ICU deaths, n(%)	561 (80 %)	4 (<1 %)	1 (<1 %)	7 (6 %)	179 (79 %)

[Table 1]

0014

COMPARISON OF FIVE SUPRAGLOTTIC AIRWAY DEVICES FOR SIMULATED EMERGENCY AIRWAY MANAGEMENT IN THE FIELD PERFORMED BY NOVICE OPERATORS

T. Henlín¹, M. Soták¹, T. Tyl¹, P. Michálek²

¹University Military Hospital Prague, Dep. of Anesthesiology and Intensive Care Medicine 1st Faculty of Medicine Charles University, Prague, Czech Republic, ²General University Hospital in Prague, Dep. of Anesthesiology and Intensive Care 1st Faculty of Medicine Charles University, Prague, Czech Republic

INTRODUCTION. Tracheal intubation remains a "gold standard" for airway management in the pre-hospital care. However, learning how to intubate trachea with a high success rate requires both supervised training and practising this skill. This is almost impossible in the pre-hospital and field care due to a relatively small number of patients requiring advanced airway management. Because failed intubation in prehospital care is associated with increased mortality, supraglottic airway devices (SADs) play important role in airway management. A number of studies have confirmed the high success rates of insertion and ventilation via supraglottic airways, but many of them were performed on manikins.

OBJECTIVES. Our goal was to determine what is the best SAD for combat life savers (CLS). We compared 5 SADs: LMA ProSeal, LMA Supreme, i-gel, Laryngeal tubus suction (LTS) II and Streamlined Liner of Pharyngeal Airway (SLIPA).

METHODS. Prospective randomized trial on 500 adult patients divided into 5 groups, each SAD was inserted in 100 patients. SADs were inserted after induction to general anesthesia by novices i.e. people who have inserted a particular SAD five times or less. The insertion time, number of attempts, ease of insertion, leaking around the device and fiberoptic assessment were recorded.

RESULTS. Table 1 provides a summary of main parameters evaluated for each device. LMA Supreme and i-gel scored high while SLIPA scored low.

Device	Introduction time—mean (s)	Leak test—mean (cmH2O)	1st attempt insertion (%)	Easy insertion (%)	The best fiber optic position (%)
LMA ProSeal	109.60 (±61)	29.17 (±6.8)	85.9	34.3	64.5
LMA Supreme	70.38 (±32)	24.84 (±6.1)	96	61.4	54.1
i-gel airway	74.41 (±41)	25.29 (±6.8)	87.9	37.4	72.2
SLIPA airway	98.48 (±59)	23.69 (±6.0)	69.4	7.1	58.5
Laryngeal tubus II	107.32 (±67)	29.48 (±8.8)	80.6	16.3	41.1

[Table 1]

CONCLUSIONS. According to the results of this study LMA Supreme and i-gel airway were the most suitable devices for the CLS. These two devices differed only in the ease of insertion assessed by the operators. Ease of insertion was evaluated on a 1–5 scale where 1 was very easy and 5 was very difficult. Insertion of the LMA Supreme was evaluated as very easy in 61.4 %, while i-gel airway insertion was deemed very easy only in 37.4 %.

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0015

PROPHYLACTIC NON-INVASIVE VENTILATION AFTER EXTUBATION IN ICU PATIENTS AT HIGH RISK FOR REINTUBATION: IMPACT ON OUTCOME

A.W. Thille^{1,2,3}, F. Boissier³, H. Ben Ghezala³, K. Razazi³, A. Mekontso-Dessap³, C. Brun-Buisson³

¹CHU Poitiers, Medical ICU, Poitiers, France, ²INSERM CIC-P 1402, Poitiers, France, ³CHU Henri Mondor, Medical ICU, Créteil, France

INTRODUCTION. The need for reintubation after planned extubation in ICU is associated with a high mortality. Whereas non-invasive ventilation (NIV) seems ineffective in non-selected patients without risk factors of extubation failure, studies suggest that prophylactic NIV may prevent post-extubation acute respiratory failure and improve outcome in hypercapnic patients. However, these studies were mainly performed in pulmonary units whereas the proportion of hypercapnic patients at time of extubation is relatively low in general ICUs (around 15 %).

OBJECTIVES. To assess the impact of prophylactic NIV on outcome in a large population of patients considered at high risk for reintubation.

METHODS. We compared 2 periods including 2 prospective cohort studies on weaning performed in a medical ICU of a teaching hospital in France [1, 2]. The main objective of the first cohort was to identify patients at high risk for reintubation and prophylactic NIV was never applied [1]. According to this study, patients at high risk for reintubation were those with an age above 65 years and those with any underlying chronic cardiac or respiratory disease [1]. In the second cohort, prophylactic NIV was systematically applied after planned extubation in all patients considered at high risk for extubation failure according to our previous study. NIV was delivered immediately after extubation for at least 8 h during the first 24 h following extubation. Extubation failure was defined by the need for reintubation within the 7 days following planned extubation.

RESULTS. After exclusion of patients ventilated less than 24 h and those extubated with a do-not-reintubate order, 132 patients were included from the first cohort (12-month period) and 225 patients from the second one (18-month period). The proportion of patients considered at high risk for reintubation was similar in the 2 cohorts: 63 % (83/132) versus 67 % (150/225), $p = 0.49$. Among patients at high risk, the rate of reintubation was lower in the second cohort receiving systematic prophylactic NIV as compared to the first cohort without prophylactic NIV: 11 % (16/150) vs. 22 % (18/83) at 48 h ($p = 0.032$), and 15 % (23/150) vs. 28 % (23/83) within the 7 days following extubation ($p = 0.026$).

CONCLUSIONS. Prophylactic NIV applied immediately after extubation reduced the reintubation rate in a large population of patients at high risk for extubation failure including those with an age ≥ 65 years and those with any underlying chronic cardiac or respiratory disease.

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Outcome of cardiac arrest: 0016–0019

0016

CARDIAC ARREST IN FINNISH INTENSIVE CARE UNITS: CHANGES IN INCIDENCE AND OUTCOME FROM 2003 TO 2013

I. Efundijev¹, R. Raj², M. Reinikainen³, S. Hoppu⁴, M. Skrifvars¹

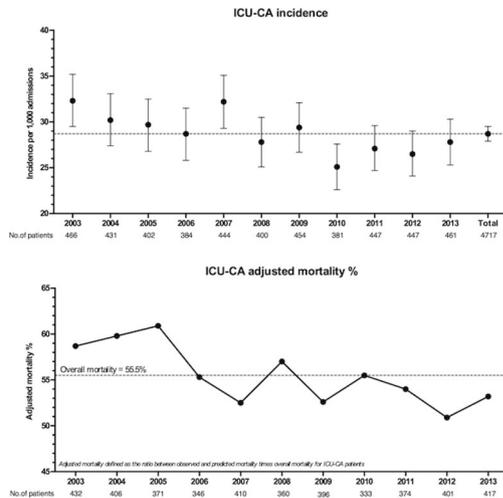
¹Helsinki University Central Hospital, Division of Anaesthesia and Intensive Care, Helsinki, Finland, ²Helsinki University Central Hospital, Department of Neurosurgery, Helsinki, Finland, ³North Karelia Central Hospital, Department of Intensive Care, Joensuu, Finland, ⁴Tampere University Hospital, Department of Intensive Care Medicine and Critical Care Medicine Research Group, Tampere, Finland

INTRODUCTION. Numerous high quality studies have been conducted on out-of-hospital and in-hospital cardiac arrest during the past decade but data on intensive care unit cardiac arrest (ICU-CA) including changes over time are scarce.

OBJECTIVES. To determine incidence, hospital mortality and changes over time of cardiac arrest in the Finnish intensive care unit (ICU) population.

METHODS. We performed a retrospective multi-centre study, based on a large national ICU database. We included adult patients (age ≥18) admitted to Finnish ICUs between Jan 2003 and Dec 2013. Patients with admission diagnosis of cardiac arrest according to the APACHE III (Acute Physiology and Chronic Health Evaluation III), missing baseline and/or outcome data were excluded. Re-admissions were excluded from the mortality analysis. ICU-CA was defined by the TISS-76 (Therapeutic Intervention Scoring System) documentation as requirement of cardiopulmonary resuscitation (cardiopulmonary resuscitation (CPR) or defibrillation) during the ICU stay. Patients with more than one episode of cardiac arrest during same ICU stay were considered as one ICU-CA event. The incidence of ICU-CA was calculated as the ratio of ICU-CA events to the total number of ICU admissions. To calculate the adjusted mortality percentages, we standardized for severity of illness, by using a logistic regression model based on: pre-admission functional status, SAPS II (Simplified Acute Physiology Score II) without hemodynamic parameters, SOFA (Sequential Organ Failure Assessment) score without cardiovascular scores, chronic comorbidities (defined by the APACHE II), age, admission type (emergency vs. non-emergency), admission class (operative vs. non-operative) and admission diagnosis (cardiovascular vs. non-cardiovascular). Thus, the annual mortality percentages illustrate trends in severity of illness-adjusted outcome from 2003 to 2013.

RESULTS. Of 164,255 identified patients fulfilling the inclusion criteria 4,717 (2.9 %) experienced cardiac arrest while in the ICU. Overall incidence of ICU-CA was 28.7/1,000 ICU-admissions with the highest incidence of 118.3/1,000 for non-operative cardiovascular patients. After excluding re-admissions, a total of 4,246 ICU-CA patients (90 %) were eligible for the mortality analysis: overall mortality was 55.5 %. When comparing patients admitted in 2003–2007 vs. 2008–2013, there was a significant reduction in the incidence (absolute reduction 0.4 %, relative reduction 13 %, $p < 0.001$), as well as a significant change in the adjusted mortality ($p < 0.05$) (Fig. 1).



[Figure 1. ICU-CA incidence and adjusted mortality]

CONCLUSIONS. The incidence of ICU-CA appears to be higher than in previous studies and is highest in patients admitted with a cardiovascular admission diagnosis. We have noted a significant reduction in the incidence, along with a significant reduction in the adjusted mortality of ICU-CA during the observed time period.

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0017

DIFFUSION TENSOR IMAGING TO PREDICT LONG-TERM NEUROLOGICAL OUTCOME AFTER CARDIAC ARREST. A MULTICENTRIC PROSPECTIVE STUDY

N. Adam¹, L. Velly², V. Perlbarg³, D. Galanaud⁴, C.E. Luyt⁵, R. Chabanne⁶, B. Veber⁷, O. Verdouck⁸, G. Citerio⁹, S. Laureys¹⁰, L. Puybasset¹

¹Pitié-Salpêtrière Hospital, University Paris 6, Neurointensive Care Unit, Paris, France, ²CHU Timone, Department of Anesthesiology and Critical Care, Marseille, France, ³Université Pierre et Marie Curie, Laboratoire d'Imagerie Fonctionnelle, Paris, France, ⁴Pitié-Salpêtrière Hospital, University Paris 6, Radiology, Paris, France, ⁵Pitié-Salpêtrière Hospital, University Paris 6, Medical Intensive Care Unit, Paris, France, ⁶CHU Gabriel Montpied, Neurointensive Care Unit, Clermont-Ferrand, France, ⁷CHU Charles Nicolle, Intensive Care Unit, Rouen, France, ⁸CHU Pellegrin, Intensive Care Unit, Bordeaux, France, ⁹San Gerardo Hospital, Neurointensive Care Unit, Monza, Italy, ¹⁰Sart-Tilman Teaching Hospital, Centre d'Étude du Coma et des Troubles de la Conscience, Liège, Belgium

INTRODUCTION. Prognostication of neurological outcome after cardiac arrest (CA) is a major issue in intensive care unit. Clinical examination, biological markers, neurophysiologic exams failed to predict accurately long term outcome for CA treated with therapeutic hypothermia (1). Fractional anisotropy (FA) measured by diffusion tensor imaging (DTI) could assess white matter injury from anoxic origin (2, 3).

OBJECTIVE. To predict one year neurological outcome after CA using whole white matter FA value.

METHODS. Prospective multicentric study conducted from 2008 to 2012 in 10 ICU from France, Italy and Belgium. Patients aged from 18 to 75 years were eligible if they had remained unconscious 7 days after CA. Magnetic resonance imaging with DTI sequence was performed within the first month after CA and white matter FA value was measured in both patients and healthy volunteers. Normalized FA values of patients with favorable outcome (CPC 1–2) were compared to those of patients with unfavorable outcome (CPC 3–5). Receiving operative curve (ROC) was used to predict neurological outcome. Area under curve (AUC) of white matter FA was compared to grey matter apparent diffusion coefficient (ADC), serum S-100β protein value, Synek score obtained with electroencephalogram and Glasgow coma scale.

RESULTS. From the 510 CA admitted in the centers, 119 patients were included in the analysis, 88 (74 %) with unfavorable outcome and 31 (26 %) with favorable outcome. AUC to predict unfavorable outcome were respectively 0.94 (95 %CI: 0.88–0.98) for whole white matter FA; 0.65 (IC95 %: 0.56–0.74) for grey matter ADC; 0.80 (IC95 %: 0.70–0.87) for Synek score; 0.51 (IC95 %: 0.41–0.61) for GCS and 0.52 (IC95 %: 0.37–0.66) for S-100β protein. AUC of whole white matter FA was significantly higher than the AUC of others exams ($p < 0.0001$). Whole white matter FA value <86.3 % of controls was able to predict outcome with 77 % sensitivity (IC95 %: 67–86 %) and 100 % specificity (IC95 %: 89–100 %).

CONCLUSIONS. Whole white matter FA value measured by DTI can predict accurately one-year neurological outcome after CA.

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0018

IS EARLY PCI ASSOCIATED WITH IMPROVED SHORT AND LONG-TERM OUTCOME AFTER OUT-OF-HOSPITAL CARDIAC ARREST?

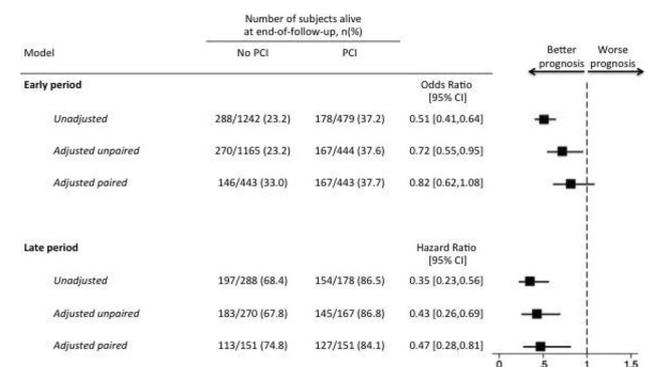
G. Geri^{1,2,3}, F. Dumas^{1,2,3}, W. Bougouin^{1,2,3}, O. Varenne^{1,2}, F. Daviaud^{1,2}, T. Morichau-Beauchant¹, F. Pène^{1,2}, L. Lamhaut^{2,4}, J.-D. Chiche^{1,2}, J.-P. Mira^{1,2}, J.-P. Empana³, A. Cariou^{1,2,3}

¹Cochin Hospital, Paris, France, ²Paris Descartes University, Paris, France, ³INSERM U970 Paris Cardiovascular Research Center, Paris, France, ⁴SAMU 75, Paris, France

BACKGROUND. The use of immediate percutaneous coronary intervention (PCI) after out-of-hospital cardiac arrest (OHCA) patients is still debated. A that time, benefit was assessed regarding early mortality but impact on long-term outcome is unknown. The aim of this study was to evaluate the early and late impact of PCI in OHCA patients admitted after successful resuscitation.

PATIENTS AND METHODS. Analysis of prospectively collected data from the Cochin registry in Paris, France. Baseline characteristics were compared between patients with or without PCI (PCI+/PCI-) performed at hospital admission. Factors associated with day-30 and year-10 survival were picked up by logistic regression and Cox multivariate analysis, respectively. Conditional logistic regression and stratified Cox analysis were performed to evaluate the impact of PCI on day-30 and year-10 survival on matched patients by propensity score.

RESULTS. 1,723 patients (71.5 % male, median age 59.9 [49.6, 72.2] years) were included in the analysis and followed for a median duration of 2 years. OHCA was located in a public place in 32.2 % of cases, witnessed in 86.7 % of cases and consecutive to an initial shockable rhythm (VF/VT) in 941 (54.6 %) patients. Therapeutic hypothermia (TH) and immediate PCI were performed in 71 and 27.8 % of cases, respectively. PCI was more frequently performed in men, public located OHCA and VF/VT. Day-30, year-2 and year-10 survival rates were 43, 40.1 and 38 % in patients PCI+ and 27.5, 23.4 and 20.2 % in patients PCI-, respectively. PCI was associated with day-30 survival and year-10 survival (OR 0.72, 95 % CI 0.55, 0.95; $p = 0.02$ and HR 0.43, 95 % CI 0.26, 0.69; $p < 0.01$, respectively). In the propensity score matched cohort, the adjusted HR for year-10 survival were also favorable for PCI (HR 0.52 [0.31, 0.87]).



[Figure]

CONCLUSION. PCI is associated with improved early and late outcome in OHCA patients. These data should encourage physicians to consider immediate coronary reperfusion in such patients.

0019

PREDICTION OF GOOD AND POOR OUTCOME IN COMATOSE PATIENTS AFTER CARDIAC ARREST: THE UTILITY OF EARLY EEG/SEP RECORDINGS DURING THERAPEUTIC HYPOTHERMIA

R. Carrai^{1,2}, A. Grippo^{1,2}, M. Spalletti¹, A. Comanducci¹, C. Cossu¹, S. Gabbanini¹, A. Peris³, S. Valente³, G. Gensini^{3,5}, A. Amantini^{1,2}

¹Careggi Teaching Hospital, Neuroscience Department, Florence, Italy, ²Don Gnocchi Foundation, IRCCS, ONLUS, Neurological Rehabilitation, Florence, Italy, ³Careggi Teaching Hospital, ICU Emergency Department, Florence, Italy, ⁴Careggi Teaching Hospital, Heart-Vessels Department, Florence, Italy, ⁵Don Gnocchi Foundation, IRCCS, ONLUS, Florence, Italy

INTRODUCTION. Somatosensory evoked potentials (SEPs) are reliable predictor of poor outcome in comatose patients after cardiac arrest (CA) treated with therapeutic hypothermia (TH) (Bouwens et al., 2012; Grippo et al., 2013). Recently the role of EEG in determining the prognosis has been reassessed. A continuous EEG pattern within 12 after CA, reliably predicts awakening (Cloosterman et al., 2012; Crepeau et al., 2013).

OBJECTIVES. To evaluate the prognostic value of EEG and SEPs in post-anoxic comatose patients at 12, 24 and 72 h from cardiac arrest (CA).

METHODS. Comatose patients after CA treated with TH were included. EEG and SEPs were recorded within 12, 24 and 72 h after CA. EEG was classified into "non-continuous" (low voltage, isoelectric, burst-suppression) and "continuous" (other patterns except epileptiform). SEPs were dichotomized into "bilaterally absent" (BA) and "present". Neurologic outcome was evaluated at 6 months by GOS: "awakening" (GOS 3–5) was considered good outcome.

RESULTS. EEG and SEPs were recorded in 147 patients, 33 of whom within 12 h. "Continuous" EEG pattern at 12 h always predicted good outcome, "non-continuous" pattern at 72 h always predicted poor outcome. BA SEPs always predicted poor outcome. Early "continuous" EEG pattern was always associated with present SEPs.

CONCLUSIONS. SEPs provide a specific and time-independent predictor of poor outcome (bilateral absence). EEG provide a specific and time-dependent predictor of good outcome ("continuous" pattern at <12 h) and poor outcome ("non-continuous" pattern at 48–72 h). Early "continuous" EEG and BA SEPs are never associated together. Combined EEG/SEPs recordings are a useful tool for reliable prognostication both of good and poor outcome in comatose patients treated with TH.

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ICU admission patterns: 0021–0025

0021

INCIDENCE, DISPOSITION AND OUTCOME OF DETERIORATING WARD PATIENTS REFERRED TO CRITICAL CARE IN 49 UK HOSPITALS—RESULTS FROM (SPOT)LIGHT: A MULTI-SITE, PROSPECTIVE, OBSERVATIONAL COHORT STUDY

S.K. Harris¹, C. Sanderson¹, M. Singer², K. Rowan³

¹London School of Hygiene and Tropical Medicine, Health Services Research and Policy, London, United Kingdom, ²University College London, Bloomsbury Institute of Intensive Care Medicine, London, United Kingdom, ³Intensive Care National Audit & Research Centre, London, United Kingdom

INTRODUCTION. The UK is ranked 24 out of 28 European countries with respect to per capita provision of Intensive Care Unit (ICU) beds [1]. This places strain on the capacity to admit from the ward to ICU in the National Health Service (NHS), and may potentially compromise patient outcomes.

OBJECTIVES. To measure the incidence, disposition, and outcome of the deteriorating ward patient referred to ICU in UK hospitals.

METHODS. Hospitals prospectively reported consecutive, adult, ward referrals to ICU (excluding repeat visits, cardiac arrests and planned admissions). Physiology, organ support, and decision-making at the first bedside assessment by the ICU or Outreach team was recorded. Each report was linked to the Intensive Care National Audit & Research Centre Case Mix Programme Database (ICNARC CMPD) to define fact and timing of ICU admission; and to national death registrations for 1 year survival.

We used the proportion of eligible CMP records linked to reported referrals to quality control the study. Individual months with <80 % linkage were excluded. Incidence models were stratified by the NHS National Early Warning Score (NEWS) risk class [2], and used generalised estimating equations (poisson link) with hospitals as clusters, and a first-order autoregressive structure for time dependence. Cox proportional hazards with a shared hospital frailty were used for survival.

RESULTS. Forty-nine hospitals reported 21,137 visits over 446 study-months. 2,447 visits (11.6 %) were repeats and excluded. 67 study months did not meet the quality control threshold excluding another 2,481 (11.8 %) visits. 16,209 patients were recruited to the study, and 15,867 (97.9 %) completed follow-up. Data linkage was 93.5 % complete. 15,447 (97.4 %) of patients were ward-referrals without pre-existing organ support. Mean acute physiology scores on the NEWS and SOFA scales were 5.6 (95 % CI 5.3–5.9) and 2.8 (95 % CI 2.6–3.0) respectively. Nearly half of patients (7,117 patients, 44.9 %) met criteria for the highest NEWS risk class. A typical hospital (90,000 annual overnight admissions) assessed 21 such patients per month (95 % CI 17–25). 5,391 (34.0 %) patients were admitted to ICU. There were 704 (4.5 %), 2,787 (17.9 %), 4,561 (29.3 %), and 6,989 (44.8 %) deaths at the end of the first day, week, month, and year respectively. During the first week, the majority (1767, 63.4 %) of deaths occurred without admission to ICU of whom 934 (52.8 %) had no treatment limitation order. 472 (23.1 %) patients with treatment limitation orders survived 1 year without ICU admission in that week.

CONCLUSIONS. Mortality is high among deteriorating ward patients, and a significant proportion die without ICU treatment despite there being no treatment limitation order.

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0022

EMERGENCY DEPARTMENT LENGTH OF STAY FOR CRITICAL CARE ADMISSIONS: A CANADIAN POPULATION-BASED STUDY

L. Rose¹, C. Atzema², D. Scales², K. Burns³, S. Gray³, A. Kiss⁴, G. Rubenfeld², J. Lee²

¹University of Toronto, Toronto, Canada, ²Sunnybrook Health Sciences Centre, Toronto, Canada, ³St Michael's Hospital, University of Toronto, Toronto, Canada, ⁴Institute for Evaluative Sciences, Toronto, Canada

INTRODUCTION. Canadian emergency departments (EDs) are experiencing increased visits, higher occupancy, and crowding. Protracted care of the critically ill may further strain ED resources.

OBJECTIVES. We sought to describe the burden of the critically ill in the ED, demographics and outcomes of ventilated and non-ventilated adults admitted from the ED to an intensive care unit (ICU), and factors associated with ED length of stay (LOS) >6 h.

METHODS. We conducted a population based cohort study linking administrative databases and using previously validated codes in the province of Ontario, Canada. We identified all patients aged 16–105 who survived to be admitted to an ICU from the ED at 118 hospitals between April 2007 and March 2012. We used ICU admission codes in the Discharge Abstract Database then linked identified patients to the National Ambulatory Care Reporting System database capturing all ED visits in Ontario. To identify patients receiving mechanical ventilation we used the Ontario Health Insurance Plan (OHIP) database. We used a generalized estimating equations model with a logit link function to examine factors associated with EDLOS a binary outcome (≤6 vs >6).

RESULTS. In 5 years, we identified 261,274 adults comprising 314,836 admissions to an ICU from the ED, representing 4.1 % of all adults presenting to 118 EDs, or 1.5 % of all ED visits, with an incidence rate of 1,374 ICU admits per 100,000 ED visits. ICU readmission via the ED within 3 months of a previous ED-ICU admission occurred for 1,271 (0.5 %, 95 % CI 0.5–0.5) patients. Median (IQR) EDLOS was 7 (4–13) h. Only 41.4 % (95 % CI 41.2–41.5) had an EDLOS ≤6 h, as recommended by the Canadian Association of Emergency Physicians (CAEP); 33,123 (10.5 %, 95 % CI 10.4–10.6) had an ED stay of ≥24 h. Patient factors independently associated with ED LOS ≥6 h were older age, female gender, lower priority triage score, admission for sepsis, respiratory, gastrointestinal or other reasons, and higher Charlson score. Hospital factors were higher mean ED occupancy, ED presentation at night, ICU functioning above census, teaching hospital, and rural location. Of the 314,836 ICU admissions, 57,838 (18.4 %, 95 % CI 18.2–18.5) received mechanical ventilation in the ED. Compared to non-ventilated patients, ventilated patients were younger (63 vs 66 years, P < 0.001), more often triaged as needing a physician immediately (34 vs 7 %, P < 0.001), and more likely to receive care in large community or academic teaching hospitals (96 vs 81 %, P < 0.001). Median ICU LOS (4.0 and 2.5 days), hospital LOS (16.6 and 11.3 days); and 90-day mortality (31.9 % [95 % CI 31.5–32.3] and 10.8 % [95 % CI 10.7–11.0]) were higher for ventilated vs non-ventilated patients.

CONCLUSIONS. Over half of all critically ill patients had an EDLOS >6 h. Potentially modifiable factors such as ED and ICU strain may be targets for future research to decrease EDLOS.

GRANT ACKNOWLEDGMENT. CIHR.

0023

ASSESSMENT OF THE RISK OF READMISSION TO THE INTENSIVE CARE UNIT USING THE SAFE DISCHARGE FROM ICU (SD-ICU) SCORE

W.S. Montenegro¹, J.R. Azevedo¹, T.R. Coutinho¹, M.S. Rocha¹, T.P. Veiga¹

¹Hospital Sao Domingos, ICU, Sao Luis, Brazil

INTRODUCTION. Unplanned ICU readmissions result in increased mortality of up to 10 times compared to the mortality of non-readmitted patients. Using readmission risk factors identified in several studies some tools were developed in order to predict the risk of readmission. The SWIFT score was validated in the original study but German and Brazilian studies failed to validate the tool.

OBJECTIVES. We conducted a prospective observational cohort study to identify risk factors for ICU readmission and use these factors to the construction of a new prediction score for ICU readmission risk.

METHODS. All adult patients who were at risk for readmission and discharged from a 37 bed general ICU from February 2012 to January 2013 were included in the study. Risk factors for readmission used in this study were defined by multivariate logistic regression on a previous study conducted in our ICU: age ≥75 years, Charlson comorbidity Index (CCI) >1 and TISS 28 ≥2. Initially the ROC curve was used for the independent variables age, TISS -28, CCI, SOFA and Apache IV scores, ICU LOS and diagnostic category, to find the cutoff points to evaluate the variable readmission to the ICU. Then, univariate logistic regression was applied and variables that were significant (p < 0.05) submitted to multivariate logistic regression to define the weight of each independent variable. Subsequently, we calculated the score of each patient and built the ROC curve of this index to verify the ability of discrimination of this mathematical model. In all tests the significance level (alpha) used was 5 %.

RESULTS. During the study period 1103 patients were discharged from the ICU. Included in the analysis were 845 patients in whom it was identified at least one of the risk factors for readmission previously established and 106 patients (12.5 %) were readmitted to the ICU. In univariate logistic regression analysis, age, CCI, TISS 28, APACHE IV score, SOFA score on admission, ICU LOS and diagnostic category were significant. Then multivariate logistic regression identified four risk factors: CCI, TISS 28, ICU LOS and age. These statistical methods also were used to assign incremental, numerical weights to the gradation of the variables that make up the Safe Discharge ICU (SD-ICU) score (Table 1). The area under the ROC curve was 0.67 (95 % CI 0.62–0.72, p < 0.0001) for SD-ICU score. Utilizing the ROC curve coordinates we established the best cutoff point of 14.5 points with a sensitivity of 0.74 and 1—specificity of 0.47.

Variable	SD-ICU points	variable	SD-ICU points
	<65		<21
AGE (years)	65–74	TISS 28	21–24
	≥75		≥25
	<2		<16
CCI	2–4	ICU LOS (days)	16–20
	≥5		≥20

[SD-ICU score]

CONCLUSIONS. A risk score based on easily measured parameters at the bedside in the ICU is able to predict the risk of readmission with satisfactory accuracy.

0024

EXPANDING THE SCOPE OF CRITICAL CARE RAPID RESPONSE TEAMS: A FEASIBLE APPROACH TO IDENTIFY PREVENTABLE ADVERSE EVENTS THAT CAUSE HARM

A. Amaral¹, A. McDonald², N. Coburn³, W. Xiong¹, R. Fowler¹, M. Chapman¹, K. Shojania⁴, N.K.J. Adhikari¹

¹Sunnybrook Health Sciences Centre, Critical Care, Toronto, Canada, ²Sunnybrook Health Sciences Centre, Emergency Department, Toronto, Canada, ³Sunnybrook Health Sciences Centre, General Surgery, Toronto, Canada, ⁴Sunnybrook Health Sciences Centre, General Internal Medicine, Toronto, Canada

INTRODUCTION. Adverse events (AEs) affect 3–12 % of hospitalized patients, and 33–50 % are considered preventable (1). These estimates come from labor-intensive chart reviews, in which nurses first looked for “flags” and physician reviewers then determined the presence of adverse patient outcomes due to medical care (1–3); however this process is not feasible outside research. Rapid response teams (RRT) consult on deteriorating patients on the wards and can potentially identify AE prospectively (4).

OBJECTIVES. To use rapid response teams (RRT) to detect AEs and compare the rate of AE identification by RRT to the rate reported using the hospital’s electronic safety reporting system.

METHODS. Prospective observational 7-month cohort study of RRT consults in a tertiary hospital. We trained RRT nurses and physicians to fill case report forms for all consults. Forms included clinical details, questions regarding causation of the patient’s condition (1), and a rating of causation and preventability of AEs using a 6-point scale. Three independent physicians, blinded to RRT assessment of causation and preventability, reviewed all forms. Each physician reviewed a subset of cases twice to measure intrarater reliability. For our primary analysis, we summarized AEs as rates per 1000 patient-days, and compared the rates between RRT and the safety reporting system using a Poisson model.

RESULTS. There were 8713 hospital admissions, with 531 RRT consults and 247 (2.8 %) cases included. Agreement for the occurrence of an AE among reviewers was 0.7 (Kendall’s statistic, $p < 0.0001$) and between the reviewers’ average and RRT was 0.59 (Kappa, 95 % CI 0.51–0.68). Agreement for preventability among reviewers was 0.72 (Kendall’s statistic, $p < 0.0001$) and between the reviewers’ average and RRT was 0.6 (Kappa, 95 % CI 0.52–0.68). Intrarater reliability on 44 cases was moderate to good (intraclass correlation per reviewer 0.87, 0.67, 0.66 for causation, and 0.88, 0.61, 0.64 for preventability). RRT identified 44 AEs/8713 admissions (0.52/1000 patient-days), of which 35 were considered preventable (0.41/1000 patient-days). There were 18 safety reports from the same wards during this period (0.21/1000 patient-days; rate ratio 2.4, 95 % CI 1.4–4.2, $p = 0.0014$ vs RRT AE rate).

CONCLUSION. Reviewing RRT consults identified a high proportion of AEs and preventable AEs. This methodology detected twice as many AEs as the hospital’s safety reporting system. RRT clinicians provide a complementary and more sensitive mechanism than traditional safety reporting systems to identify possible AEs in hospitals.

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0025

DEATHS IN THE ICU COMPARED TO HOSPITAL AND POPULATION DEATHS IN A NORWEGIAN HEALTH REGION IN 2011

B.A. Alme¹, H. Flaatten^{1,2}, S. Aardal³

¹Haukeland University Hospital, Department of Anesthesia and Intensive Care, Bergen, Norway, ²University of Bergen, Bergen, Norway, ³Haukeland University Hospital, Department of Research and Development, Bergen, Norway

INTRODUCTION. Death in hospitals is a common occurrence because of the increased use of hospitals for patients with severe and complicated end-stage diseases, and as a consequence of the increased severity of illness in many acutely admitted patients. Hospital deaths can also occur partially or totally as a consequence of adverse events during medical care. The contribution of the ICU regarding the place for patients to die probably varies considerably between countries.

OBJECTIVES. To register the distribution of deaths in a Norwegian Health Trust with regards to the place of death: Outside hospitals, in hospitals and in the ICU. We also aimed to study the magnitude of sudden, unexpected deaths associated with adverse events in the same Hospital Trust in 2011.

METHODS. From Statistics Norway we retrieved data of all deaths in the Hordaland county with 484240 inhabitants in 2011, and from the Norwegian Patient Registry (NPR Norway) we retrieved data of all deaths in the 5 hospitals in our region: One large Region University Hospital, three small county hospital and one private hospital. Information about patients who died in the ICUs was retrieved from the hospital electronic patient data management system and medical records. In addition all deaths in 3 of the hospitals including the University Hospital was classified by the authors into groups according to Norwegian law: Expected or Sudden and/or unexpected deaths (SUD) and if the SUD occurred as a consequence of natural or un-natural causes. An expert review panel screened all deaths with regards to adverse events and possible preventability using a five point Likert scale. Age, length of hospital stay (LOS) and Charlson Comorbidity Index were registered.

RESULTS. There were 3875 deaths in Hordaland county in 2011. 1338 (34.5 %) took place in a hospital. 187 deaths occurred in an ICU. This latter group represents 4.8 % of all deaths and 14.0 % of the deaths in hospitals. Among the 3 hospitals further investigated there were 59,605 patients admitted with 1186 registered deaths (1.98 %). The mean and median ages were 73 and 78 years, respectively, and the median LOS was 5.6 days. Of the deaths, 290 (24.5 %) were considered sudden and/or unexpected, and 220 of these were judged to be caused by natural events. Of the 70 un-natural deaths, 16 (1.3 %) were classified as preventable or possible preventable. 25.7 % of the unnatural deaths occurred in the ICU.

Group	N	Age years mean & median	CCI mean	LOS days mean and median	Dead in ICU (%)	Preventable
All	1186	73.8 (78)	6.9	9.9 (5.6)	11.6	
Expected	896	74.5 (78)	7.4	10.5 (6.3)	8.7	
Un-expected	290	71.5 (78)	5.5	8.1 (2.7)	20.3	
Natural	220	73.4 (79)	5.8	8.3 (2.1)	18.8	
Un-natural	70	66.9 (69)	4.8	7.6 (3.9)	25.7	16*

[Classification of cause of death in hospitals.]

Preventability	No (% all deaths)
Not Preventable	31 (2,6 %)
Possibly not	6 (0,5 %)
Uncertain	17 (1,4 %)
Probably yes	11 (0,9 %)
Yes	5 (0,4 %)

[Preventability in the 70 un-natural deaths.]

CONCLUSIONS. Among all deaths in our county only a small portion died in an ICU. The magnitude of ICU deaths in the hospital population also was low (14,0 %). This is in contrast to recent data from the US where 15–20 % of population deaths is reported to occur in the ICU [1]. We also found a high frequency of deaths by un-natural causes to occur in the ICU, however the magnitude of preventable deaths was low.

(§ 2 according to Regulations 2000-12-21 nr. 1378) Death is considered to be unnatural if it can be caused by:

A	Murder or other trauma to the human body
B	Suicide or self-inflicted damage to the body
C	Accidents like capsizing, burns, avalanche, lightning, drowning, traffic-related
D	Occupational accidents
E	Error, omission or accident related to diagnosis or treatment of disease or trauma
F	Use of illegal drugs
G	Unknown causes when death has occurred suddenly and unexpectedly
H	All deaths occurring in civil or military prisons
I	Finding of an unknown corps

[Unnatural causes of death according to law.]

REFERENCE. 1. The Dartmouth Atlas of healthcare: <http://www.dartmouthatlas.org/data/table.aspx?ind=14>

Muscle and neuro: From experimental to clinical studies in sepsis: 0028–0029

0028

A RANDOMIZED CONTROLLED TRIAL COMPARING EARLY JEJUNAL WITH GASTRIC NUTRITION IN CRITICAL ILLNESS

C. Couto¹, M. Beck², G. Friedman^{1,2}

¹UFRGS, Programa de Pós-Graduação em Ciências Pneumológicas, Porto Alegre, Brazil, ²Complexo Hospitalar Santa Casa de Porto Alegre, UTI Central, Porto Alegre, Brazil

INTRODUCTION. Enteral nutrition is the first choice for critically ill patients. Gastric intolerance is common (opioids, shock and vasopressors) and may increase the incidence of nosocomial pneumonia. The literature is controversial if position of the feeding tube can influence rates of pneumonia.

OBJECTIVES. To evaluate the incidence of pneumonia and related complications comparing enteral administration by gastric vs. jejunal tube.

METHODS. Prospective randomized single-blind study conducted in an University ICU. During 12 months, patients >18 years who required enteral nutrition were eligible. Exclusion criteria were patients with anastomoses and esophagectomy; medical indication for post-pyloric nutrition, gastrostomy or jejunostomy, contraindication to enteral nutrition, pregnancy, life expectancy less than 48 h, patients who had difficulties during insertion of the tube and those admitted with enteral feeding (jejunal or gastric) with contraindications for the change of tubes for the purposes of the study. The positioning of post-pyloric tube was confirmed radiologically.

RESULTS. A hundred and fifteen patients were included (gastric n = 61, jejunal n = 54). There was no significant difference between the two groups for age (60 ± 14 vs. 63 ± 17), APACHE II (22 ± 6 vs. 22 ± 7) or GCS (7[3–13] vs. 10 [3–14]). There was no significant difference between the two groups in the rates of pneumonia and other outcomes (Table).

CONCLUSIONS. There is no difference in the rates of pneumonia when administering enteral nutrition via gastric or jejunal tube.

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Variables	Gastric tube (n = 61)	Jejunal tube (n = 54)	P
Mechanical Ventilation (MV)—n (%)	51 (84)	44 (81)	0.957
Duration MV (days)—median (P25–P75)	7 (3–13)	4 (2–11)	0.241
ICU stay (days)—median (P25–P75)	12 (7–19)	10 (7–21)	0.444
ICU mortality—n (%)	22 (36)	20 (37)	1.000
Pneumonia—n (%)	12 (20)	13 (24)	0.730
Diarrhea—n (%)	11 (18)	15 (28)	0.306
Vomiting—n (%)	18 (29)	14 (26)	0.826
Constipation—n (%)	14 (23)	9 (17)	0.544

[Main outcomes]

0029

ANATOMICAL STUDY OF THE DIGESTIVE SYSTEM IN MULTIPLE ORGAN DYSFUNCTION SYNDROME

E. González-Higueras¹, A.R. Murillo-Martín¹, V. de Paz¹, J.M. Añón¹, A. Corrales¹, A. García de Lorenzo², M.R. Solano², O.A. Hernández¹, J.B. Araujo¹, J. Razquin¹

¹Hospital Virgen de la Luz, Cuenca, Spain, ²Hospital La Paz, Madrid, Spain

INTRODUCTION. We sought to get a pathological pattern to describe the gastrointestinal tract dysfunction evolution Multiple Organ Dysfunction Syndrome (MODS) its relation to SOFA score and the survival in patients with MODS.

METHODS. Prospective cohort study, conducted in our Intensive Care Unit (12 medical-surgical critical care beds in a hospital with 400 beds), for 3 years, non probabilistic consecutive sampling. Adult patients with SOFA > 6, mechanically ventilated (MV) > 48 h were Included. Variables analyzed were: SOFA score, APACHE II, intestinal anatomical pattern and clinical and demographic variables.

RESULTS. 40 patients were included and 58 biopsies were performed. Age 69 ± 12 years. APACHE II 22.5 ± 7 . SOFA 11.1 ± 3.6 . Mortality 22.5% (n = 9). Anatomical pattern analyzed in each biopsy: Number of whole villi 52.3 ± 19.8 , Atrophy 2.9% (0-80), edema 14.7% (0-100) Partial denudation 11.3 ± 7.1 %, complete denudation 41 ± 19.6 %, devitalized villi 14 ± 8.6 (27 \pm 13.2 %). Deceased patients showed a higher rate of atrophy, devitalization and complete denudation (p < 0.001); same findings were observed among patients with higher SOFA (p < 0.001). APACHE II score was associated with complete denudation (OR: 1.34 (0.1 to 8.1) and OR: 1.05 (0.02 to 3.28)).

CONCLUSIONS. There is a common histological pattern in MODS patients, shown in the second duodenal portion, that can be related to gastrointestinal system failure. We called this villi pathological distortion were "Devitalized Villi". Atrophy and complete denudation, within the intestinal villi are the most repeated changes related to MODS. A greater degree of SOFA score increased gastrointestinal pathological findings and mortality.

Oxydative stress in sepsis: From fundamentals to clinic: 0031

0031

RESPECTIVE IMPACT OF BODY TEMPERATURE AND HEART RATE KINETICS ON PATIENT'S OUTCOME: POST HOC ANALYSIS OF A RANDOMIZED TRIAL ON FEVER CONTROL IN SEPTIC SHOCK PATIENTS

F. Schortgen¹, A. Charles-Nelson², L. Bouadma³, G. Bizouard², L. Brochard⁴, S. Katsahian²

¹Hopital Henri Mondor-APHP, Réanimation Médicale, Créteil, France, ²Hopital Henri Mondor-APHP, Unité de Recherche Clinique, Créteil, France, ³Hopital Bichat Claude Bernard-APHP, Réanimation Médicale et Infectieuse, Paris, France, ⁴St Michael's Hospital and Keenan Research Centre, Interdepartmental Division of Critical Care, University of Toronto, Toronto, Canada

INTRODUCTION. In febrile septic shock, we previously showed in a RCT (Sepsiscoll) that external cooling for normothermia (36.5-37 °C) decreases day-14 mortality¹.

OBJECTIVES. In a post hoc analysis of the Sepsiscoll database¹, we decided to study whether the kinetics of decrease could have an impact. Because recent data suggest that β -blockers for heart rate (HR) control (80-95 b/min)² could have a similar effect and that fever control also lowers HR, we also looked at HR kinetics.

METHODS. Cooling was applied to reach 37 °C within 2 h after enrolment and to maintain normothermia during 48 h. T and HR were recorded every 2 h during the 48 h. In the no cooling arm, we assessed the association between high T and high HR exposure and d-14 mortality and in the cooling arm the association between the intensity and the rapidity of T and HR control and d-14 mortality. We tested different thresholds of T and HR, the best was selected by AUC-ROC and Youden index analyses. We tested the time spent with $T \geq 38.4-38.5-39$ °C and $HR \geq 80-85-90-95-100$ b/min in no cooling, and the time spent with $T < 36.5-37-37.5-38$ °C and $HR < 80-85-90-95-100$ b/min in cooling. The time slope to obtain normal value of T (37 °C)¹ and of HR (95b/min)² was assessed under cooling. Cox models were used to adjust mortality on severity (SAPS III, SOFA) and on treatments influencing T (steroids, neuromuscular blockers and RRT). In the no cooling arm, patients with inappropriate initial antibiotic were excluded to only include patients in whom fever decrease resulted from appropriate antimicrobial treatment.

RESULTS. 94 and 84 patients were analyzed in the cooling and no cooling arms with 18 and 26 deaths respectively. At inclusion, T was 38.9 ± 0.6 and 39.0 ± 0.6 °C and HR was 113 ± 22 and 117 ± 25 b/min in the cooling and no cooling arms. T and HR were significantly lower from the 2nd h of cooling. In no cooling, the longer was the time spent with a $T \geq 38.5$ °C the higher was the mortality (49 \pm 30 vs 34 \pm 30 % of the time, p = 0.039) [adjusted Hazard R: 3.98 95 %CI (1.04-15.20), p = 0.004]. In cooling, the time spent below each threshold of T was not associated with better survival. T normalization under cooling, however, was more rapid in non survivors than in survivors -0.73 (-0.43) vs -0.46 (-0.32) °C/h, p = 0.011 [aHazard R 0.11 (0.03-0.49), p = 0.003]; the slope threshold that discriminated the best survivors and non survivors was -0.31 °C/h. In the two groups, HR kinetics was not associated with mortality.

CONCLUSIONS. In patients with no fever control and adequate antibiotic therapy, a longer time spent with a $T \geq 38.5$ °C is associated with a higher d-14 mortality. In patients under cooling, we did not identify a threshold of T lowering associated with better survival. T normalization slower than -0.31 °C/h might be beneficial, but needs future validation. We found no impact of HR kinetics on outcome.

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Neuromonitoring: 0037-0040

0037

VISUALIZING SECONDARY INSULTS OF ELEVATED ICP IN PEDIATRIC TBI

F. Güiza¹, B. Depreitere², T.-Y.M. Lo³, P.A. Jones⁴, G. Van den Berghe¹, G. Meyfroidt¹

¹KU Leuven, Intensive Care Medicine, Leuven, Belgium, ²KU Leuven, Neurosurgery, Leuven, Belgium, ³Royal Hospital for Sick Children, Paediatric Intensive Care and Neurology, Edinburgh, United Kingdom, ⁴University of Edinburgh, Child Life and Health, Edinburgh, United Kingdom

INTRODUCTION. Currently there is a lack of definitions for secondary insults of elevated ICP to guide management of the pediatric TBI patient. Following recommendations derived from studies in adults, a static ICP threshold of 20 mmHg is generally used [1].

OBJECTIVES. We evaluated a method based on minute-by-minute ICP monitoring and neurological outcome to visualize the dynamic aspects of secondary injury, which goes beyond the 20 mmHg paradigm.

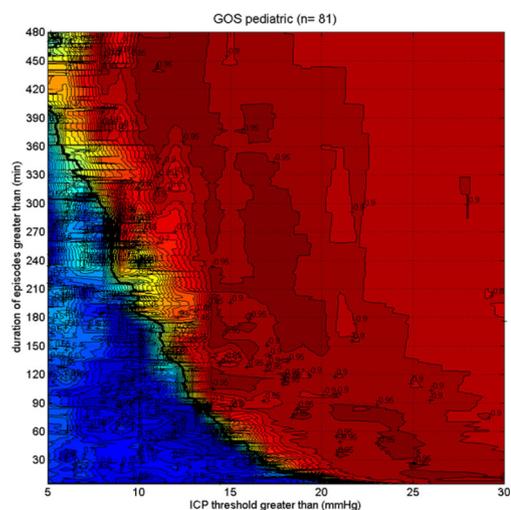
METHODS. Retrospective analysis of outcome as measured by GOS at 6 months and physiological data in minute resolution of 81 children recruited during 62 non-consecutive months up-to July 2003 from two regional pediatric neurosurgical and intensive care centers (Edinburgh and Newcastle) [2].

A color coded contour plot was made for the association between favorable neurological outcome and the average number of secondary insults of elevated ICP during ICU stay. Insults were defined for continuous values of duration and ICP thresholds, ranging from 5 to 480 min and from 5 to 30 mmHg. Negative association with favorable outcome is shown in red and positive association in blue. The transition between association regions is highlighted in black.

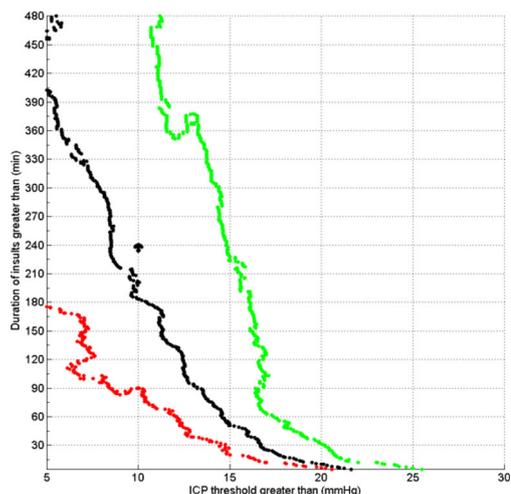
A low-frequency autoregulation index (LAX) [3] was computed every minute, to identify insults during which (on average) autoregulation was functional or impaired.

RESULTS. Figure 1 shows that on average, insults above 22 mmHg lasting more than 5 min are negatively associated with favorable neurological outcome. As insult duration increases there is a markedly decrease in the threshold at which negative association with favorable outcome is observed.

Figure 2 shows in black the transition line derived from the visualization of all insults (Figure 1), in red only from insults during which autoregulation was impaired and in green only from insults during which autoregulation was functional. This might indicate a tolerance for insults of longer duration and higher thresholds when autoregulation is preserved.



[Figure 1]



[Figure 2]

CONCLUSIONS. Secondary injury in the pediatric population is dynamic such that not only thresholds but also insult duration are relevant. Treatment thresholds could be dependent on age and the autoregulatory status of the patient. The proposed visualization puts the static 20 mmHg threshold into context and potentially provides a more complete description of secondary insults in TBI. These visualizations are meant as exploratory tools to generate hypothesis for TBI management, and as such still require prospective validation.

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0038

ACCURACY OF BRAIN MULTIMODAL MONITORING TO DETECT CEREBRAL HYPOPERFUSION AFTER TRAUMATIC BRAIN INJURY

P. Bouzat¹, P. Marques-Vidal², J.-B. Zerlauth³, N. Sala², T. Suys², P. Schoetker², J. Bloch², R.T. Damiel², M. Levivier², R. Meuli², M. Oddo²

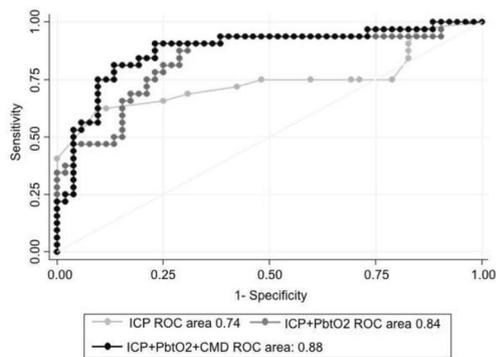
¹Grenoble University Hospital, Grenoble, France, ²CHUV-Lausanne University Hospital, Lausanne, Switzerland, ³CHUV-Lausanne University Hospital, Lausanne, Switzerland

INTRODUCTION. Despite increasing utilization, data on the accuracy of brain multimodal monitoring to detect low cerebral blood flow (CBF) are still limited¹.

OBJECTIVES. The aim of this prospective observational study was to examine in patients with severe TBI the accuracy of brain multimodal monitoring - consisting of intracranial pressure (ICP), brain tissue P_O₂ (PbtO₂) and cerebral microdialysis (CMD) placed in apparently normal brain parenchyma - to detect cerebral hypoperfusion, using perfusion CT scan (PCT) to measure CBF regionally and globally.

METHODS. This prospective observational study was conducted at the Department of Intensive Care Medicine, CHUV-University Hospital Centre, Lausanne, Switzerland, between May 2010 and November 2013. Patients were admitted after severe TBI, defined by an admission Glasgow Coma Scale (GCS) < 9 and an abnormal admission brain CT-scan (defined by a Marshall score² ≥ 2). All patients underwent intracranial monitoring with ICP, PbtO₂ and CMD, as part of standard care. CBF was measured using PCT in tissue area around intracranial monitoring (regional CBF, rCBF) and in bilateral supra-ventricular brain areas (global CBF) and was matched to cerebral physiologic variables. The accuracy of intracranial monitoring to predict low rCBF (defined as an oligemic CBF < 35 ml/100 g/min) was examined using area under the ROC curves (AUC).

RESULTS. Thirty PCT scans (median 27 [interquartile range 20-45] hours after TBI) were performed on 27 patients [age 39 [24-54] years, GCS 7 [6-8]]. Regional CBF was strongly correlated to global CBF (Pearson's r = 0.70, p < 0.01). Compared to normal rCBF values (n = 16), low rCBF (n = 14) measurements had a higher proportion of samples with ICP > 20 mmHg (13 vs. 30 %), PbtO₂ < 20 mmHg (9 vs. 20 %), CMD glucose < 1 mmol/L (22 vs. 57 %) and lactate/pyruvate ratio (LPR) > 40 (4 vs. 14 %; all p < 0.05). Compared to ICP monitoring alone (AUC 0.74 [95 % confidence interval 0.61-0.87]), monitoring ICP + PbtO₂ (AUC 0.84 [0.74-0.93]) or ICP + PbtO₂ + CMD (AUC 0.88 [0.79-0.96]) was significantly more accurate in predicting low rCBF (both p < 0.05). By multivariable analysis, CMD glucose < 1 mmol/L (adjusted odds ratio 2.95 [95 % confidence intervals 1.28-6.78], p = 0.01) and LPR > 40 (8.54 [2.14-30.47], p < 0.01) were strong predictors of low rCBF, independently of ICP and PbtO₂.



[ROC analysis]

CONCLUSIONS. Brain multimodal monitoring provides adequate assessment of global CBF at the bedside and is more accurate than ICP monitoring alone in detecting cerebral hypoperfusion in patients with severe TBI.

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0039

ASSOCIATION BETWEEN OPTIC NERVE SHEATH DIAMETER ON COMPUTED TOMOGRAPHY AND INTRACRANIAL PRESSURE IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY

M.S. Sekhon¹, D.E. Griesdale², C. Robba³, E. Needham³, K. Walland³, N. McGlashan³, R. Mossallam³, D.K. Menon⁴

¹University of British Columbia, Vancouver, Canada, ²University of British Columbia, Anesthesiology, Pharmacology and Therapeutics, Vancouver, Canada, ³University of Cambridge, Neurosciences, Cambridge, United Kingdom, ⁴University of Cambridge, Anesthesia, Neurosciences, Cambridge, United Kingdom

INTRODUCTION. Increased intracranial pressure (ICP) is associated with worse outcomes following traumatic brain injury (TBI) and is correlated with optic nerve sheath diameter (ONSD) on ultrasound and magnetic resonance imaging. Increased ONSD on computed tomography (CT) has been associated with increased mortality in TBI but its relationship to ICP is unclear.

OBJECTIVES. The purpose of our study was to assess the relationship between ONSD measured on CT and intracranial pressure in severe TBI patients.

METHODS. We conducted a retrospective cohort study of patients with a TBI requiring ICP monitoring admitted to the neurocritical care unit at Addenbrooke's Hospital between 2009 and 2013. ONSDs for each patient were measured on portable head CT during simultaneous ICP monitoring and archived by the ICM + brain monitoring software. ONSDs were independently measured by four physicians (neurocritical care fellows) who were blinded to patient demographics, intracranial pressure, clinical physiological data and outcomes. ICP values each minute were averaged over a 15 min duration of the CT scan to provide a mean ICP. Simple linear regression was used to assess an association between ONSD and ICP. Logistic regression was used to construct a receiver operating curve (ROC).

RESULTS. Sixty-two patients were eligible for inclusion. ONSD was able to be measured on portable CT in 92 % of patients, leaving 57 patients included for the final analysis.

Thirty-one (54 %) of patients had an ICP > 20 mmHg. In those patients, the mean ONSD was larger (7.0 mm [SD 0.71]) than patients with ICP ≤ 20 mmHg (6.2 mm [SD0.50], P < 0.0001). There was a linear association between ONSD and ICP (r = 0.74, P < 0.0001). ONSD was able to discriminate an ICP threshold of > 20 mmHg with an area under the ROC of 0.83 (95 %CI: 0.73 - 0.94). Using a cut-off of 6.0 mm, ONSD had a sensitivity of 97 %, specificity of 42 %, positive predictive value (PPV) of 67 % and negative predictive value (NPV) of 92 %. An ONSD threshold of 7.0 mm had the following performance characteristics: sensitivity 45 %, specificity 96 %, PPV 93 %, and NPV 60 %. The overall between-rater intraclass correlation coefficient for ONSD measurements was 0.86 (95 %CI: 0.78 - 0.91, P < 0.0001).

CONCLUSIONS. ONSD measured on CT is associated with ICP and is able to discriminate intracranial hypertension in a cohort of patients with severe TBI. ONSD measurements on CT are reproducible amongst observers, supporting its generalizability as a clinical measure.

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0040

PATIENT-SPECIFIC THRESHOLDS AND DOSES OF INTRACRANIAL HYPERTENSION IN SEVERE TRAUMATIC BRAIN INJURY

C. Lazaridis¹, S.M. DeSantis², P. Smielewski³, D.K. Menon⁴, P. Hutchinson⁵, J. Pickard⁵, M. Czosnyka³

¹Baylor College of Medicine, Neurocritical Care, Houston, United States, ²University of Texas, School of Public Health, Houston, United States, ³Cambridge University, Academic Department of Neurosurgery, Cambridge, United Kingdom, ⁴Cambridge University, Department of Anaesthesia, Cambridge, United Kingdom, ⁵Cambridge University, Department of Neurosurgery, Cambridge, United Kingdom

INTRODUCTION. Current guidelines for the management of severe traumatic brain injury (TBI) recommend treatment of intracranial pressure (ICP) after a threshold of 20-25 mm Hg.¹ This threshold is based on observational studies and non-controlled series and it fails to take into account patient-specific pathophysiology. Based on continuous monitoring of the pressure reactivity index (PRx) we defined individualized ICP thresholds by graphing the relationship between ICP and PRx.

OBJECTIVES. In order to quantify the secondary brain injury insult of intracranial hypertension, we employed measurements of "ICP dose". We hypothesized that doses based on individually assessed ICP-thresholds would correlate closer with 6-month outcome when compared to doses derived by the recommended universal thresholds of 20 and 25 mm Hg.

METHODS. Data from 327 TBI patients were analyzed. Intracranial pressure doses were computed as the cumulative area under the curve above the defined thresholds in graphing ICP versus time.² The term Dose 20 (D20) was used to refer to an ICP threshold of 20 mm Hg. The markers D25 and DPRx were calculated similarly. The discriminative ability of each dose on mortality was assessed by ROC analysis using 5-fold cross validation (CV).

RESULTS. DPRx (0.81, CI 0.74-0.87) was found to have the highest AUC over both D20 (0.75, CI 0.68-0.81) and D25 (0.77, CI 0.70-0.83) indicating it has the best discriminative ability. Cross-validation confirmed the results of the observed AUCs; in the cross-validated model, DPRx was still the best predictor of mortality [DPRx AUC 0.77 (95 % CI 0.68-0.89), D20 0.72 (95 % CI 0.66-0.81) and D25 0.65 (95 % CI 0.56-0.73)]. Mean D20 was 1055 mm Hg*hour versus 478 mm Hg*hour for DPRx (p < 0.0001).

CONCLUSIONS. DPRx was found to be the best discriminator of mortality despite the fact that D20 was twice as large of a dose than DPRx. Individualized doses of intracranial hypertension were stronger predictors of mortality than doses derived from the universal thresholds of 20 and 25 mm Hg. The pressure reactivity index could offer a method towards individualizing the ICP threshold.

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Caring for the critically ill burn patient: 0043-0045

0043

CIRCULATING LEUKOCYTE-DERIVED MICROVESICLES ARE ELEVATED AFTER SEVERE BURN INJURY

J. Porter¹, K.P. O'Dea¹, S. Singh¹, M. Takata¹

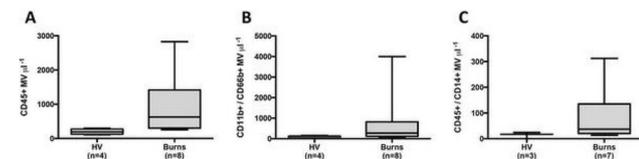
¹Imperial College London, Section of Anaesthetics, Pain Medicine and Intensive Care, London, United Kingdom

INTRODUCTION. Severe burn injury is a unique example of critical illness, where the early phase is characterised by an exaggerated inflammatory response. Pro-inflammatory mediators are elevated in the initial stages but do not necessarily correlate with clinical progress¹. Moreover, the pathway that leads from local mediator release to systemic inflammation is undefined. Microvesicles (MVs), sub-cellular membrane-bound particles released by activated or dying cells, may play a role in this pathway. Elevated levels of leukocyte-derived MVs have been demonstrated in pro-inflammatory states such as sepsis² but they have not been assessed in patients with burn injury.

OBJECTIVES. To quantify and characterise circulating microvesicles in patients with severe burn injury.

METHODS. Patients admitted to the Burns Intensive Care Unit (BICU) were prospectively studied. Demographics were recorded including Total Body Surface Area (TBSA) burned. Blood was sampled within 24 h of admission and centrifuged to remove cells. Soluble inflammatory mediators were quantified using a cytokine antibody array. MVs were quantified by flow cytometry, on the basis of scatter parameters and antibody binding to surface markers. Leukocyte MVs were defined as CD45+, neutrophil MVs as CD11b+/CD66b+ and monocyte MVs as CD45+/CD14+. The results were compared to samples taken from healthy volunteers. The Mann-Whitney U test was used to determine statistical significance.

RESULTS. 8 BICU patients were recruited (4 males) and mean age was 48 ± 23 years. Mean TBSA and Abbreviated Burn Severity Index (ABSI) were 27 ± 12 % TBSA and 7.6 ± 2.3 respectively. The presence of a systemic inflammatory response was supported by clinical data and raised levels of inflammatory mediators, including IL-8 and MCP-1. In comparison to healthy volunteers ($n = 4$), levels of plasma leukocyte and neutrophil MVs were significantly elevated (Figure 1A and 1B). There was also a trend towards increased counts of monocyte MVs (Figure 1C).



[Figure 1]

Figure 1: Levels of leukocyte microvesicles per microlitre of plasma, in healthy volunteers and burn patients.

- A) CD45+ MVs ($p = 0.016$)
- B) CD11b+/CD66b+ ($p = 0.016$) MVs
- C) CD45+/CD14+ MVs.

Box plots represent median, interquartile range and 10th to 90th percentiles.

CONCLUSIONS. Severe burn injury was associated with significantly elevated levels of leukocyte-derived MVs, the majority of which appear to be neutrophil-derived. The role of these microvesicles in propagating inflammation following severe burn injury warrants further investigation.

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GRANT ACKNOWLEDGMENT. Funded by the Chelsea and Westminster Health Charity.

0044

THE AGE OF TRANSFUSED PACKED RED BLOOD CELLS CORRELATES WITH THE DEGREE OF IMMUNOSUPPRESSION AS ASSESSED BY GENE EXPRESSION PATTERNS IN SEVERELY INJURED TRAUMA PATIENTS

M. Vivian¹, H.D.T. Torrance^{2,3}, R. Pearce², K. Brohi³, C.J. Hinds^{2,4}, M.J. O'Dwyer^{1,2}

¹Barts Health NHS Trust, Adult Critical Care Unit, London, United Kingdom, ²Queen Mary, University of London, Translational Medicine and Therapeutics, London, United Kingdom, ³Trauma Sciences Unit, London, United Kingdom, ⁴St Bartholomew's Hospital, Intensive Care Unit, London, United Kingdom

INTRODUCTION. Our group has previously reported an association between transfusion of packed red blood cells (PRBCs), a pattern of gene expression consistent with immunosuppression and a greater incidence of infectious complications in different patient populations (1, 2).

OBJECTIVES. To explore the association between the age of transfused PRBCs and specific patterns of inflammatory gene expression in severely injured trauma patients.

METHODS. Severely injured trauma patients requiring ICU treatment were recruited if the baseline study blood sample could be obtained within 2 h of the insult as previously described (1). Each patient or a surrogate provided informed consent. A second blood sample was obtained at 24 h. Messenger RNA (mRNA) was extracted from whole blood and candidate gene expression was quantified using quantitative polymerase chain reaction. The number of units of PRBCs transfused in 24 h was recorded and the median age of the units transfused to each patient calculated. All PRBCs administered were leukocyte depleted and had a maximum age of 35 days. The primary outcome was the change in candidate gene expression over the initial 24 h as defined by a ratio of gene expression at 24 h to gene expression at baseline. A multivariate analysis included variables descriptive of the severity of injury and shock state. These variables were injury severity score (ISS), base deficit at baseline and at 24 h and the number of PRBCs transfused.

RESULTS. 65 trauma patients from the original cohort (1) required blood transfusion in the first 24 h and were included in the analysis. 54 (83 %) patients were male and median patient age was 40 (IQR 32 - 59). Median ISS was 33 (IQR 23-42) and 56 (88 %) patients suffered blunt injury. Median age of transfused PRBCs was 20 days (IQR 17-22) and patients each received a median of 5 units (IQR 4 - 9.5) of PRBCs over the first 24 h of hospital admission. 41 (63 %) patients developed infectious complications and 15 (23 %) patients died before hospital discharge. No association was detected between the median age of PRBCs administered and later infectious complications or mortality. Greater decreases in gene expression over 24 h was observed with increasing age of the transfused PRBCs for the candidate genes outlined in table 1.

Candidate gene	Univariate analysis (median age of PRBCs Vs ratio of candidate gene expression at 24 h: candidate gene expression at baseline)	Multi variate analysis (including number of units transfused, BD at baseline and 24 h and ISS)
RORγt (Th17 specific transcription factor)	$r^2 \equiv 0.19, p \equiv 0.003$	Total $r^2 \equiv 0.30$; p(age of blood) $\equiv 0.03$; p(quantity PRBCs) $\equiv 0.18$; p(BD baseline) $\equiv 0.85$; p(BD 24 h) $\equiv 0.98$; p(ISS) $\equiv 0.49$
IL12 (Th1 promoter)	$r^2 \equiv 0.10, p \equiv 0.003$	Total $r^2 \equiv 0.17$; p(age of blood) $\equiv 0.04$; p(quantity PRBCs) $\equiv 0.34$; p(BD baseline) $\equiv 0.65$; p(BD 24 h) $\equiv 0.58$; p(ISS) $\equiv 0.64$
IL23 (Th17 promoter)	$r^2 \equiv 0.10, p \equiv 0.03$	Total $r^2 \equiv 0.19$; p(age of blood) $\equiv 0.04$; p(quantity PRBCs) $\equiv 0.25$; p(BD baseline) $\equiv 0.89$; p(BD 24 h) $\equiv 0.93$; p(ISS) $\equiv 0.51$
Foxp3 (Treg cell promoter)	$r^2 \equiv 0.15, p \equiv 0.04$	Total $r^2 \equiv 0.15$; p(age of blood) $\equiv 0.04$; p(quantity PRBCs) $\equiv 0.91$; p(BD baseline) $\equiv 0.61$; p(BD 24 h) $\equiv 0.55$; p(ISS) $\equiv 0.89$
GATA3 (Th2 transcription factor)	$r^2 \equiv 0.16, p \equiv 0.007$	Total $r^2 \equiv 0.23$; p(age of blood) $\equiv 0.04$; p(quantity PRBCs) $\equiv 0.16$; p(BD baseline) $\equiv 0.68$; p(BD 24 h) $\equiv 0.94$; p(ISS) $\equiv 0.86$

[Table 1: Gene expression and median age of PRBCs]

CONCLUSIONS. Whilst blood transfusion alone is associated with an immunosuppressive gene expression pattern (1, 2), older blood may exacerbate this response in trauma patients. Reduced gene expression of the proinflammatory Th1 cytokine, IL12, the proinflammatory Th17 transcription factor, RORγt, and the Th17 polarising cytokine, IL23, support this hypothesis.

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GRANT ACKNOWLEDGMENT. The Intensive Care Society Young Investigator Award (MO'D), Barts and The London Charity Project Grant (MO'D), RCS Fellowship (HT).

0045

EPIDEMIOLOGY OF PATIENTS WITH SUSPECTED INHALATION INJURY ADMITTED TO A BURN INTENSIVE CARE UNIT

S. López-Cuenca¹, A. Estrella-Alonso¹, A. Martin-Pellicer¹, O. Penuelas¹, M.A. de la Cal², J.A. Lorente³

¹Hospital Universitario de Getafe, Madrid, Spain, ²Hospital Universitario de Getafe, CIBER Respiratory Diseases, Madrid, Spain, ³Hospital Universitario de Getafe, CIBER Respiratory Diseases, European University of Madrid, Madrid, Spain

INTRODUCTION. Lung injury resulting from inhalation of smoke or chemical products, combined or not with cutaneous burns, increases morbidity and mortality^{1,2}. The diagnosis is based on clinical suspicion, being confirmed by bronchoscopy. The treatment is supportive^{1,2}.

OBJECTIVES. The purpose of our study is to describe the characteristics of patients with suspected inhalation injury (SII) admitted to a burn intensive care unit. Besides, we compared the group of SII to the group without inhalation suspicion.

METHODS. We performed a prospective and observational study in patients with burn injuries admitted in our unit from 2008 to 2012. We included patients over 16 years old, >20 % total body surface area (TBSA) burned, admission <48 h after burn or with comorbidity. We suspected SII if injury happened in a closed space fire, or the patient presented facial burns, soot in sputum, singed nasal hairs, changes in voice, dyspnea. Bronchoscopic findings in patients with SII were graded from I to III (mild, moderate or severe).

RESULTS. We included 165 patients. Patients with SII (N = 106) had the following characteristics: 75 % men, mean age was 47 years, the average total body surface area was 27.9 % (16.2 % full-thickness burn), 54 % facial burns, 15 % carbonaceous sputum and 12 % singed nasal hairs. 79 patients (74.5 %) underwent bronchoscopy, 45 of which (57 %) were normal, and 43 % were abnormal (34), showing mild, moderate or severe injury in 22 (65 %), 4 (12 %) and 8 (24 %) cases, respectively. 81 % chest X Ray at admission was normal. 82 % were intubated at admission, being under mechanical ventilation an average of 23.6 days. Only 16 % needed tracheostomy. The average length of stay was 33 days. Mortality was 14 % (global burn ICU unit 10.3 %). 40 % had complications (the most common renal failure and eye injury) and 48 % infections (the most common catheter related and bacteraemia). Pseudomonas was the bacteria most often isolated. Comparing both groups (SII vs not SII), TBSA burned ($p = 0.0001$), prevalence of abnormal chest X Ray ($p = 0.003$) and number of surgical interventions performed ($p = 0.008$) and mortality ($p = 0.04$) were higher in SII group. Besides, the length of stay and days under mechanical ventilation ($p = 0.001$) were longer in SII group.

CONCLUSIONS. Patients with SII have a specific clinical profile that allows the identification of a group of patient with a high morbidity and mortality.

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GRANT ACKNOWLEDGMENT. FIS P11/02791, P12/0898, P12/02451.

Ethical issues in intensive care: 0046–0050

0046

IS LIVING AT 'ANY COST' REALLY WHAT EVERYONE WANTS? - A STRUCTURED CHOICE EXPERIMENT

C. Corke¹, T. Flynn²

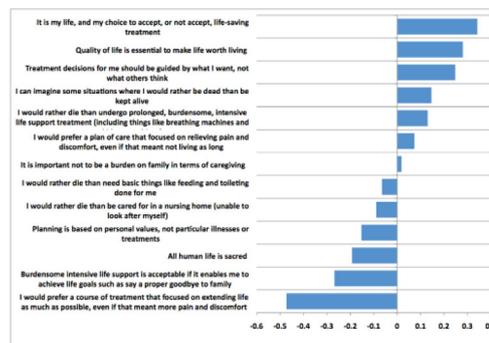
¹Barwon Health, Intensive Care, Geelong, Australia, ²UNISA, The Institute for Choice, North Sydney, Australia

INTRODUCTION. There has been little research that explores how patient rank priorities for medical treatment at the end of life. Over recent years there have been significant advances in the scientific evaluation of human choice. We used a validated best-worst choice experiment to rank statements relating to end of life preferences among more than 1000 older Australians.

OBJECTIVES. To elucidate those priorities that underpin end of life choices.

METHODS. A best-worst choice experiment was used to rank statements relating to end of life priorities. On-line panels of the general population (aged >55 years) were invited to participate. Firstly all results were analysed together and subsequently cluster analysis revealed 3 distinct subsets

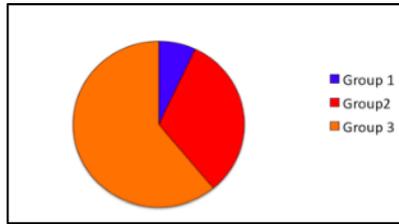
RESULTS. The ranking of statements for the entire group is shown in Table 1 (together with the strength associated score).



Standard errors all lie between 0.0115 and 0.0142.

[Average Attitudinal Scores (N = 1166)]

The three groups identified in the cluster analysis are shown in Table 2.



Group 1	(7%) believe in extending life no matter what the consequences
Group 2	(32%) view quality of life as important but are willing to accept some limitations
Group 3	(61%) view quality of life as paramount and would rather die than accept limitations

[Cluster analysis]

The relative size of each of the groups identified in cluster analysis is shown in Table 3. It is notable that group 3, who express treatment limits is substantially larger than those who express no limits (group 1).

CONCLUSIONS. This research suggests that living forever 'at any cost' is very much a minority opinion. Most people have a variety of priorities that need to be recognised and explored.

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0047

PREVENTION OF INTENSIVE CARE UNIT NURSE BULLYING

F. DeKeyser Ganz¹, H. Levvy², R. Khalaila³, D. Arad⁴, K. Bennaroch⁵, O. Kolpak⁶, Y. Drori⁷, J. Benbinishty⁸, O. Raanan⁹

¹Hadassah- Hebrew University, Faculty of Medicine, School of Nursing, Jerusalem, Israel, ²Rambam Health Care Center, Haifa, Israel, ³Zefat Academic College, Zefat, Israel, ⁴Ministry of Health, Jerusalem, Israel, ⁵Rambam Medical Center, Haifa, Israel, ⁶Western Galilee Medical Center, Naharia, Israel, ⁷Haemek Medical Center, Afula, Israel, ⁸Hadassah Medical Organization, Jerusalem, Israel, ⁹Sheba Medical Center, Tel Hashomer, Israel

INTRODUCTION. Bullying refers to repeated, offensive, intimidating, or insulting behaviors that make recipients feel humiliated or threatened. This practice has both physical and psychological consequences, leading to decreased job satisfaction and increased burnout. No multi-center study was found that investigated only critical care nurses, despite the fact that ICUs have a relatively high incidence of bullying¹. Little has been published about how to prevent it in the ICU.

OBJECTIVES. The objective was to describe the prevalence of nurse bullying and methods of its prevention.

METHODS. Data were collected from a convenience sample of 155 ICU nurses in five Israeli medical centers. Questionnaires were administered either in staff meetings or individually. All collected responses were placed in an envelope at a central location and were anonymous. 3 questionnaires were used, a demographic and work characteristics questionnaire, the Negative Acts Questionnaire-Revised² and the Bullying Prevention Questionnaire (designed by the authors). Prevention was divided into three subscales, institutional, unit and individual. Bivariate analyses were conducted to determine whether any demographic or work characteristics were associated with bullying or its prevention. Characteristics found to be significantly associated with bullying or prevention were used as predictor variables in logistic regressions.

RESULTS. The majority of the sample was female (n = 102, 69%), worked as staff nurses (n = 111, 76%), had a baccalaureate nursing education (n = 87, 60%) with post-basic ICU certification (n = 122, 83%), with a mean of 11.5 years as an ICU nurse. Almost one third of the respondents (n = 43, 29%) reported being the victim of bullying although no one reported being bullied on a daily basis. The mean total score on the NAQ-R was 33.3 (SD = 11.6) with a mean item score of 1.6 (SD = 1.4) out of 5. The total prevention score was 96.8 (SD = 14.4). Mean item subscale scores were: institutional- 2.7(SD = 0.3), unit- 2.2(SD = 0.4) and individual-2.4(SD = 0.3) None of the demographic or work characteristics were found to correlate with the presence of bullying or its prevention, however there was a significant difference on bullying and prevention scores based on hospital; and for prevention based on type of unit.

CONCLUSIONS. Despite the fact that the level of bullying was found to be low, its prevalence was alarming. This study provides further evidence of the ubiquitous nature of bullying, as no personal or work characteristics were associated with its prevalence. Significant differences between types of units and hospitals suggest that there is a need for increased vigilance in the prevention of bullying on a unit and hospital wide basis.

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GRANT ACKNOWLEDGMENT. This study was supported by the Israeli Society of Cardiovascular and Intensive Care Nursing.

0048

WORLDWIDE CONSENSUS ON THE PRINCIPLES OF END-OF-LIFE CARE FOR THE CRITICALLY ILL: THE WELPICUS STUDY

C.L. Sprung¹, R.D. Truog², J.R. Curtis³, G.M. Joynt⁴, A. Michalsen⁵, A. Avidan¹, and the Welpicus Study Group

¹Hadassah Hebrew University Medical Center, Department of Anesthesiology and Critical Care Medicine, Jerusalem, Israel, ²Boston Children's Hospital, Department of Critical Care

Medicine, Boston, United States, ³Harborview Medical Center and The University of Washington, Seattle, United States, ⁴The Chinese University of Hong Kong, Department of Anaesthesia and Intensive Care, Hong Kong, China, ⁵Tettang Hospital, Department of Anaesthesiology and Critical Care Medicine, Tettang, Germany

INTRODUCTION. Great differences in end-of-life practices of critically ill around the world warrant agreement for the major ethical principles.

OBJECTIVES. To determine the extent of worldwide consensus for end-of-life practices, delineate where there is and is not consensus and analyze reasons for lack of consensus.

METHODS. Critical care societies worldwide were invited to participate. Country coordinators were identified and draft statements were developed for major end-of-life issues and translated into six languages. Multidisciplinary responses using a web-based survey assessed agreement or disagreement to definitions and statements linked to anonymous demographic information. Consensus was prospectively defined as >80% agreement. Definitions and statements not obtaining consensus were revised based on comments of respondents, and then translated and redistributed.

RESULTS. Of the initial 1283 responses from 32 countries, consensus was found for 66 (81%) of the 81 definitions and statements; 26 (32%) had >90% agreement. With 83 additional responses to the original questionnaire (1366 total) and 604 responses to the revised statements consensus could be obtained for another 11 of the 15 statements. Consensus was obtained for informed consent, withholding and withdrawing life-sustaining treatment, legal requirements, ICU therapies, CPR, shared decision-making, medical and nursing consensus, brain death and palliative care. Consensus was obtained for 77 of 81 (95%) statements.

CONCLUSIONS. Worldwide consensus could be developed for the majority of definitions and statements about end-of-life practices. Statements achieving consensus provide standards of practice for end-of-life care; statements without consensus identify important areas for future research.

0049

FAMILIES' EXPERIENCES OF QUALITY OF CARE FOR SERIOUSLY ILL AND DYING PATIENTS IN THE ICU. DEVELOPMENT AND VALIDATION OF A EUROPEAN QUESTIONNAIRE

H.L. Jensen^{1,2}, R.T. Gerritsen³, M. Koopmans³, H. Ørding⁴

¹Lillebaelt Hospital, Department of Anaesthesiology and Intensive Care, Vejle, Denmark, ²University of Southern Denmark, Institute of Regional Health Research, Odense C, Denmark, ³Medical Center Leeuwarden, Department of Intensive Care, Leeuwarden, Netherlands, ⁴University of Southern Denmark, Faculty of Health Sciences, Odense C, Denmark

INTRODUCTION. Knowledge about families' experiences is important when working with improvement of quality of care for ICU patients and their families. Cultural differences make it difficult to use North American instruments for family surveys in Europe without adaptation.

OBJECTIVES. To develop and validate a European questionnaire (named euroQ2) for evaluation of families' experiences of quality of care for ICU patients: Quantitative validation.

METHODS. The study was conducted in Denmark (DK) and The Netherlands (NL).

Pre studies:

1) Interviews with families (DK)
2) Development of questionnaire based on the Canadian Family satisfaction in the ICU (FS-ICU) and the American Quality of Dying and Death (QODD) questionnaires, literature and the interviews

3) Qualitative validation in DK and NL.

The questionnaire was developed in two versions: one for family members of patients discharged from the ICU and one for family members of patients dying in the ICU (similar but with an extra section about end-of-life care). The patient should be at least 24 h in the ICU before families are asked about participation, and up to three family members can participate. The questionnaire is mailed 3 weeks after discharge from/death at the ICU. If not responding the family members are contacted by phone.

Present study: First part of quantitative validation with 100 family members (50 from DK and NL). For every question participants are asked to assess relevance and understandability. The study includes test-retest and additional questionnaires in regard to posttraumatic stress, anxiety and depression.

RESULTS. A total of 57 family members of 46 patients have so far responded, hereof 41 family members of discharged patients and 16 of patients dying in the ICU. Median length of stay was 9.9 days (range 1.5-33.6 days). Response rate was 88%. Most family members were partners (42%) or children (47%), mean age 54 (range 22-88). For all questions a median of 96% (range 81-100%) were assessed as relevant and a median of 97% (range 75-100%) as understandable. The median floor effect was 0 (range 0-5) and median ceiling effect 39 (range 19-58). There was a median of 0% missing data (range 0-6%). So far 12 family members have responded twice with a mean weighted kappa of 0.64 (range 0.34-0.86) for agreement.

CONCLUSIONS. Most questions of the euroQ2 were found both relevant and understandable, providing high face and content validity. The ceiling effect was high but comparable to similar instruments and missing data was low. Agreement was fair. All questions not scoring 100% will be evaluated and possibly adjusted based on comments. After adjustment based on evaluations and pilot testing of adjusted questions, the second part of the quantitative validation will include 1000 family members (500 from 10 ICUs in DK and NL). Following this, testing in a number of other European countries is planned.

GRANT ACKNOWLEDGMENT. The study was supported by the Region of Southern Denmark.

0050

POTENTIALITY OF DONATION AFTER CONTROLLED CARDIAC DEATH (CADC) PROGRAM IN 11 SPANISH HOSPITALS

A. Sandiungue^{1,2,3}, M. Llaurodo-Serra^{1,2,4}, E. Oliver⁵, N. Masnou⁶, B. Cancio⁷, G. Miró⁸, E. Navas⁹, M. Badia¹⁰, M. Jurado¹¹, M. López¹², M.D. Bosque¹³, M. Ibáñez¹⁴, J. Twose¹⁵, P. López¹⁵, M. Bodr^{1,2,3}, cADC Study Group

¹Joan XXIII, University Hospital of Tarragona, Intensive Care Unit, Tarragona, Spain, ²Institut d'Investigació Sanitària Pere Virgili, Tarragona, Spain, ³Universitat Rovira i Virgili, Tarragona, Spain, ⁴Universitat Rovira i Virgili, Nursing Department, Tarragona, Spain, ⁵Bellvitge University Hospital, Barcelona, Spain, ⁶Vall d'Hebron Hospital, Barcelona, Spain, ⁷Hospital Moixès Broggi, Barcelona, Spain, ⁸Hospital de Mataró, Mataró, Spain, ⁹Mútua de Terrassa, Terrassa, Spain, ¹⁰Arnau de Vilanova University Hospital, Lleida, Spain, ¹¹Hospital de Terrassa, Terrassa, Spain, ¹²Hospital de Vic, Vic, Spain, ¹³Hospital General de Catalunya, Barcelona, Spain, ¹⁴Verge de la Cinta University Hospital, Tortosa, Spain, ¹⁵Organizació Catalana de Trasplantaments i Teixits, Barcelona, Spain

INTRODUCTION. After the release of new legal regulations (1) and recommendations of cDCD in Spain (2), we proposed to evaluate the potentiality of this kind of donation in Catalonia.

OBJECTIVES. To analyse the potentiality of a cDCD program in our setting.

METHODS. Prospective, multicentre observational, 4-months study (March-June 2013) of all adult patients who died after life support therapy limitation (LSTL) in 11 ICUs of Hospitals in Catalonia. Potentiality for cDCD was assessed through the analysis of clinical, analytical and agonal times (time from Life Support Therapy Limitation (LSTL) initiation to asystole) in patients in whom withdrawing of mechanical ventilation (MV) and/or vasoactive support (VAS) was performed as a form of definitive LTSL (D-LTSL = LTSL preceding death).

RESULTS. During the study period a total of 3315 patients were admitted in the participating ICUs with a global mortality of 9.3 %; 25 brain death utilized donors were registered. A total of 326 patients underwent LSTL, 65.9 % of whom (n = 215) died. Treatment withdrawal was the most common form of D-LTSL (n = 124; 57.7 %), being VAS discontinuation (n = 53; 42.7 %), oxygen tapering-down (33.8 %) and extubation/T-piece (n = 36; 29.0 %) the most common form of treatment withdrawal. Patients died 197.5 min (25-75IQR:52-685.5) after therapy withdrawal, and MV or/and VAS discontinuation resulted in the shortest agonal times (120 min (25-75IQR: 35.5-530 min)). Patients in whom VAS or/and MV was withdrawn (n = 77) were mostly male (59.2 %), of 69.7 ± 11 years old (y/o) had an APACHEII at admission of 23.0 ± 6.9 and were predominantly of medical origin (67.5 %; mostly neurocritical (23.3 %) and infectious disease (24.7 %)). Of those, 32 were ≤70 y/o and 18 of them (22.3 %) were medically eligible for donation; In 10 patients agonal times of ≤60 min were registered and 6 had no organ-specific contraindications for donation. A total of 10 kidneys and 3 livers could have been retrieved in 4 of the 11 participating hospitals accounting for a 24 % donation increase.

CONCLUSIONS. The initiation of a cDCD program in our setting could have increased one donor out of every 4 brain death donors. 4.8 % of the patients undergoing treatment withdrawal as a form of D-LTSL could become cDCD donor.

REFERENCE(S). (1) http://www.boe.es/diario_boe/txt.php?id=BOE-A-2012-15715 (2) <http://www.ONT.es>

GRANT ACKNOWLEDGMENT. Mutua Madrileña: PV13063S

Poster Corner Sessions Haematological malignancies and oncology in the icu: 0051–0064

0051

REDUCED MORTALITY IN PATIENTS WITH HAEMATOLOGICAL MALIGNANCIES RECEIVING INVASIVE VENTILATION ON ICU

J. Greenhill¹, J. McKinlay¹, A. Holland¹, S. Ranjan¹, P. Morgan¹

¹Surrey and Sussex Healthcare NHS Trust, East Surrey Hospital, Anaesthetics/ICU, Redhill, United Kingdom

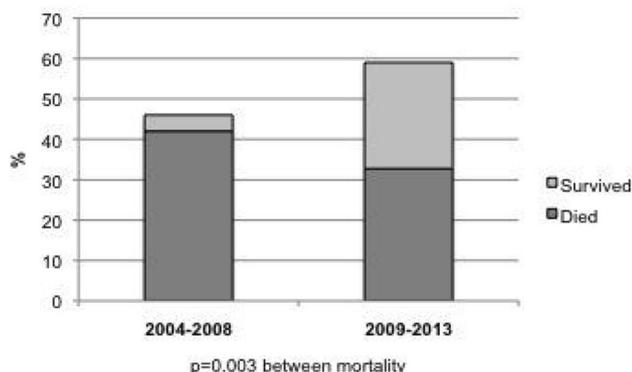
INTRODUCTION. Haematological malignancies (HM) are being diagnosed with increasing incidence and patients with HM are more frequently being admitted to the Intensive Care Unit (ICU) 0.¹ Mortality rates on ICU remain high for admissions with HM, but there have been reported reductions recently.² Some studies suggest these reductions are particularly noticeable in patients receiving Invasive Ventilation (IV) and Renal Replacement Therapy (RRT) whilst outcomes amongst those not intubated are significantly better.^{1,3}

OBJECTIVES. This observational study aimed to explore the outcomes for HM patients on our ICU over a 10 year period (2004-2013) and to determine any causative associations.

METHODS. Using our database of patient records, admissions from 2004 to 2013 were identified. Search terms related to HM were then applied to the data to identify all relevant cases. Data collected included: underlying HM, age, APACHE II score, support received and outcome. Two groups were then compared: Admissions during 2004-2008 (Group 1) and 2009-2013 (Group 2).

RESULTS. We identified 126 HM cases over the 10 years (50 in Group 1 & 76 in Group 2). We demonstrated a reduction in mortality from 60 % to 37 % (p = 0.017), with no difference in APACHE II scores (p = 0.58). When sub-divided into specific HM categories (e.g. Non-Hodgkin's Lymphoma, Multiple Myeloma) the proportion of cases were similar within Group 1 and Group 2. An improvement was seen in those requiring invasive ventilation (IV), with a reduction in mortality from 91.3 % to 44.4 % (p = 0.002). When this population was further divided into those that required IV *without* RRT, mortality decreased from 89 % to 59 % (p = 0.028). Mortality amongst patients who required both intubation *and* RRT fell from 100 % to 46 % but this was not statistically significant.

Percentage of Patients Intubated within Group (with proportion survived/died)



[Graph 1]

Importantly, intubated HM patients were still significantly more likely to die than those not receiving IV, both over the 10 years and within the groups individually (p = 0.0001).

Amongst non-intubated HM patients mortality fell from 33.3 % to 9 % (p = 0.04). We found that no patient requiring RRT *without* IV died in either group.

CONCLUSIONS. Intubation is still associated with high mortality in the ICU but we have shown a mortality reduction amongst intubated HM patients. The improvement over time amongst these patients may be attributable to many factors including improved ventilatory strategies, better haematological therapies and enhanced staff education.

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0052

IMPROVED MORTALITY RATES FOR PATIENTS WITH HAEMATOLOGICAL MALIGNANCY ADMITTED TO ICU: A TEN YEAR RETROSPECTIVE REVIEW

J. Greenhill¹, A. Holland¹, J. McKinlay¹, S. Ranjan¹, P. Morgan¹

¹Surrey and Sussex Healthcare NHS Trust, East Surrey Hospital, Anaesthetics/ICU, Redhill, United Kingdom

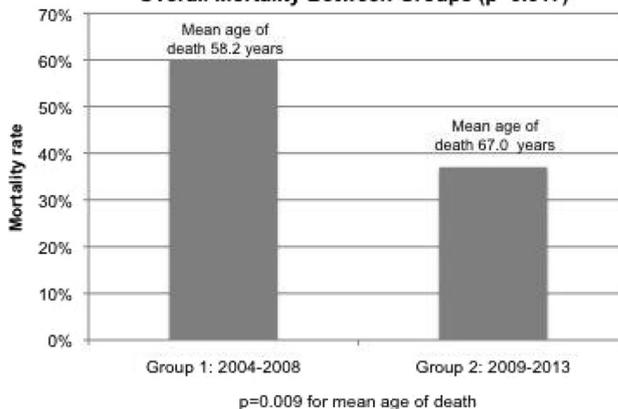
INTRODUCTION. Haematological malignancies (HM) are being diagnosed with increasing incidence in Europe.¹ With HM treatment advances, as well as general clinical improvements, such as response to sepsis, patients with HM are increasingly being admitted to the Intensive Care Unit (ICU) with potentially reversible complications.^{1,2} Mortality rates on ICU remain high compared to overall admissions but there have been reported reductions in mortality rates over the past few decades.¹⁻³

OBJECTIVES. This retrospective observational study aimed to establish the mortality rate amongst HM patients on our unit over a 10 year period (2004-2013) and investigate whether there had been any improvements in the mortality rate over this time period.

METHODS. Using our database of patient records, admissions from 2004 to 2013 were identified. Multiple search terms were then applied to the data to identify all relevant cases. Data collected included: underlying HM, level of support needed, age, APACHE II score and mortality. Two time-frames were then compared: Admissions during 2004-2008 (Group 1) and 2009-2013 (Group 2).

RESULTS. 6037 patients were admitted over the 10 years studied. The all-cause mortality rate for this period was 20.7 %. 127 patients were identified as having a HM accounting for 2.1 % of all admissions. The mortality rate for those with HM was 46 % (P = 0.0001).

Overall Mortality Between Groups (p=0.017)



[Mortality between Groups and Mean Age of Death]

We demonstrated a reduction in mortality from 60 % for Group 1 (n = 30/50) to 37 % in Group 2 (n = 28/76) for all patients with HM (p = 0.017). This is despite patients in Group 2 having an older age with a mean of 64.7 years vs. 60.6 in Group 1 (p = 0.031). The APACHE II scores were comparable (p = 0.583). We found no difference in levels of support received between the two groups.

CONCLUSIONS. The mortality rate for HM patients is high compared to overall mortality on our ICU. However, there was a significant mortality rate decrease on our unit over the past 10 years for HM. This may be attributable to advances in haematological treatments, improvements in delivery of advanced organ support or through optimisation via other clinical and therapeutic developments. The data may help inform decisions around the prognosis of admission to ICU for HM patients.

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0053

IMPROVED LONG-TERM OUTCOMES OF PATIENTS WITH NON-HAEMATOLOGICAL MALIGNANCY ADMITTED TO ICU

R. Fisher¹, L. Starsmore¹, C. Dangoisse¹, T. Manickavasagar¹, C. Whiteley¹, M. Ostermann¹

¹Guy's and St. Thomas' NHS Foundation Trust, Critical Care, London, United Kingdom

INTRODUCTION. In 2011 there were more than 330,000 new diagnoses of cancer in the UK. Data showing that outcomes in patients with cancer have improved have led to calls for ICU admission policies which reflect this. (1).

Guy's and St. Thomas' NHS Trust is a tertiary referral oncology centre in central London (UK). Between February 2004 and July 2008, ICU and 6-month survival of

patients with solid tumours admitted to the ICU as an emergency were 73 % and 27 % respectively. (2)

OBJECTIVES. To evaluate the prognosis of cancer patients admitted to ICU in 2008-2012.

METHODS. Retrospective analysis of all patients with solid tumours admitted to the ICU as an emergency between August 2008 and July 2012.

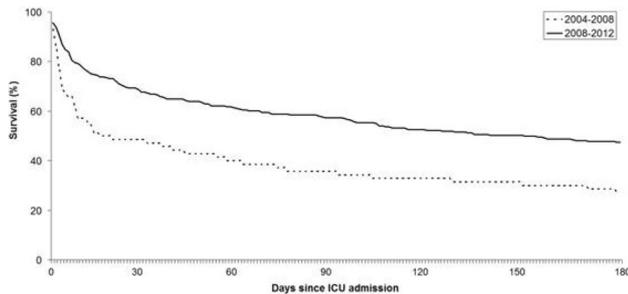
RESULTS. During the four-year period 2008-2012 there was a substantial increase in the rate of admissions of all patients to the ICU (from 9/week to 20/week) and the proportion of cancer patients more than doubled (from 4.0 % to 8.3 %).

Patients with cancer admitted to the ICU between 2008-2012 were older, less sick and required less respiratory support on admission (Table 1). 180-day survival was significantly better in the later period (Figure 1 and Table 1).

CONCLUSIONS. During an 8-year period, there was an increase in the number of patients with solid tumours admitted to ICU. The degree of severity of illness on admission fell during the 8-year period and long-term outcome improved. Further work is required to determine the relevant factors contributing to this improvement.

	2004-2008	2008-2012	P
Admissions (individual patients)	87 (70)	356 (300)	
Age (mean ± SD)	56.1 (13.0)	65.2 (11.8)	<0.001
Male sex (%)	50	61.7	NS
Respiratory support on admission (%)	57.5	41.9	0.011
Circulatory support on admission (%)	28.7	19.9	NS
Neutropenia (WCC < 1) on admission (%)	9.2	4.8	NS
SOFA score (median)	6	4	<0.05
ICU survival (%)	73.6	80.9	NS
180-day survival (%)	27.1	47.4	0.002

[Table 1.]



[Figure 1. 180-day survival]

REFERENCE(S). 1. Azoulay E et al. Intensive care of the cancer patient: recent achievements and remaining challenges. *Annals of Intensive Care* 2011 1:5. 2. McGrath S et al. ICU and 6-month outcome of oncology patients in the intensive care unit. *QJM* 2010 Jun; 103(6):397-403.

GRANT ACKNOWLEDGMENT. Not applicable.

0054

USEFULNESS OF PRESEPSIN (PSP) FOR ASSESSMENT OF SEPSIS IN LEUKOPENIC PATIENTS (PTS)

P. Makarova¹, G. Galstyan², A. Krechetova³, E. Gemdjan⁴, D. Tichomirov⁵, E. Parovichnikova⁶

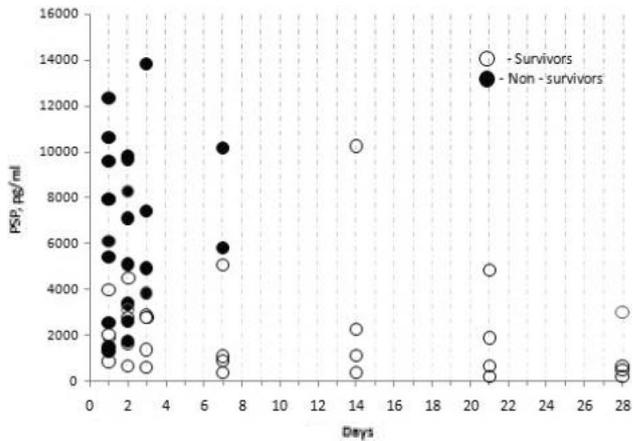
¹Scientific Center for Hematology, ICU, Moscow, Russian Federation, ²Scientific Center for Hematology, Moscow, Russian Federation, ³Scientific Center for Hematology, Lab of ICU, Moscow, Russian Federation, ⁴Scientific Center for Hematology, Lab of Statistic, Moscow, Russian Federation, ⁵Scientific Center for Hematology, Lab of Virology, Moscow, Russian Federation, ⁶Scientific Center for Hematology, Dept of Hematology, Moscow, Russian Federation

INTRODUCTION. PSP (sCD14-ST) is a soluble N-terminal fragment of the protein CD14. Recently PSP considered as an early marker of sepsis. However, most of the studies were performed at pts without leukopenia.

OBJECTIVES. To evaluate whether PSP is a useful biomarker for assessing the severity of sepsis and organ dysfunction in leukopenic pts with septic shock (SS).

METHODS. 27 leukopenic pts (WBC < 0.5 × 10⁹/l) were enrolled in the study: 15 leukopenic pts with SS and 12 leukopenic pts without infection. In pts with SS plasma levels of PSP, procalcitonin (PCT), interleukin-6 (IL-6), and C reactive protein (CRP) levels were measured on admission and after 2, 3, 7, 14, 21 and 28 days. Also, SOFA and APACHE II scores were calculated at the same time. 28-day all-cause mortality was assessed. Plasma levels of PSP, PCT, IL-6 and CRP in pts without infection («normal ranges») were assessed once.

RESULTS. PSP, PCT, IL-6 and CRP levels were elevated in pts with SS in comparison with pts without infection. PSP levels in survivors and non-survivors did not differ on the first day of SS. However, PSP levels in survivors were significant lower than in non-survivors on the 2, 3, 7 days of SS (2208 pg/ml vs 4790 pg/ml, 2085 pg/ml vs 4920 pg/ml, 993 pg/ml vs 7972 pg/ml respectively, P < 0.05; median test). PSP levels did not correlate with PCT levels and WBC counts. PSP levels correlated with CRP (R = 0.4292, p < 0.001) and IL-6 (R = 0.4717, p < 0.001) levels, plasma antithrombin III activity (R = -0.3192, p = 0.018), duration of Xlla-dependent fibrinolysis (R = 0.4121, p = 0.001), SOFA score (R = 0.6124, p < 0.001) and APACHE II score (R = 0.6513, p = 0.001).



[PSP levels in leukopenic pts with septic shock]

CONCLUSIONS. Despite a leukopenia, plasma PSP levels can be used for an assessment of severity of SS and organ dysfunction.

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0055

SHORT- AND LONG-TERM OUTCOMES OF CRITICALLY ILL PATIENTS WITH SOLID TUMORS MALIGNANCIES. THE UTILITY OF SEVERITY SCORING SYSTEMS

M.L. Pérez Pérez¹, B. Balandín Moreno¹, A. Gonzaga López², C. Maximiano Alonso², S. Alcántara Carmona¹, I. Fernández Simón¹, B. Lobo Valbuena¹, N. Martínez Sanz¹, A. Pérez Lucendo¹, J. Palamidessi Dominguez¹, R. Fernández Rivas¹

¹Hospital Univ. Puerta de Hierro, Intensive Care Unit, Madrid, Spain, ²Hospital Univ. Puerta de Hierro, Department of Medical Oncology, Madrid, Spain

INTRODUCTION. Over the last decade, survival rates in critically ill cancer patients have improved. As a result increasing numbers of patients are admitted to ICU. The patients with solid tumors malignancies (ST) are an heterogeneous group suggesting that large variations may occur in the effectiveness of intensive care.

OBJECTIVES. To analyze characteristics and short- and long-term outcomes of patients with ST requiring ICU admission. We also evaluated different model scores used in critically ill cancer patients.

METHODS. Retrospective observational cohort study performed in the 22-bed ICU of a tertiary University Hospital. We included demographic data, Eastern Cooperative Oncology Group Performance Status (ECOG PS), tumor's characteristics and treatments received. Reasons for ICU admission, number of organ failure (NOF), life-sustaining interventions, and hospital/6 months mortality were also recorded. The scoring systems evaluated were: APACHE II, SOFA and Intensive Care Mortality Model (ICMM).

RESULTS. Sixty-two patients with ST were included (January 2010 - March 2014). Mean age 63 ± 12; men 56 %. PS of 0-1 was in 82 %. The most frequent type of ST was gastrointestinal (37 %) and lung (18 %). ST were in recently diagnosed (37 %) and in progression (45 %). Thirty five (56 %) had received chemotherapy (CT) and/or radiation (34 %). The main reasons for ICU admission were postoperative care (43.5 %), sepsis (27 %) and acute respiratory failure (13 %). Mean APACHE II and SOFA were 16 ± 7.5 and 7 ± 11, respectively; ICMM > 50 % in 32 %. Twenty nine patients had NOF ≥ 2; life-sustaining interventions were mechanical ventilation (MV) in 48 % and vasopressors in 42 %. Two patients received renal replacement therapy.

Average ICU and hospital stay were 2 (IQR, 1-7) and 15 (IQR, 9-32.5) days. The overall hospital mortality was 29 %, while survival at 6 months was 60 %.

In a multivariate model, CT [RR 4.4, IC 95 % (1.2- 15.2)], MV [RR 8.3, IC 95 % (1.9 - 37.3)] and NOF [RR 2.9, IC 95 % (1.1-7.8)] were associated with increased hospital mortality.

Thirty-five patients with a medical reason for admission received more CT (71.4 % vs 37 %), MV (62.9 % vs 29.6 %) and NOF ≥ 2 (22.9 % vs 0 %) (p < 0.05). The hospital mortality was higher in the medical group (48.9 % vs 3.7 %) (p < 0.05).

The areas under the receiver operating characteristics curves were 0.738 for APACHE II and 0.773 for ICMM. ICMM specificity was 93.2.

There were significant differences between survivors and non-survivors with APACHE (20.56 vs 14.34) (p < 0.002) and ICMM (60.21vs 34.51)(p < 0.001), but not with SOFA. No statistical differences were found if we excluded surgical patients.

CONCLUSION. The prognosis in patients with solid tumor malignancies is highly variable. The cancer treatment, reasons for admission in ICU (medical or postoperative care), need of life-sustaining support and number of organ failure were the main determinants of mortality. In our serie, the severity scoring systems had a limited utility.

0056

OUTCOMES IN PATIENTS (PTS) WITH HEMATOLOGICAL MALIGNANCIES (HM) WHO RECEIVED INTRAVENOUS CHEMOTHERAPY (CHT) IN THE SETTING OF ACUTE RESPIRATORY FAILURE (ARF)

S.A. Keselman¹, G.M. Galstyan¹, E.G. Gemdjan², E.N. Parovichnikova³

¹Scientific Center for Hematology, ICU, Moscow, Russian Federation, ²Scientific Center for Hematology, Moscow, Russian Federation, ³Scientific Center for Hematology, Hematology and BMT Department, Moscow, Russian Federation

INTRODUCTION. ARF is one of the most frequently reason for ICU admission of pts with HM [1,2]. There is serious challenge to initiate or continue chemotherapy in pts with HM and severe ARF.

OBJECTIVES. To evaluate efficacy of ChT and respiratory care performed at one time in pts with HM and ARF.

METHODS. Retrospective observational study from Jan 1995 to Dec 2013. There were enrolled 112 pts with HM and hypoxicemic ARF who received ChT in ICU. Collection data were demographics, type of HM and disease status, regimens of intravenous ChT, baseline severity of disease and ARF, respiratory care, vital status (alive or dead) in ICU, at 6 months, at 1 and at 3 years from ICU admission. Data are presented as median and IQR. **RESULTS.** 65 pts suffered from acute leukemia, 24 pts from lymphoma, 23 pts from multiple myeloma. Pts with acute leukemia were older than pts with lymphoma and myeloma (38 years [27-51] vs 48 years [30-59] and 60 years [48-68], $p < 0.05$). On admission pts with acute leukemia were more hypoxicemic than pts with lymphoma and multiple myeloma (P/F ratio 180 [123-214] vs 217 [171-250] and 230 [163-273], $p < 0.05$). APACHE II scores were similar for all groups (25 [21-27], 22 [20-25], 22 [21-28]). Induction ChT was performed for 63 pts (97%) with leukemia; 19 pts (79%) with lymphoma; 17 pts (74%) with multiple myeloma. ChT for relapse/progression was performed for 2 pts (3%); 5 pts (21%); 6 pts (26%), respectively. Non-invasive ventilation was performed for 48 pts with overall efficacy 60%. Mechanical ventilation was performed in 54 pts with overall efficacy 28%. The complications in ICU were sepsis (58%), septic shock (29%), renal failure (49%), neurological complications (40%). Overall ICU survival was 63%. Baseline P/F ratio, APACHE II score, neutropenia in ICU weren't ICU mortality predictors.

Parameter	OR	95 % CI	p-value
Mechanical ventilation	24.8	5.6-55.2	0.001
Septic shock	2.4	1.1-5.7	0.04

[Independent ICU mortality predictors]

Among ICU survivors, on 60th day from ICU admission ($n = 70$) there were 81% ($n = 33$) responders for chemotherapy (complete remission/mass reduction) and 19% non-responders. There were alive at 6 months, 1 year and 3 years from ICU admission 40, 36 and 13%, respectively. 17 pts (15%) ICU survivors haven't achieved yet 3-year survival point. Their follow up in progress.

CONCLUSION.

1. ChT performed in the setting of ARF doesn't impair ICU survival in pts with HM.
 2. Non-invasive respiratory care is the optimal short-time strategy for ARF compensation while induction ChT in pts with HM.
 3. Efficacy of induction chemotherapy impact on ICU survival in pts with HM and ARF.
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0057

MORTALITY PREDICTORS IN PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT WITH HEMATOLOGIC MALIGNANCIES

J.C. Lopez-Delgado¹, F. Esteve¹, E. Jubert¹, L. Sanchez-Ales¹, J.P. Pinseau¹, J. Ballús¹, R. Mañez¹

¹Idibell, Hospital Universitario de Bellvitge, Intensive Care, L'Hospitalet de Llobregat, Spain

INTRODUCTION. Patients with hematologic malignancies have higher mortality when admitted in ICU. However, medical advances have increased their survival in the last years and mortality predictors are evolving.

OBJECTIVES. To identify mortality predictors in patients with hematologic malignancies (HM) admitted in ICU of a tertiary university hospital.

METHODS. Retrospective observational study from January 2006 to February 2011. A total of 105 consecutive critically ill were included. We collected variables at admission and during admission. Continuous variables were compared using the Student t-test and the χ^2 test was applied to evaluate categorical prognostic factors. A multivariate analysis was done using Cox regression model. We also evaluated what ICU scores were best predictors for outcome.

RESULTS. 66.7% ($n = 70$) were male, with mean age of 55.3 ± 13.2 years. 91.4% ($n = 96$) were diagnosed in the last month of HM (46.7% of acute leukemia), 77.1% with current chemotherapy. We showed differences between survivors (33.3%; $n = 35$) and non-survivors groups (66.7%; $n = 70$) in the platelet count on admission (126 ± 135 vs. $68 \pm 93 \times 10^9 L^{-1}$; $p = 0.012$), PaO_2/FiO_2 on admission (222 ± 113 vs. 147 ± 90 ; $p = 0.001$), pre-ICU stay (3.7 ± 6.3 vs. 11 ± 16.6 days; $p = 0.015$), septic shock rates (25.7% vs. 17.1%; $p = 0.04$), multiorgan failure rates (0 vs. 12.8%; $p = 0.03$) and ADRS incidence on admission (2.8% vs. 18.6%), mean hospital stay (29.1 ± 28.6 vs. 11.4 ± 12.8 days; $p < 0.001$) and invasive mechanical ventilation (IMV) needs during admission (31.4% vs. 82.9%; $p < 0.001$). Multivariate analysis showed that IMV needs during admission was a mortality predictor for patients with HM (Hazard ratio: 2.936; Confidence Interval 95%: 1.023-8.431; $p = 0.045$). Kaplan-Meier analysis showed a better survival of patients without IMV needs (66.7% vs. 15.9%; $p < 0.001$). ICU scores were poor predictors of mortality, having APACHE II the higher predictive power (area under the curve 66.2 ± 5.4 ; $p = 0.007$).

CONCLUSIONS. The need of IMV in patients with HM admitted in the ICU may be a predictor of mortality. ICU scores are poor predictors of outcome in our population. A more specific score could be more useful in assessing outcome in those patients.

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0058

HEMATOLOGICAL PATIENTS IN ICU - RETROSPECTIVE ANALYSIS OF A CANCER SPECIALIZED CENTER

C. Moreira^{1,2}, O. Afonso¹, I. Sequeira¹, F. Coelho¹, A. Martins¹, F. Faria¹

¹Instituto Português de Oncologia, Serviço de Cuidados Intensivos, Porto, Portugal, ²Centro Hospitalar do Porto, Serviço de Hematologia, Porto, Portugal

INTRODUCTION. In the last years increasing number of patients with hematological malignancy are admitted in intensive care unit (ICU) due to early complications of the

disease, or chemotherapy side effects. Few studies are published on these patients; therefore controversies about the outcome and prognostic factors remain an important issue.

OBJECTIVES. Analysis of hematological malignancy patients admitted at our ICU on the last 5 years in terms of survival and outcome predictors.

METHODS. Retrospective analysis of all patients with hematological malignancy admitted at the ICU from January/2009 to December/2013.

RESULTS. Of the 1721 patients admitted, 226 (13%) had some kind of hematological malignancy. The 3 main pathologies were Non Hodgkin Lymphoma (29%), Acute Myeloid Leukemia (23%) and Acute Lymphoblastic Leukemia (22%). Most of the patients came from bone marrow transplant unit and hematological ward (76%). The mean age was 45.42 years (minimum 3; maximum of 79), the majority were under 65 years old (87%). We found no important differences between survival in the three age groups, although there was a small difference in favor of younger patients (<45 years). We report a global mortality rate of about 40%, which is concordant to the literature (1). The group of patients with bone marrow transplant doesn't seem to have a worse outcome; the same applies to neutropenic patients. Forty three percent of patients had dysfunction of 3 or more organs; in this group the mortality rate was higher than in the group with dysfunction of less than 3 organs (64% vs 27%). When applying an ICU specific score (APACHE II), we defined 3 different groups in terms of mortality: in the lower risk group (3-10) all patients survived; in the higher risk group (>35), we reported a mortality rate of almost 80%. Of the 226 patients, 156 (69%) needed invasive mechanical ventilation with a mortality rate of 61% whereas those (31%) who had noninvasive ventilation had a mortality rate of only 3%.

CONCLUSIONS. This specific group of patients has a higher mortality rate than the solid cancer patients, whose mortality rate in ICU is similar to the general population (2). In our ICU, hematological patients have a mortality of 43% versus 12% for the solid tumor patients. As demonstrated in previous studies, the presence of multiorgan dysfunction and the need for invasive mechanical ventilation at admission seem to be the major predictors of a poor outcome.

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0059

SERUM IMMUNOGLOBULIN LEVELS, PLASMA VITAMIN D AND MANNOSE-BINDING LECTIN DIFFERENCES IN IMMUNODEPRESSED VS NON IMMUNODEPRESSED PATIENTS WITH INVASIVE PNEUMOCOCCAL INFECTION

R. Boixeda¹, E. Güell¹, M.C. de la Torre¹, G. Saucá¹, L. García¹, C. Muñoz-Almagro², F. Lozano², J. Almira¹, J.C. Yébenes¹

¹Consorci Sanitari Mataró, Mataró, Spain, ²Hospital Sant Joan de Déu, Barcelona, Spain, ³Clinic Hospital and University of Barcelona, Barcelona, Spain

INTRODUCTION. The most of studies about risk factors of infections exclude immunodepressed (ID) patients because this group has a predisposition to suffer more infection with worst clinical outcome. On the other hand, there are few studies that analyse how is the biologic response in infected patients with secondary ID.

OBJECTIVES. To evaluate differences in serum immunoglobulin, vitamin D and MBL levels in immunodepressed vs non immunodepressed (NID) patients with invasive pneumococcal infection (IPI).

METHODS. Prospective study of adult patients with IPI identified in the *Hospital de Mataró* (Mataró, Barcelona) from January 2011 to December 2013. IPI was defined as isolated of *S. pneumoniae* in blood cultures. Clinical, laboratory and demographic data were recorded. Comorbidity was assessed using the Charlson index. Levels of immunoglobulins, levels of vitamin D and MBL deficiency were determine on first day of diagnosis.

RESULTS. During the study period, 62 patients were detected with IPI, 49 were immunocompetent and 13 had some immunodepressive condition (2 pharmacological immunosuppression, 3 HIV-positive, 2 multiple myeloma, 3 lymphoproliferative disease and 3 solid neoplasia). Pneumonia was the infectious focus in 84% of NID patients respect 66.7% in ID patients. The Fine score was 4-5 in 48.9% of Non ID patients respect 92.3% in ID patients ($p = 0.005$). No differences were observed in terms of length of hospital stay or mortality. The incidence of low levels of serum immunoglobulin, low plasma vitamin D level and Mannose-Binding Lectin differences in immunodepressed vs non immunodepressed patients with invasive pneumococcal infection are listed in table 1.

	% of NID (n = 49)	% of ID (n = 13)	p
Low level MBL	12.8	7.7	1
Vit D (<30 ng/dl)	7.5	20	0.38
IgG < 680 mg/dL	11.1	20	0.49
IgG1 < 323 mg/dL	26.7	40	0.61
IgG2 < 154 mg/dL	11.1	80	0.002
IgG3 < 10 mg/dL	4.4	20	0.27
IgG4 < 5 mg/dL	17.8	80	0.009
IgA < 50 mg/dL	0	40	0.008
IgM < 30 mg/dL	8.9	0	1

[Comparison between ID vs NID]

CONCLUSIONS.

1. ID patients with IPI have more humoral deficiency (low levels of IgG2 and IgG4 subclass immunoglobulins) than those without immunodepression.
2. Also ID patients have a trend to higher deficiency of Vit D levels respect NID.

0060

OUTCOME AND PROGNOSTIC FACTORS CRITICALLY ILL CANCER PATIENTS

T. Taskin¹, O. Demirkiran¹

¹Istanbul University Cerrahpasa Medical School, Anesthesiology and Intensive Care, Istanbul, Turkey

INTRODUCTION. In recent years, cancer is a disease in which increased all over the world. In last 10 years approach to patients with severe cancer which required intensive care

has been changed. We aimed to evaluate the outcome and prognostic factors of cancer patients in intensive care.

METHODS. In this retrospective study, 111 patients were included in the diagnosis of solid or systemic malignancy which applied to our intensive care unit between January 2010 and May 2012.

RESULTS. In this study, 50,5 % (n = 56) female, 49,5 % (n = 55) male were admitted. Mean age of the patients was 63,33 ± 13,15 years. The most common cause of admission to ICU was acute respiratory failure (54,05 %), in order followed by sepsis (9,91 %), and metabolic acidosis (8,11 %). Length of stay in ICU was 5,73 ± 5,77 days. 63,1 of the patients discharged from ICU, and 36,9 % of the patients were died. APACHE II score (26,1 ± 5,49 vs 29,29 ± 8,08 was significantly lower in non survival group. Invasive mechanical ventilation use, length of MV 6,92 ± 6,01 vs 3,00 ± 3,37 day) was higher in non survival group. Organ failure, vasopressor use were higher in non-survival group (p < 0.001). Blood pressure was lower, and heart rate was higher in non survival group (p < 0.001).

CONCLUSIONS. We believe that the earlier assessment criteria should be developed before the patients have life-threatening organ dysfunction. We found better outcomes while multidisciplinary approach is applied to cancer patients received the intensive care unit. We believe that the formation of a joint protocol by intensive care units and oncology units would be useful for cancer patients.

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**0061
PSEUDOHYPOXAEMIA AND SPURIOUS HYPOKALEMIA IN HAEMATOLOGICAL MALIGNANCY**

G. Rajendran¹, K. Marshall¹, A. Kong¹

¹Ipswich Hospital, Intensive Care Unit, Ipswich, United Kingdom

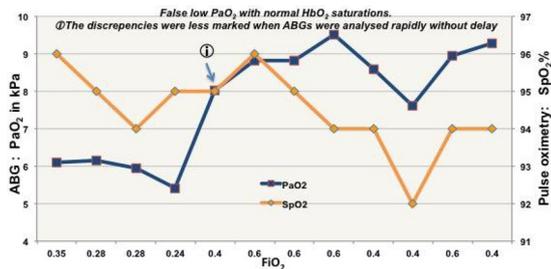
INTRODUCTION. Haematological malignancies with high blast cells could present to intensive care unit (ICU) with low PaO₂ and deranged electrolytes. We experienced a case who was admitted to ICU with severe hypokalemia and low PaO₂ which were later identified as spurious. We present a practical way of identifying 'false' hypoxaemia and hypokalemia in this group of patients.

White cell count (WCC) was 357 × 10⁹/L and a peripheral film exhibited blast cells in a middle-aged male who presented with non-specific abdominal pain and referred to ICU for management of severe hypokalemia. Bone marrow biopsy confirmed Acute Myeloid Leukemia (AML). Remarkably, despite displaying no clinical signs of respiratory failure and maintaining SpO₂ > 92 % on pulse oximetry, his arterial blood gas (ABG) samples consistently returned low readings of PaO₂ and SaO₂.

OBJECTIVE. To analyse the causes and significance of pseudohypoxaemia and spurious hypokalemia and ways to recognise and fix them.

METHOD. A literature search using terms *pseudohypox(a)emia, hypokalemia, leukocytosis and thrombocytosis* retrieved 31 case reports in 'pubmed'. All published reports with relevance to haematological malignancy were reviewed. Reported methods of identifying and correcting spurious hypoxaemia and hypokalemia were analysed.

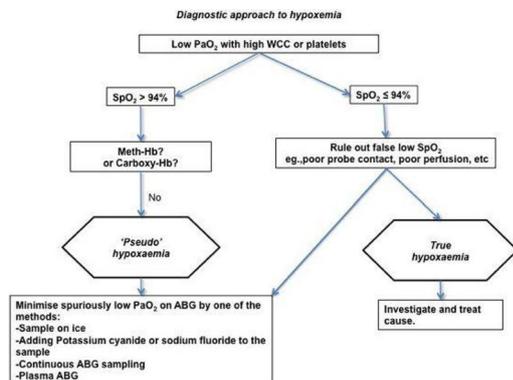
RESULTS. Analysing the ABG samples immediately after sampling, without delay, diminished the discrepancies between SpO₂ and PaO₂ in our case (Fig. 1).



[PaO₂ vs SpO₂ vs FiO₂]

This artifactual phenomenon of pseudohypoxemia typically occurs in haematological conditions when WCC is >80 × 10⁹/L or with platelets >600 × 10⁹/L [1]. It is reported to be due to oxygen consumption by abnormal leucocytes or platelets within the whole blood sample during transit or due to interference of leucocytes on the gas electrodes. Hypokalemia could be also spurious due to increased Na-K ATPase activity in the blast cells [1].

CONCLUSION. Methods to stall cell metabolism may improve the accuracy of ABG PaO₂ measurements in patients with high cell counts [2]. We present a simple flowchart to guide clinicians (Fig. 2).



[Diagnostic approach]

ICU physicians should be aware and interpret hypoxemia and hypokalemia with high index of suspicion in these patients, as it is imperative to avoid unnecessary mechanical ventilation and potentially harmful potassium infusion.

ABBREVIATIONS.

- ABG - Arterial Blood Gas
- FiO₂ - Fraction of inspired oxygen
- PaO₂ - Arterial partial pressure of oxygen
- SaO₂ - Arterial oxygen saturation
- SpO₂ - Pulse oximetry oxygen saturation
- WCC - White cell count.

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**0062
THE IMPACT OF MULTIRESTANT PATHOGENS IN CLINICAL OUTCOMES OF CANCER PATIENTS WITH SEVERE PNEUMONIA**

J. Salluh¹, L. Rabello², M. Soares¹, L. Azevedo³, I.A. de Souza³, T. Lisboa⁴

¹Instituto DOR de Pesquisa, Rio de Janeiro, Brazil, ²Instituto Nacional de Câncer, Rio de Janeiro, Brazil, ³Hospital Sírio-Libanês, São Paulo, Brazil, ⁴Santa Casa de Misericórdia de Porto Alegre, Porto Alegre, Brazil

INTRODUCTION. Pneumonia is the most frequent type of infection in cancer patients. Multiresistant (MR) pathogens are often associated with inadequate antimicrobial therapy and they have been associated with increased mortality.

OBJECTIVES. The aims of this study were to describe the microbiology and outcomes of cancer patients with severe pneumonia requiring ICU admission.

METHODS. A secondary analysis of a prospective cohort study was performed from 2002 to 2013 at 3 ICUs in Brazil (2 in referral cancer centers and one in a high-volume tertiary hospital). Adult patients (>18 years) with a diagnosis of cancer with pneumonia (not acquired in the hospital setting) were evaluated at ICU admission. Demographic, clinical and laboratory data were collected during the first day of ICU: CURB-65, SAPS II, SOFA score, comorbidities, Performance Status and cancer-related data. Microbiologic data included bacterial characteristics, MR identification, empiric antibiotics and the adherence to treatment guidelines.

RESULTS. 325 patients were admitted in the ICU with pneumonia being 229 (70.5 %) patients with solid tumors and 96 (29.5 %) patients with hematological malignancies. ICU and hospital mortality rates were 45.8 % and 64.9 %. Microbiological confirmation was present in 169 (52 %) with a slight predominance of Gram negative bacteria [99 (30.5 %)]. There were 40 (12.3 %) positive blood cultures. The most frequent pathogens were methicillin-sensitive *S. aureus* [42 (24.9 %)], *P. aeruginosa* [41(24.3 %)] and *S. pneumoniae* [21 (12.4 %)]. A relatively low incidence of MR [23 (13.6 %)] was observed. Adequate antibiotic therapy based on microbiological identification and in vitro susceptibility was prescribed for most patients [136 (80.5 %)]. Adherence to ATS/IDSA guidelines was observed in only 98 (30.2 %) patients. The most common failures to adhere to the ATS/IDSA guidelines were the absence of double therapy (amycacin/quinolones) [174 (53.5 %)] and lack of coverage of MRSA [134 (41.2 %)]. Hospital mortality rates were comparable between MR and no MR patients [MR 17 (73.9 %) vs 99 (67.8 %) p 0.636]. There were no differences regarding ATS/IDSA guidelines adherence [MR 2 (8.7 %) vs 30 (20.5 %) p = 0.255]. In MV analysis, mechanical ventilation [OR 6.53 (3.27 - 13.10)], dialysis [OR 4.48 (1.46 - 13.74)] and higher SAPS II [OR 1.03 (1.00 - 1.05)] were associated with increased hospital mortality. MR were forced into MV analysis but were not associated with outcomes.

CONCLUSIONS. Severe pneumonia in cancer patients presents high hospital mortality rates, with particular clinical and microbiological characteristics. Despite low adherence to ATS/IDSA guidelines, antibiotic therapy was adequate in most patients following local guidelines based on local bacterial profiles. Further investigation is needed to clarify the impact of MR pathogens on clinical outcomes of cancer patients with severe pneumonia.

**0063
DIC SCORE PREDICTS MORTALITY IN CRITICALLY ILL PATIENTS WITH LIVER CIRRHOSIS**

A. Drolz^{1,2}, T. Horvatis^{1,2}, K. Rutter^{1,2}, S. Kluge¹, V. Fuhrmann^{1,2}

¹University Medical Center Hamburg-Eppendorf, Intensive Care Medicine, Hamburg, Germany, ²Medical University of Vienna, Internal Medicine III, Gastroenterology and Hepatology, Vienna, Austria

INTRODUCTION. The disseminated intravascular coagulation (DIC) score has been shown to predict outcome in critically ill patients. Since disturbances of coagulation and hemostasis, as reflected by the DIC score, are a common finding in patients with liver cirrhosis, it is unclear whether the DIC score has prognostic value in critically ill patients with liver cirrhosis.

OBJECTIVES. To assess the applicability and prognostic impact of the DIC score in critically ill patients with liver cirrhosis

METHODS. Patients with liver cirrhosis admitted to the medical intensive care unit (ICU) were analyzed for this study. Detailed laboratory analyses including platelet count, d-dimer, fibrinogen and prothrombin index were performed on admission and the DIC score was calculated. Survival was assessed on site or by contacting the patients or the attending physician.

RESULTS. One hundred admissions to ICU with liver cirrhosis were analyzed. Thirty-two percent were female. Median age was 55 (IQR 48-63) years. The median SOFA score on admission was 8 (4-13), median MELD score 25 (IQR 19-36), 28-day-mortality was 58 %. Median DIC score on admission was 5 (IQR 4-9). Overt DIC (DIC score ≥ 5) was found in 62 %. DIC score was significantly higher in non-survivors compared to survivors (5 (IQR 4-7) vs. 4 (IQR 4-6); p < 0.01). AUROC for the DIC score in prediction of 28-day-mortality was 0.66 (95 % CI 0.56-0.77). Overt DIC on admission was significantly associated with 28-day-mortality (OR = 2.89 (95 % CI 1.25-6.66), p < 0.05). 28-day-mortality rate in admissions with cirrhosis and overt DIC was 68 % compared to 42 % with that with a DIC score < 5.

CONCLUSIONS. Disturbances in coagulation and hemostasis are found in the majority of cirrhotic patients admitted to the ICU. The DIC score is a suitable predictor of 28-day-mortality in critically ill patients with liver cirrhosis.

0064

DOES THE CHILD-PUGH SCORE PREDICT ICU SURVIVAL IN THE CRITICALLY ILL PATIENT WITH CHRONIC LIVER FAILURE?D.P. Wise¹, S.R. Singh¹, T.D. Wardle¹¹Countess of Chester Hospital, Chester, United Kingdom

INTRODUCTION. The mortality rate for patients with chronic liver failure who develop critical illness is high [1]. The Child-Pugh score (CPS) is a useful prognostic indicator for patients with chronic liver disease. Scoring ranges from five to fifteen and is measured using a number of variables including: grade of encephalopathy, grade of ascites, serum bilirubin, serum albumin and prothrombin time. A score of 5-6 = category A cirrhosis, 7-9 = category B cirrhosis and 10-15 = category C cirrhosis. These scores are associated with a 1 year survival rate of 100, 80 and 45 per cent respectively [2].

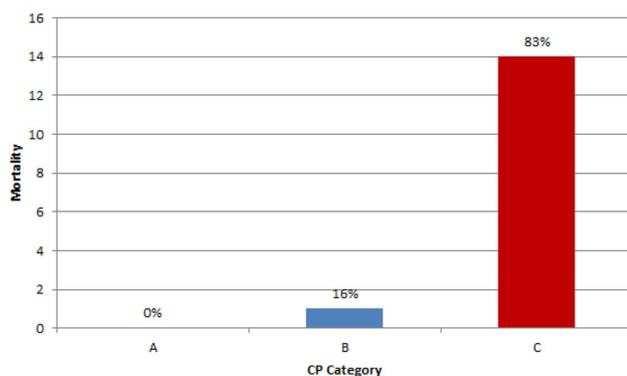
OBJECTIVES. (a) To investigate any correlation between the pre-ICU CPS on admission and hospital survival after ICU. (b) To determine ICU mortality according to CP category and CPS.

METHODS. Data were obtained via the Intensive Care National Audit and Research Centre (ICNARC) [3]. A pre-ICU CPS was calculated for each case diagnosed as hepatic failure with evidence of chronic liver disease managed in the ICU (n = 31). The outcome measures were survival to hospital discharge or death. The CPS was then matched to the outcome.

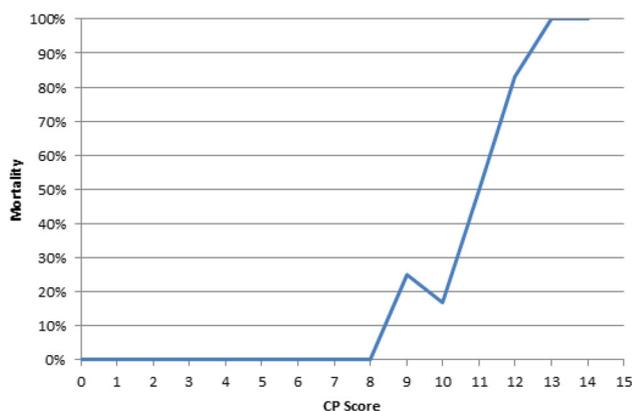
RESULTS.

CP Category on admission	Total number (n)	Survival to hospital discharge (n)	Death (n)
A	3	3	0
B	6	5	1
C	22	8	14
Total	31	16	15

[A Table to describe Results]



[A Bar Chart to describe Results]



[A Scattergraph to describe Results]

There were 7 patients classified as CP category C whose score was ≥ 13 , all but one died. There were 6 patients who scored 10 (category C minimum score), 5 of these survived.

CONCLUSIONS. This limited study has shown:

- Hospital mortality appears to increase with increasing CPS in the critically ill ICU patient with chronic liver failure.
- There appears to be an inflection point around a CPS of 12 after which the mortality rises sharply with no survivors with a score of ≥ 13 .
- A large study is required to confirm these observations.
- If confirmed the pre-ICU CPS may help guide selection for critical care in critically ill patients with chronic liver failure.
- In particular the pre-ICU score may help to identify those patients who would not benefit from ICU (CPS ≥ 13).
- There is scope to subdivide the Child's C category as most patients with a score of 10 survived the admission, while those with a score of ≥ 13 did not survive.
- One suggestion is to classify all scores between 10 and 12 as category C_a and all scores ≥ 13 into a category C_b.

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0065

IS EARLY MOBILITY BEING DONE IN THE CLINICAL PRACTICE?K.T. Timenetsky¹, F.M. de Freitas², R.D.S. Santos², D.H. de Lacerda², P. Verissimo², D. Carnieli-Cazzati², R.A. Caserta²¹Hospital Israelita Albert Einstein, Critically Ill, Sao Paulo, Brazil, ²Hospital Israelita Albert Einstein, Sao Paulo, Brazil

INTRODUCTION. Early mobility in critically ill patients has become an integral part of their treatment. Improvements on mechanical ventilation time, delirium and return to independent functional status at hospital discharge have been reported. Although, are we mobilizing our patients early on clinical practice?

OBJECTIVE. To evaluate if early mobility is being performed at clinical practice.

METHODS. A prospective, observational study was performed in order to follow patients who were under physiotherapy treatment during 1 month period at a 41 bed intensive care unit (ICU). We observed the number of patients that were receiving early mobility, which type of early mobility they were receiving, and if there was anything different that could have been performed at that moment. Patients and physiotherapists were blinded to the study's objective.

RESULTS. We observed 130 patients during the study period, 60 % of patients were male, and median age of 77 years old (range of 20 to 88). Of these patients, 50 % were under invasive mechanical ventilation and 17 % under noninvasive mechanical ventilation. Regards to patients under invasive mechanical ventilation (65 patients), 29 % were sedated. Of all patients observed, 17 % were using low levels of vasopressor drugs. Early mobility was performed in 115 patients (88.4 %). Of these patients, 42 % were receiving passive mobilization, 1.7 % assistive exercise, 22.6 % active-assisted exercise, 15.6 % active exercise, and 3.4 % resisted exercise. In regards to functional activity, 20 % were submitted to sitting, 16.5 % to standing position, and 12 % to walking in the ICU. Regardless of most patients been submitted to early mobility, 76.5 % of them could have been submitted to a more challenging activity.

CONCLUSION. The majority of ICU patients are receiving early mobility, but most of them could have been challenged to a higher level of activity.

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0066

A SURVEY OF INTERNATIONAL PRACTICES AND INFRASTRUCTURE TO SUPPORT EARLY MOBILIZATIONR.N. Bakhru¹, D.J. McWilliams², V.J. Spuhler³, D.J. Wiebe⁴, W.D. Schweickert⁵

¹Wake Forest School of Medicine, Pulmonary, Critical Care, Allergy, and Immunologic Diseases, Winston Salem, United States, ²Queen Elizabeth Hospital, Therapy Services, Birmingham, United Kingdom, ³University of Utah, College of Nursing, Salt Lake City, United States, ⁴University of Pennsylvania School of Medicine, Center for Clinical Epidemiology and Biostatistics, Philadelphia, United States, ⁵Hospital of the University of Pennsylvania, Pulmonary, Allergy, Critical Care Medicine, Philadelphia, United States

INTRODUCTION. Early mobilization (EM) of mechanically ventilated (MV) patients has been demonstrated to be safe, feasible, and improve patient outcomes. However, pioneer EM programs have varied in their implementation methodology. Dissemination of EM practices is not known and may vary based upon national standards of ICU infrastructure.

OBJECTIVES. The primary objective of this study was to describe EM practices in the context of ICU infrastructure in four countries. Secondary objectives were to determine EM written protocol prevalence and report barriers to practice.

METHODS. An international phone survey of clinical leaders of ICUs in the UK, Germany, France (n = 150 for each country), and the United States (n = 500) was conducted. Institutions were selected at random with stratification based on size (EU, US) and region (US). Nurse managers were the target audience; physicians and physiotherapy leaders were accepted. Protocol prevalence was compared with Chi squared testing. Multivariable logistic regression was conducted to identify hospital and ICU factors associated with EM protocols.

RESULTS. 1487 ICU leaders were contacted with 951 surveys completed (64 % response rate). Hospital and ICU characteristics (Table 1) demonstrate marked variability in unit-based physiotherapists, high intensity staffing, and nurse: patient ratios. Sedation and weaning protocols were quite variable; they were most common in the US (p < 0.01 for each). However, written EM protocol use was infrequent amongst all four countries (20-30 % prevalence). Programs incorporating ambulation of MV patients was variable (31-67 % of ICUs with EM protocol; 8-79 % of ICUs with EM practice), as were programs using a bedside cycle or neuromuscular electrical stimulation. Variables independently associated with an EM protocol included other protocol use (weaning protocol OR 4.82, p < 0.01, France; sedation protocol OR 4.66, p < 0.01, Germany; sedation protocol OR 2.18, p = 0.02, US), setting written daily goals for patients (OR 2.32, p = 0.13, Germany; OR 2.00, p = 0.07 in US), and conducting multidisciplinary rounds (OR 2.15, p = 0.01, US). The most common barriers to EM were safety and feasibility concerns in France, staffing concerns in Germany, and safety and prioritization concerns in the UK and US.

CONCLUSIONS. EM protocols exist in the minority of hospitals. ICU infrastructure varies and may lead to different barriers to EM implementation. Protocols for EM implementation may require sensitivity to country given variable ICU infrastructure.

GRANT ACKNOWLEDGMENT. Research funded by Hill-Rom.

	France	Germany	UK	US
Type of ICU				
Medical/ Surgical	51%	39%	79%	58%
Medical alone	15%	22%	2%	35%
Median ICU Beds	10 (6-14)	12 (8-16)	9 (6-16)	16 (12-24)
High-Intensity Staffing	66%	82%	83%	48%
Multidisciplinary Rounds	89%	61%	70%	77%
Dedicated Physiotherapists	77%	52%	92%	34%
Nurse to Patient Ratio				
1:1	0%	3%	97%	1%
1:2	4%	39%	1%	88%
1:3 or less	90%	58%	2%	3%
Sedation Protocol	41%	53%	68%	83%
Ventilator Weaning Protocol	21%	57%	44%	80%
EM				
Written Protocol	24%	30%	20%	30%
EM Practice Without Protocol	16%	29%	32%	16%

[Table 1]

0067

INTERMITTENT POSITIVE PRESSURE AND VOLUME RESPIRATORY INCENTIVATOR IMPROVES LUNG FUNCTION IN ABDOMINAL SURGICAL PATIENTS

S.C. Fernandes¹, D. Carnieli-Cazati¹, K.T. Timenetsky², E.A. Giovanetti¹, R.A. Caserta¹
¹Hospital Israelita Albert Einstein, Critically Ill, Sao Paulo, Brazil, ²Hospital Israelita Albert Einstein, Critically ill, Sao Paulo, Brazil

INTRODUCTION. Abdominal surgeries lead to respiratory complications, such as reduction in lung volumes and capacities. Chest physiotherapy (CPT), in order to expand lung volumes, helps to promote the reestablishment of lung mechanisms, although there are no evidence of which would be the best technique to achieve it.

OBJECTIVE. To evaluate the vital capacity (VC) after two CPT techniques in abdominal surgical patients.

METHOD. A prospective randomized study, in abdominal surgical patients admitted to the Intensive Care Unit (ICU) of Hospital Israelita Albert Einstein. The following data were collected: VC measurement, muscle force evaluated by the Medical Research Council (MRC) and Functional Independence Measurement (MIF). These data were collected at two moments: one right after patient was breathing spontaneously at the ICU (D1) and at ICU discharge (D2). A total of 38 patients were randomized in two groups: positive pressure group (PP) and respiratory incentive group (RI).

RESULTS. 18 patients were in the PP group and 20 in the RI group. There were no difference in age, gender and personal medical antecedents. In regards to VC, there was no difference between D1 and D2 in the PP group (median of 1412 ml ± 547.21 × 1809 ± 692.32 respectively, p = 0.979). The same was observed in the RI group (1408.33 ± 419.12 × 1838.89 ± 621.33 respectively, p = 0.889). Nevertheless there was a significant improvement in VC after CPT at D1 and D2 (p < 0.001; p < 0.001, respectively). The same improvement was observed in FIM (p < 0.001). The improvement in VC had no correlation with the improvement in muscle force. In the PP group there was no correlation of MRC score with VC at D1 and D2 (r = 0.10 and r = 0.235, respectively), as for the RI group (r = 0.520 and r = 0.138, respectively). In this way confirming that CPT techniques were effective regardless of muscle force improvement.

CONCLUSION. Chest physiotherapy, through positive pressure and respiratory incentive is effective in improving VC of abdominal surgical patients, demonstrating the importance of immediate physiotherapy intervention in this setting.

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0068

CLINICAL PREDICTORS OF NEONATAL HEALTHCARE-ASSOCIATED BLOODSTREAM INFECTIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

E.H. Verstraete¹, K. Blot², D. Vogelaers¹, L. Mahieu³, S. Blot¹

¹Ghent University, Internal Medicine, Ghent, Belgium, ²Ghent University, Faculty of Medicine and Health Sciences, Ghent, Belgium, ³Antwerp University Hospital, University of Antwerp, Neonatal Medicine, Antwerp, Belgium

INTRODUCTION. Blood cultures are the gold standard for neonatal healthcare-associated bloodstream infections (HABSI) diagnosis, but time consuming and suffering from sensitivity and specificity issues. Prediction models aim to facilitate early diagnosis and treatment of neonatal HABSI.

OBJECTIVES. To systematically review prediction models for neonatal HABSI and to pool odds ratios (OR) of individual clinical parameters, i.e. clinical signs, hematological markers, and risk factors to detect predictors of neonatal HABSI.

METHODS. A systematic search was done by two researchers separately (all in English, up till January 2014). The following items were collected: population characteristics; setting; methods; in- and exclusion criteria; applied HABSI definition; clinical assessment time and clinical parameter definitions. Only results of laboratory-confirmed HABSI were included. Methodological quality of the included studies was assessed through the QUADAS-2 scale. Random-effects meta-analysis calculated pooled OR and 95 % confidence interval (CI) of clinical parameters.

RESULTS. The systematic review revealed 9 articles with 7 different models representing a total of 883 neonates and 1011 episodes of HABSI. Heterogeneity in study definitions hampered comparison and selection bias might have confounded the results. Fourteen clinical parameters could be pooled over 2 till 5 studies (Table 1). Lethargy and pallor or mottling were predictive for HABSI. Tachycardia and need for increased respiratory support reached a borderline significance (p < 0.100).

CONCLUSIONS. These findings suggest that lethargy and pallor or mottling are the most powerful predictors of neonatal HABSI.

Predictor	Pooled OR	95% CI	p-value	Heterogeneity (I-squared)	Number (studies/neonates)
Apnoe/Bradycardia	1.60	0.78-3.30	0.201	69%	5/579
Bronchopulmonary dysplasia	5.17	0.33-81.30	0.243	79%	2/180
Distended abdomen	1.30	0.80-2.12	0.295	0%	4/437
Feeding intolerance	1.40	0.64-3.03	0.399	55%	5/579
Fever	1.72	0.86-3.45	0.127	37%	3/302
Grunting	1.02	0.54-1.93	0.943	0%	4/479
Hypothermia	1.78	0.85-3.74	0.126	0%	3/302
Increased respiratory support	1.86	0.97-3.58	0.064	41%	3/399
Irritability	0.88	0.38-2.04	0.772	0%	2/319
Lethargy	3.98	1.69-9.40	0.002	72%	4/499
Necrotizing enterocolitis	2.59	0.38-17.5	0.329	42%	2/180
Pallor/Mottling	2.55	1.26-5.18	0.010	52%	3/419
Tachycardia	1.64	0.96-2.79	0.070	5%	3/399
Tachypnea	1.27	0.68-2.34	0.454	29%	3/399

[Table 1. Random-effects meta-analysis of predictors]

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0069

IMPACT OF NEONATAL HEALTHCARE-ASSOCIATED BLOODSTREAM INFECTIONS ON MORTALITY IN A NEONATAL INTENSIVE CARE UNIT

E.H. Verstraete¹, K. De Coen², D. Vogelaers³, P. Vanhaesebrouck², S. Blot¹

¹Ghent University, Internal Medicine-Infectious Diseases, Ghent, Belgium, ²Ghent University Hospital, Ghent University, Neonatal Medicine, Ghent, Belgium, ³Ghent University Hospital, Ghent University, Internal Medicine-Infectious Diseases, Ghent, Belgium

INTRODUCTION. Healthcare-associated bloodstream infection (HABSI) is a frequent complication in neonatal intensive care units (NICUs) and can be life-threatening.

OBJECTIVES. To describe risk factors for mortality in neonates with special emphasis on impact of HABSI.

METHODS. A hospital-based surveillance-program and a NIC audit system were used to identify neonatal HABSI-cases (2002-2011). HABSI is defined according to National Institute of Child Health and Development criteria. Neonates with a NICU stay <3 days were excluded. Only the first episode of HABSI is considered. Severity of illness is assessed with the Clinical Risk Index for Babies (CRIB) score. Risk factors for mortality were assessed by univariate analysis and multiple logistic regression.

RESULTS. On 5134 admissions, 342 neonates developed HABSI (6.7 %). Overall mortality was 5.6 % (n = 288). Univariate risk factors associated with mortality are in Table 1. Logistic regression analysis revealed that independent risk factors for mortality are: asphyxia (OR 41.5, confidence interval [CI] 23.5-73.2), CRIB ≥ 4 (OR 6.0, 95 % CI 4.4-8.1), life-threatening congenital malformation (OR 7.6, 95 % CI (5.4-10.7), renal insufficiency (OR 6.8, 95 % CI 4.0-11.5), and very-low-birth-weight (VLBW) (OR 3.6, 95 % CI 2.6-5.1). Adjusting for other variables, HABSI is no risk factor for mortality (p = 0.839). **CONCLUSIONS.** HABSI is associated with but not significantly predictable for mortality.

VARIABLE	DEAD (n=288)	SURVIVED (n=4846)	P-value
Asphyxia, n (%)	42 (14.6)	35 (0.7)	<0.001
Birth weight, ≤1500 gram, n (%)	114 (39.6)	859 (17.7)	<0.001
Cerebral hemorrhage, n (%)	89 (30.9)	217 (4.5)	<0.001
Life-threatening congenital malformation, n (%)	96 (33.3)	410 (8.5)	<0.001
CRIB ≥4, n (%)	147 (51.0)	435 (9.0)	<0.001
Gender, male, n (%)	169 (58.7)	2829 (58.4)	0.919
Gestational age, ≤31weeks, n (%)	110 (38.2)	972 (20.1)	<0.001
HABSI, n (%)	36 (12.5)	306 (6.3)	<0.001
Renal insufficiency, n (%)	41 (14.2)	63 (1.3)	<0.001
Mechanical ventilation, n (%)	269 (93.4)	1677 (34.6)	<0.001
NICU stay, days (median, Q1-Q3)	6 (3-17)	14 (8-26)	<0.001
Surgery, n (%)	66 (22.9)	762 (15.7)	0.001

[Table 1. Univariate risk factors for mortality.]

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0070

ORAL CARE IN VENTILATED PATIENTS - CAN WE IMPROVE IT?

A.L. Pivkina¹, V.G. Gusarov¹, I.V. Zhivotneva¹, G.E. Bodunova¹

¹N.I. Pirogov National Medical Surgical Center, ICU, Moscow, Russian Federation

INTRODUCTION. Oral hygiene significantly decreases the risk of ventilator-associated pneumonia (VAP)¹. Yet, ICU nurses frequently perceive oral care as a challenging task. Special devices for oral care may facilitate this procedure.

AIM. To compare the efficacy and usability of oral care methods in ventilated patients.

METHODS. This is an open, controlled randomized study (period: Jan 2013 - Feb 2014) in which patients were designated to receive either (I) traditional oral care with use of tissue swabs, dressing forceps, metal tray and suction catheter or (II) special oral care with a kit including a self-cleaning covered Yankauer, suction toothbrushes, suction and applicator swabs, containers for antiseptic solution (0.02 % aqueous chlorhexidine solution). Usability of the methods was evaluated by means of a questionnaire filled out by nurses after each oral care intervention. Questionnaires reflected oral care method's convenience, simplicity and efficacy, risk of oral mucosa trauma, and procedure time. The 5-grade scale ranging from 1 (very bad) to 5 (very good) was used. VAP rate, onset time, use of antibiotics for VAP, length of ventilation and ICU stay was monitored in both patient groups.

RESULTS. Forty patients were enrolled in the study, 19 received traditional and 21 specialized oral care. The incidence of new VAP cases decreased in the main group from 68.4 ± 10.6 % to 33.3 ± 10.3 % (p < 0,05), days of VAP/100 days of tracheal intubation - from 52.4/100 to 18.4/100 (p < 0,05), pneumonia developed later (8,7 vs. 4,8 days, p < 0,001), the amount of daily antibiotics doses for VAP decreased from 256 to 111 (p < 0,01). A non-significant decrease of ventilation time from 15 (9,5-18,5) to 11 (8-20) days (p > 0,05) and time of intensive care unit stay from 22 (17,5-29,5) to 19 (22-28) days (p > 0,05) was registered. Eighteen ICU nurses took part in the usability study and processed 152 questionnaires. Results of the evaluation are in the Table.

Sign, % Traditional method (I) Special devices (II)

5 4 3 2 1 5 4 3 2 1

Convenience - - 100,0 - - 78,9 21,1 - - -

Simplicity - - 89,5 10,5 - 88,1 9,2 2,6 - Efficacy - 19,7 80,3 - - 81,6 14,5 3,9 - Risk of mucosal trauma - 19,8 10,5 69,7 - 78,9 17,1 4,0 - -

CONCLUSIONS. The use of a special oral care kit seems to reduce VAP rate and as such also antibiotic consumption. The overall usability of the kit was perceived very valuable.

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0071

SUPERVISED MACHINE LEARNING CAN CLASSIFY ARTIFACT IN MULTI-SIGNAL VITAL SIGN MONITORING DATA FROM STEP-DOWN UNIT (SDU) PATIENTS

M. Hrvanek¹, L. Chen², A. Dubrawski², G. Clermont³, E. Bose¹, M. Fiterau², D. Wang², M. Güllame-Bert¹, M.R. Pinsky³

¹University of Pittsburgh, School of Nursing, Pittsburgh, Pennsylvania, United States,

²Carnegie Mellon University, Robotics Institute, Pittsburgh, Pennsylvania, United States,

³University of Pittsburgh, School of Medicine, Pittsburgh, Pennsylvania, United States

INTRODUCTION. Clinicians must filter alarms from monitoring artifact to identify true patient instability using non-invasive vital sign (VS) data streams to avoid alarm fatigue. **OBJECTIVES.** We used a variety of validated supervised machine-learning algorithms trained on expert-annotated data to develop models based on pattern recognition in multi-VS data to automatically classify events as artifacts and real alerts, and then test the models in VS data streams from bedside monitors.

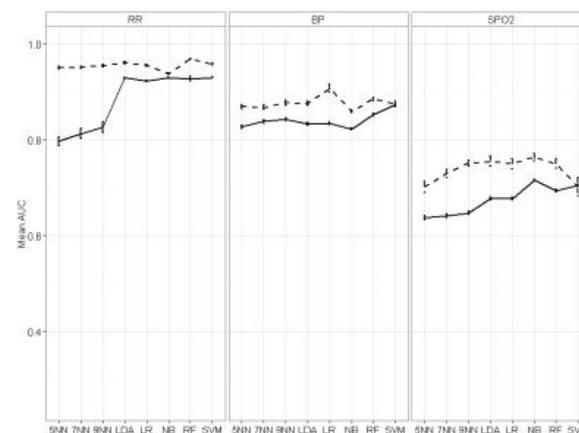
METHODS. Monitoring data were recorded (frequency 1/20 Hz) in 634 SDU patients (41,635 monitoring hours). VS excursion beyond stability thresholds (HR <40 or >140, RR <8 or >36, SysBP <80 or >200, DiaBP >110, SpO2 <85 %) defined events, which were visually annotated by two experts as real or artifact. Data were then divided into two 8-week blocks (Block 1 served as the machine learning training/validation set; Block 2 as the test set). In Block 1 we used expert opinion to develop featurized rules for patterns discriminating artifact from real alerts, extracted their numeric features, and applied machine learning algorithms using these features to train and validate models to classify events as real or artifact. Machine learning algorithms (K nearest neighbors [NN] at different K, Linear Discriminative Analysis [LDA], Logistic Regression [LR], Naïve Bayesian classifier [NB], Random Forest [RF], and Support Vector Machine [SVM]) were then used to test the robustness of the models to correctly classify events (real or artifact) in Block 2 data.

RESULTS. Block 1 yielded 812 VS events, and 40 % were judged by experts as artifact (RR 43 %, SpO2 40 %, BP 15 %, HR 2 %); Block 2 had 1,521 events; also 40 % artifact. Fig. 1 summarizes mean AUC scores for Block 1 (dashed lines) from the various machine learning algorithms after model training and 10-fold cross-validation. In Block 1, the VS event providing consistently best AUC scores for correct classification was RR (range of high AUC score 0.970 for RF to low 0.951 for SNN) followed by BP (range of high AUC 0.907 for LR to low 0.860 for NB), while SpO2 was hardest to classify (range of high AUC 0.764 for NB to low 0.702 for SNN and SVM). When the models were tested on Block 2 data (solid lines in Fig. 1), which was unseen and did not participate in model building, RF still correctly classified RR artifact with an AUC score of 0.942, LR still classified BP with an AUC of 0.839, while NB classified SpO2 with an AUC of 0.716. RF seemed to be the classifier performing consistently well across all VS in both training and test sets.

CONCLUSIONS. VS artifacts are common in monitored step-down unit patients and usually follow predictable patterns. Supervised machine learning-defined algorithms

allowed us to build models that accurately classified events (real or artifact) to a clinically important degree.

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[Figure 1.]

0072

USE OF HELIUM-OXYGEN IN PATIENTS WITH RESPIRATORY DISTRESS

P. Aliaga Simões de Souza¹, E. Ribeiro dos Santos¹, B. Murata Murakami¹

¹Faculdade de Enfermagem do Hospital Israelita Albert Einstein, São Paulo, Brazil

INTRODUCTION. The velocity of airflow in the airways is determined by several factors including the inspired gas density. The lower the density, the easier it is for a gas to penetrate the lungs due to reduced friction, which decreases the respiratory effort¹⁻³. Helium is a low-density gas that can be mixed with oxygen, a compound referred to as helium-oxygen (HO). This mixture can assist in the treatment of diseases such as asthma, laryngitis, bronchiolitis, with evidence for improvement in dyspnea symptoms^{1,2}. HO also aids in the elimination of CO₂ because its diffusion process is 4 to 5 times higher compared with the ambient air⁴. Treatment with HO is indicated in cases refractory to conventional therapy and often used for the pediatric population due to their anatomical and physiological characteristics, which makes them more vulnerable to obstructive diseases^{2,4}.

OBJECTIVES. To identify the clinical and epidemiological profile of children and newborns who used HO and to investigate the clinical evolution of patients and complications. **METHODS.** This is a field retrospective descriptive-exploratory study, based on quantitative analysis of data collected from medical charts. The study was performed in a large private tertiary care hospital in São Paulo - Brazil. The non-probability sample consisted of charts of children who used HO during May 2010 to Aug 2013. For data collection, a four-part instrument was used: sample characterization, clinical signs, symptoms and medical diagnosis, clinical evolution and complications.

RESULTS. 49 medical charts were assessed. Most children (33, 67.3 %) were male with predominant age from zero to 1 year (19, 38.7 %). The most common clinical antecedents were asthma (11, 20.7 %) and bronchitis (6, 11.3 %). The most prevalent signs and symptoms were cough (25, 29.4 %), dyspnea (24, 28.2 %) and fever (8, 9.4 %). The most frequent medical diagnosis on admission was asthma (11, 22.4 %), followed by acute respiratory failure (10, 20.4 %) and bronchospasm (9, 18.3 %). Improved respiratory distress occurred in 26 patients (53.0 %), observed through modification of vital parameters and through Wood's modified scores or Croup Score. Only one patient had a complication, severe hypoxemia requiring tracheal intubation.

CONCLUSION. The present study found that HO therapy was most often used by male patients under 1 year old, hospitalized with asthma. Most patients (53.0 %) were benefited, with improved breathing pattern. The treatment was proven safe, with only one complicated case.

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0073

WHO ARE WE SITTING, STANDING AND WALKING IN THE ICU?

C. Taniguchi¹, C.S.D.M. Silva², K.T. Timenetsky¹, A.M.S.O. Nogueira¹, R.D.S. Santos², E.A. Giovanetti², C.S. Antunes¹, S. Calegari¹, S.S. Kanda¹, R.A. Caserta²

¹Hospital Israelita Albert Einstein, Critically Ill, Sao Paulo, Brazil, ²Hospital Israelita Albert Einstein, Sao Paulo, Brazil

INTRODUCTION. Recent studies demonstrated the benefit of early mobilization in critically ill patients, such as functional independence upon discharge, fewer days of mechanical ventilation (MV) and lower incidence of delirium. The early mobilization techniques are: assuming the Sitting position (SiP), Standing position (StP) and Walking (W). Nevertheless we would like to assess the degree of severity of patients who undergo SiP, StP and W in our intensive care unit (ICU).

OBJECTIVE. To assess the criticality of patients undergoing SiP, StP and W in the ICU and to detect whether the mobilization is related to any of the patient characteristics.

METHODS. A prospective observational study, which was conducted in the ICU of the Hospital Israelita Albert Einstein after the Ethics Committee approval. All patients admitted to the ICU who were performing physiotherapy, aged 18 and over, were included in the study. Patients who did not accept participation in the study were excluded. The following data were collected: demographic data, admission diagnosis, severity scores (SAPS), ICU and hospital length of stay, presence of sepsis, use of non-invasive ventilation (NIV), MV

use and time, pulse oxygen saturation, value of lactic acid, overall muscle strength (assessed by the Medical Research Council -score for muscle strength), period of time and distance maintained in functional activities (SiP, StP and W). Data was collected over a 12-month period.

RESULTS. We evaluated 183 patients, mostly male patients (60 %), median age of 72 years old (range of 23 to 102). Most patients were admitted for clinical treatment (68 %), and used NIV (55 %). There were no complications related to any of the activities. We observed that the time until SiP was significantly lower among patients with surgical treatment ($p = 0.045$). The time until SiP, StP and W was significantly lower among patients who did not use MV ($p < 0.001$). The time spent in SiP was significantly higher among those who did not use MV ($p = 0.036$). The longer the duration of MV, the longer until SiP ($r = 0.694$), StP ($r = 0.798$) and even W ($r = 0.798$). There was significant evidence ($p < 0.001$) with moderate correlation between duration of ICU and hospital stay and time to the activity: the longer the duration of ICU stay, the longer it was until SiP ($r = 0.565$ and 0.442 , respectively), StP ($r = 0.484$ and 0.455 , respectively) and W ($r = 0.480$ and 0.446 , respectively).

CONCLUSION. The results suggests that surgical patients perform the activities earlier than clinical patients; patients who did not need MV performed the activity earlier; the longer the MV period, the longer it was until the start of activities; also the sooner the activities were performed the sooner the patient could be discharged from the ICU and from the hospital.

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Age (years) - median (range)	72 (23-102)
Clinical Treatment - n(%)	125 (68.3)
Surgical Treatment - n(%)	58 (31.7)
Sepsis - n(%)	58 (31.7)
Mechanical Ventilation - n(%)	89 (48.6)
Tracheostomy - n(%)	9 (4.9)
Noninvasive ventilation - n(%)	101 (55.2)
SAPS - median (range)	52 (11-109)
ICU length of stay - median (range)	4 (1-255)
Hospital length of stay - median (range)	16 (2-373)

[Table 1 - Patients characteristics]

	Sitting Position	Standing Position	Walking
Period in position (minutes) - median (range)	120 (2-480)	5 (1-30)	–
Time to position (days) - median (range)	2.6 (0.1-54)	2.5 (0.1-53)	2.7 (0.1-14.7)
MRC muscle score - median (range)	48 (6-60)	53 (20-60)	60 (34-60)
Lactic Acid - median (range)	12 (5-34)	12 (5-31)	12 (7-31)
Distance Walked (meters) - median (range)	–	–	9 (1-600)

[Table 2 - Detail of patients functional activities]

0074

IS THE MANCHESTER MOBILITY SCORE ON DISCHARGE FROM INTENSIVE CARE AN INDICATOR OF POST INTENSIVE CARE LENGTH OF STAY AND HOSPITAL DISCHARGE DESTINATION?

J.A. Grant¹, O. Gustafson¹

¹Oxford University Hospitals, Physiotherapy, Oxford, United Kingdom

INTRODUCTION. The benefits of early mobility in critically ill adults are becoming increasingly recognised. It is unclear whether achieving a higher functional state whilst on the Intensive Care Unit (ICU) has positive benefits on reducing the post ICU length of stay (LoS). The Manchester Mobility Score (MMS) is a simple bedside measurement tool which has been shown to be effective in assessing rehabilitation at ICU discharge¹. It has been implemented in several ICU's in the UK. To date little data exists exploring the link between MMS on ICU discharge and post ICU length of LoS, or on discharge destination from hospital.

OBJECTIVES. Review if a correlation exists between the ICU discharge MMS and post ICU LoS and discharge destination.

METHOD. A retrospective review was carried out in the general ICU of a university teaching hospital. The population included general surgical, medical and trauma patients. All patients who had an ICU LoS of greater than 3 days, survived to critical care unit discharge, and were discharged towards within the same hospital were included. Their MMS and ICU discharge were recorded, along with their post ICU length of stay, and their discharge destination (home, other NHS provider, re-admission to ICU, death).

RESULTS. Data was collected for 245 patients. Those discharged with a MMS of greater than 5 demonstrated a 58 % shorter post ICU LoS compared with those with 4 and below. On discharge from hospital 75 % of patients with an MMS of 5 went home, compared with 40 % of those with an MMS of 3.

CONCLUSION. A higher MMS on ICU discharge is associated with a shorter post ICU LoS and increased likelihood of being discharged home.

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0075

VALIDITY, RELIABILITY AND APPLICABILITY OF GREEK VERSIONS OF SEDATION- AGITATION SCALES AMONG CRITICALLY ILL PATIENTS

A. Tzenalis¹, A. Ntantana¹, E. Papaemanouil¹, C. Zamouridou¹, D. Matamis¹

¹Papageorgiou General Hospital, ICU, Thessaloniki, Greece

INTRODUCTION. The majority of critically ill patients experience significant distress, anxiety, and agitation during their intensive care unit (ICU) stay. Numerous factors, including sleep deprivation, unfamiliar environment, delirium, adverse medication effects, pain, and extreme anxiety can contribute to ICU patient distress. Although sedation-agitation scales are commonly used in Greek ICU practice, there is no report evaluating the clinical usefulness of these scales in the Greek language.

OBJECTIVES. The objective of this study was to evaluate the validity and reliability of Greek translations of four sedation-agitation scales, among critically ill patients: Glasgow Coma Scale (GCS), Ramsay, Richmond Agitation-Sedation Scale (RASS) and Sedation-Agitation Scale (SAS).

METHODS. This is a validation study in a mixed ICU of a general hospital.

All scales were applied to 100 patients by four critical care team members (four nurses). Each scale was tested for interrater reliability and validity, by correlations between them. Interrater agreement was measured using kappa (κ) and correlations using Spearman's test.

RESULTS. 400 observations were made on 100 patients. All scales had at least substantial agreement (weighted κ 0.78-0.93). RASS (weighted κ 0.78-0.92) and SAS (weighted κ 0.82-0.91) had the best agreement. All scales had a good and significant correlation with each other according to Spearman correlation.

CONCLUSIONS. All four scales demonstrated good interrater reliability and were comparable. RASS and SAS showed the best correlations and the best agreement results. The Greek versions of GCS, Ramsay, RASS and SAS presented substantial agreement between raters and significant correlations with each other. RASS and SAS showed the best correlation and the best agreement results. These two scales can be used in clinical practice, protocol sedations and interventions in order to reduce the negative impacts of oversedation and agitation.

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0076

IMPACT OF A SPECIFIC INSPIRATORY MUSCLE TRAINING IN EXERCISE CAPACITY AND INSPIRATORY MUSCLE FORCE IN HOSPITALIZED ACUTE HEART FAILURE PATIENTS: PILOT STUDY

P. Verissimo¹, K.T. Timenetsky¹, E. Colucci¹, T.J. Andre¹, L.H.R. Gonçalves¹, C.I.C. Garcia¹, A.S.Y. Yang¹, R.A. Caserta¹

¹Hospital Israelita Albert Einstein, Critical Care Department, São Paulo, Brazil

INTRODUCTION. Heart failure (HF) is a multi organ syndrome, also affecting the muscle system, consequently worsening exercise capacity and dyspnea during daily living activities. At ambulatory treatment chronic HF patients benefit from a specific inspiratory muscle training to improve exercise capacity. So far there is no evidence of this specific training in acute HF at an inpatient treatment setting.

OBJECTIVE. To evaluate the impact of respiratory muscle training in inspiratory and peripheral muscle force and exercise capacity in patients hospitalized with acute HF.

METHODS. A controlled, randomized study in hospitalized acute HF patients. Patients with a maximum inspiratory pressure (MIP) lower than 70 % of predicted value were randomized either to training or control group. We excluded patients with chronic pulmonary disease and neurological disorders. All patients were submitted to MIP(cmH₂O) measurement, hand grip (Kg/f) to evaluate peripheral muscle force, and a 4 min step test (steps) to evaluate exercise capacity, in two moments: after clinical stability (day 1) and at hospital discharge.

RESULTS. So far we enrolled 9 patients (5 to training group and 4 to control group). Patients in the training group were younger than the control group (median of 61 years, IQR of 59-76 x median of 85, IQR of 83-86). The most of patients were male in both groups (control group 60 % x training group 75 %). The initial MIP of the training group seems higher than the control group (median of 54 range of 36 to 80 x 38 range 32 to 50, respectively). At hospital discharge the median MIP in the control group improved 8 points (46 range 36 to 50) while in the training group there was an improvement of 16 points (70 range 36 to 120) (Figure 1). The initial 4 min step test of the training group seems similar than the control group (median of 42 range of 37 to 50 x 40 range 22 to 49, respectively). At hospital discharge the median 4 min step test in the control group improved 1 point (41 range 24 to 55) while in the training group there was an improvement of 10 points (52 range 33 to 59)(Figure 2). The initial hand grip of the training group seems higher than the control group (median of 34 range of 28 to 40 x 19 range 16 to 24, respectively). At hospital discharge the hand grip measurement was maintained in both group (median of 34 range of 28 to 40 x 20 range 12 to 24, respectively). The control group stayed at the hospital 2 days longer than the training group (median of 11 range of 10 to 13 x 09 range 05 to 22, respectively).

CONCLUSION. The inspiratory muscle force and exercise capacity seems to improve with specific inspiratory muscle training in acute HF, although no impact on peripheral muscle force.

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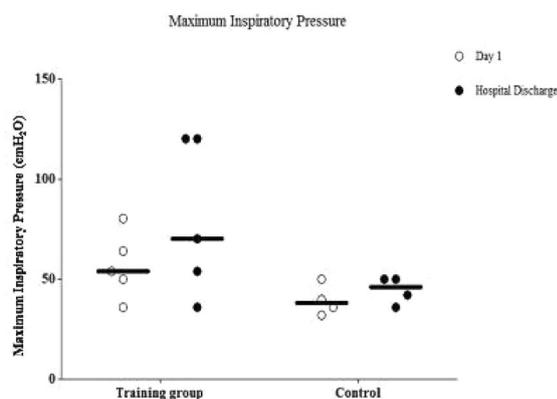


Figure 1: Maximum inspiratory pressure between the training and control group at Day 1 and at hospital discharge. The circles represent individual values and the horizontal line represents the median value of each group

[Figure 1: Patients maximum inspiratory pressure]

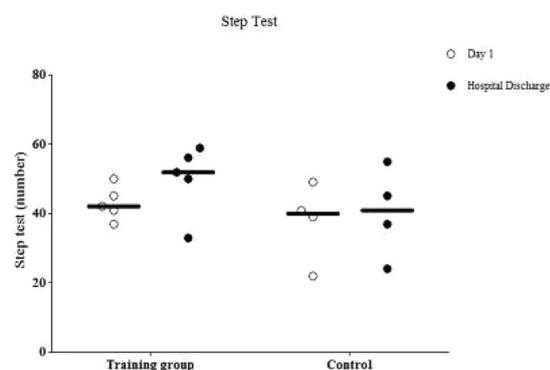


Figure 2: 4 minutes step test between training and control group at day 1 and at hospital discharge. The circles represent individual values and the horizontal line represents the median value of each group

[Figure 2: Patients 4 min step test]

0077 RAPID NURSE LED ASSESSMENT OF CRITICALLY ILL PATIENTS BY SONOGRAPHY: A SYSTEMATIC REVIEW & MULTIDISCIPLINARY TEAM SURVEY

N. Hare¹, P. Hopkins², G. Lee¹, A. Vercueil²

¹Kings College London, London, United Kingdom, ²Kings Health Partners AHSC, London, United Kingdom

BACKGROUND. Focused ultrasound offers a safe, bedside diagnostic tool and is increasingly being used by clinicians for evaluation of the critically ill patient [1].

OBJECTIVES. The aim of this study was to evaluate the evidence supporting nurse-led ultrasound, examine baseline use of ultrasound and assess acceptability and barriers to implementing a nurse-led protocol.

METHODS. A systematic review and critical analysis of current literature was undertaken using a pre-planned strategy. A novel survey tool was developed, piloted and distributed across the MDT within the General and Liver Critical Care Units. Internal consistency was assessed using Cronbachs Coefficient. Attitudes were assessed on a 5-point Likert Scale, free text items using thematic analysis.

RESULTS. Despite their close involvement in supportive care, there is a paucity of evidence to support critical care nurses using ultrasound within their clinical remit. Nurses in other clinical areas can safely use ultrasound for a specific indication [2] and there is evidence that nurses can safely undertake more complex ultrasound within the emergency setting [3,4]. Response rate to the survey was 38 % (n = 152/400). Respondents were from nursing (n = 98), medicine (n = 32), therapies (n = 7) and imaging (n = 15) teams. Most nurses and therapists had no experience using ultrasound (94 %). All medical staff had used focused ultrasound, with 50 % having undertaken formal accreditation. Respondents agreed that nurse-led ultrasound could be an appropriate role (67 %) and it would not deskill other professionals (71 %). The most commonly identified focus for the role was time critical evaluation (61 %). The most prominent local barriers were training (71 %), limited opportunity to practise (61 %) and availability of computers (70 %). Further data analyses will be undertaken using Chi Squared and Mann Whitley Tests to identify association between staff groups, experience and perceived barriers. Thematic analysis identified barriers emerging such as appropriateness, ability and safety.

CONCLUSIONS. It may be acceptable to integrate focused ultrasound into a nurses role but there are significant local barriers. The progression towards increased use of ultrasound, coupled with a lack of evidence within nursing provides a strong rationale for further research. Semi structured interviews will be undertaken to understand the barriers identified in this study and audit of x-ray use/radiation exposure is planned. A future RCT to provide evidence around the effectiveness and salience of a nurse-led protocol within the critically ill patient population is proposed.

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Liver and gut failure: 0079–0091

0079 ACUTE DECOMPENSATION OF CHRONIC LIVER DISEASE AND OUTCOMES IN CRITICAL ILLNESS

T.G. Simon¹, C.K. McKane², F.K. Gibbons³, K.B. Christopher⁴

¹Brigham and Women's Hospital, Department of Medicine, Boston, United States,

²Brigham and Women's Hospital, Department of Nursing, Boston, United States,

³Massachusetts General Hospital, Pulmonary and Critical Care, Boston, United States,

⁴Brigham and Women's Hospital, Renal Division, Boston, United States

INTRODUCTION. Acute decompensation of chronic liver disease frequently requires ICU-level monitoring, and has a high in-hospital mortality rate. It is not known if changes in MELD Score (Model For End-Stage Liver Disease) in patients with chronic liver disease have prognostic implications in critical illness.

OBJECTIVES. We hypothesized that a change in MELD score in patients with chronic liver disease would be associated with increased risk of 30-day all cause mortality.

METHODS. We performed a two center observational study of patients treated in medical and surgical intensive care units in Boston, Massachusetts. We studied 1,382 patients, age ≥ 18 years, who received critical care between 1998 and 2012. The exposure of interest was a change in MELD score from ICU admission to 72 h after. We used a validated strategy to identify patients with chronic liver disease using assignment of ICD-9 codes for chronic liver disease (571.x), chronic hepatitis C (70.54) and chronic hepatitis B (70.32) during or prior to hospitalization for critical care. The primary outcome was all cause 30 day mortality. Adjusted odds ratios were estimated by multivariable logistic regression models. Adjustment included MELD score at ICU admission, age, race (white versus non-white), gender, Deyo-Charlson Index, patient type (medical versus surgical), sepsis and number of acute organ failures.

RESULTS. The cohort was 67 % male, 76 % white and had a mean (SD) age of 56.2 (13.5) years. 36 % of the cohort had sepsis, 52 % acute kidney injury and 37 % were surgical patients. The 30-day mortality was 27.7 %. The odds of 30-day mortality in patients with ICU admission MELD score of 20-30, 30-40 and >40 were 1.21 (95 %CI 0.73-2.01), 2.09 (95 %CI 1.22-3.59), and 3.76 (95 %CI 1.89-7.46) respectively, relative to patients with MELD of 6-10 and adjusted for age, race, gender, Deyo-Charlson Index, patient type, sepsis and number of acute organ failures. Changes in MELD were a robust predictor of 30 day mortality and remained so following multivariable adjustment. The fully adjusted odds of 30-day mortality in patients with an increase in MELD of >3 was 2.32 (95 % CI 1.43-3.78; $P = 0.001$), relative to patients without a change in MELD. Further, fully adjusted odds of 30-day mortality in patients whose MELD score decreased by more than 3 was 0.53 (95 %CI 0.32-0.88; $P = 0.014$), relative to patients without a change in MELD, indicating a 47 % decrease in the odds of mortality. In the fully adjusted model the Hosmer-Lemeshow P value was 0.35 indicating good model fit. The AUC of the fully adjusted change in MELD model for 30-day mortality was 0.78 (95 %CI 0.74-0.80).

CONCLUSIONS. Critically ill patients with chronic liver disease who have increases in MELD score 72 h after ICU admission are at high-risk for mortality. Chronic liver disease patients treated with critical care who have declines in MELD score appear to have improved 30 day mortality.

0080

EARLY PLASMA EXCHANGE ALLEVIATES PRO-INFLAMMATORY CYTOKINE SECRETION OF PERIPHERAL MONOCYTES IN PATIENTS WITH ACUTE LIVER FAILURE

C. Bernsmeier¹, V. Patel¹, A. Singanayagam¹, C. Willars¹, W. Bernal¹, G. Auzinger¹, C.G. Antoniadis^{1,2}, J. Wendon¹

¹King's College Hospital, King's College London, Institute of Liver Studies, London, United Kingdom, ²St. Mary's Hospital, Imperial College London, Section of Hepatology, London, United Kingdom

INTRODUCTION. Acute liver failure (ALF) is a devastating condition with a mortality >40 % despite transplantation. It is characterized by overwhelming hepatocyte death inducing a systemic inflammatory response (SIRS). SIRS moreover confers adverse outcome. Monocytes/macrophages have been implicated as key effectors of SIRS in the pathogenesis of ALF (1,2). Novel therapeutic strategies to ameliorate acute liver injury are desirable. A multicentre study demonstrated a 20 % survival benefit in patients treated with therapeutic plasma exchange (TPE) (3). TPE is an established therapy used for various immunologically driven disorders. Its mechanism of action is unclear but recent data highlight its ability to dampen pro-inflammatory responses of monocytes (4).

OBJECTIVES. To determine the immune-modulatory effect of TPE on monocytes in patients with ALF as a pathogenic proof of principle for its possible therapeutic benefit.

METHODS. The pilot study included 7 patients with ALF (n = 3 undergoing early TPE, (day 1 after admission); n = 1 late TPE (day 3); n = 3 without intervention). Healthy peripheral blood mononuclear cells were cultured for 24 h in medium containing 25 % plasma from ALF patients. The effect of plasma obtained before, after TPE and after 5-8 days was compared to the effect of plasma from patients who did not undergo TPE. TNF- α and IL-6 production of monocytes in response to lipopolysaccharide (LPS) was assessed by flow cytometry based intracellular staining.

RESULTS. ALF plasma induced monocyte death in vitro in relation to disease severity. Pro-inflammatory cytokine production of monocytes was markedly reduced after incubation with plasma from ALF patients following early TPE compared to plasma preceding TPE: TNF- α was significantly suppressed (mean MFI 1936 vs. 651, $p = 0.0012$); IL-6 was numerically lower (mean MFI 3676 vs. 1834, $p = 0.1349$). Sequential plasma samples from patients with ALF following late TPE or natural course of disease did not modify TNF- α or IL-6 production differentially.

CONCLUSIONS. Clearance of accumulating mediators from the plasma by TPE modulated monocyte function towards anti-inflammation in vitro. TPE might therefore alleviate SIRS and extrahepatic organ dysfunction with possibly beneficial effects on outcome if introduced in early phases of ALF.

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0081**A PROSPECTIVE OBSERVATIONAL PILOT STUDY ASSESSING THE DIAGNOSTIC ACCURACY OF INTESTINAL FATTY ACID BINDING PROTEIN IN CRITICALLY ILL PATIENTS WITH SUSPECTED INTESTINAL ISCHAEMIA**B.J. Kelly¹, O. Miskolci¹, B. Marsh¹¹Mater Misericordiae University Hospital, Critical Care Medicine, Dublin, Ireland

INTRODUCTION. Intestinal fatty acid binding proteins (i-FABP) are small and abundant proteins within the cytoplasm of mature enterocytes located at the villus tip, the area most vulnerable to ischaemia. Upon the death of these enterocytes, i-FABP is liberated into the circulation [1], [2]. These proteins performed relatively well in the diagnosis of intestinal ischaemia in a recent systematic review (DOR = 7.62, AUC = 0.78) [3].

METHODS. ELISA for i-FABP was performed on 28 critically ill patients admitted to the Mater Misericordiae Hospital's intensive care unit between March 2013 and December 2013. Patients on vasopressors ± elevated serum lactate levels with clinical or radiological suspicion for intestinal ischaemia were recruited in the case group (n = 12). Similarly 'shocked' patients without suspicion for intestinal ischaemia were recruited in the control group (n = 16). Analysis of association (Pearson's Chi square) and comparison of means (student t-test, unpaired) was carried out on the 23 patients with confirmed presence or absence of intestinal ischaemia.

RESULTS. 12 patients had clinical suspicion for intestinal ischaemia of which 50% (n = 6) had proven ischaemia. i-FABP was markedly raised in 83.3% (n = 5). The mean i-FABP in those with intestinal ischaemia was 2,662.4 ± 1875.8 pg/ml (CI 95% 693.8 to 4630.8). The mean i-FABP in those without ischaemia was 496.0 ± 112.7 pg/ml (CI 95% 257.0 to 734.9). The mean difference was 2166.4 ± 475.4 pg/ml. Testing the hypothesis of no difference in mean i-FABP levels demonstrated a p value = 0.0002. The mean APACHE II score was 28.4 ± 9.5 (CI 95% 24.7 to 32.2). There was no association between bowel ischaemia and APACHE II <25 or >25 (X² = 0.873, p = 0.35). The mean age was 65.03 ± 15.4 years (CI 95% 58.9 to 71.1). There was no association between bowel ischaemia and age <65 and >65 (X² = 1.50, p = 0.221). In the group with proven intestinal ischaemia, n = 4 (66.7%) had lactate levels greater than 4.0, however this did not reach statistical significance (X² = 0.917, p = 0.34).

CONCLUSION. Using an i-FABP level of 700 pg/ml as a cut off, our pilot study showed i-FABP has a positive predictive value of 62.5%, a negative predictive value of 93.3%, a sensitivity of 83.3% and a specificity of 82.4%. There was a statistically significant difference in mean i-FABP levels between patients with and without confirmed ischaemia (p = 0.0002).

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0084**DECOMPENSATED ALCOHOLIC LIVER DISEASE INTENSIVE CARE PROGNOSIS: A DISTRICT GENERAL HOSPITAL PERSPECTIVE**J.M. McFarlane¹, M. Mostert¹, B.O. Rose¹, R. Breeze¹¹University Hospital Lewisham, Intensive Care Department, London, United Kingdom

INTRODUCTION. The UK has seen a growing prevalence of alcoholic liver disease (ALD) over the last 25 years with worrying increases in ≤35 year olds [1]. Mortality rates for decompensated ALD admissions to ICU are commonly quoted at around 70%, though the majority of studies represent tertiary care centres [2]. This guides all centres' views on prognosis.

OBJECTIVES. We aim to evaluate if the ALD mortality in District General Hospitals (DGH) is comparable to current tertiary care centres.

METHODS. This retrospective study examines the 1 year mortality of decompensated ALD admissions to a DGH's ICU over 3 years, between November 2009 and November 2012. Only patients with decompensated ALD as their primary admission cause were included and were divided into three main presenting features: upper gastrointestinal bleed (UGIB); multiorgan failure (MOF)/sepsis and encephalopathy. Three main organ support factors were recorded for all patients: renal replacement therapy (RRT); mechanical ventilation (MV) and inotropic support (IS).

RESULTS. We identified 54 admissions to the 17 bed ICU with 5 multiple admissions. The median age was 54 years (IQR 47-61) with 4.1% of admissions ≤35 years of age. Mean APACHE II and ICNARC scores were 18.4 (SD 7.5) and 22.4 (SD 10.3) respectively. Overall mortality rates were 30.6, 44.9, 55.1 and 57.1% for ICU, hospital, 6 month and 12 month mortality respectively.

UGIB represented the most common diagnosis at presentation (57.1%). These patients had the lowest mean APACHE II score (17, SD 6.4) as well as the lowest hospital (35.7%) and 12 month (42.9%) mortality. **Encephalopathic** patients (14%) had a mean APACHE II score of 20 (SD 5.5) and the lowest mean ICNARC (15.9, SD 4.7) scores with an ICU and 12 month mortality of 14% rising to 71% respectively. Patients presenting with **MOF/sepsis** (29%) had the highest mean APACHE II (20.4, SD 6) and ICNARC (25.8, SD 8.5) scores and also the highest ICU (50%) and 12 month (79%) mortality.

Organ support subgroups	n - %	ICU Mortality %	Hospital Mortality %
MV (only)	18.4 (9/49)	11.1 (1/9)	22.2 (2/9)
MV (all)	57.1(28/49)	39.3 (11/28)	46.4 (13/28)
RRT (all)	26.5 (13/49)	69.2 (9/13)	75.9 (10/13)
IS (all)	26.5 (13/49)	78.6 (8/13)	86.7 (9/13)
RRT + MV (only)	6.1 (3/49)	66.7(2/3)	66.7 (2/3)
RRT + IS (only)	2 (1/49)	100 (1/1)	100 (1/1)
MV + IS (only)	12.2 (6/49)	50 (3/6)	66.7 (4/6)
MV + RRT + IS	12.2 (6/49)	66.7 (4/6)	66.7 (4/6)

[Organ support mortality]

29% of patients required no organ support, with a discharge survival of 71%. MV represented the most common organ support (57%), but carried the best prognosis for ICU and hospital mortality (39.3% and 46.4%, respectively). IS had the worst prognosis for ICU

and hospital mortality (78.6% and 85.7%, respectively). For ≥2 organs supported, ICU and hospital mortality was 62.5% and 68.8% respectively.

CONCLUSIONS. Our study indicates that DGH mortality in decompensated ALD is lower than current published tertiary care studies, whose patients may represent a select cohort [2]. Our findings suggest a review of current ALD predicted prognosis in DGHs, on which the burden of disease largely rests [2]. This is now increasingly relevant with research indicating the benefits of earlier transplant in ALD [3].

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0085**ALBUMIN DIALYSIS (MARS) IMPROVES SURVIVAL IN ACUTE LIVER FAILURE WITH CONTRAINDICATIONS TO EMERGENCY TRANSPLANTATION**A. Escorsell^{1,2}, M. Sanz¹, A. Mas^{1,2}, E. López³, J. Fernández^{1,2}, P. Sanz¹¹Clinic, Liver Unit, Barcelona, Spain, ²IDIBAPS, Barcelona, Spain, ³Hospital Clínic, Pharmacy, Barcelona, Spain

Albumin dialysis (Molecular Adsorbent Recirculating System, MARS) may allow extra waiting time or even avoid liver transplantation (LT) in patients with acute liver failure (ALF). This study was aimed at investigating the effects of MARS in the survival of ALF patients reaching criteria for emergency LT and with contraindications for the procedure. Eighteen patients (median age: 54 years) were prospectively evaluated. ALF was due to HBV (n = 2), DILI (n = 4), acetaminophen overdose (n = 2), mushroom poisoning (n = 1), autoimmune (n = 1), septic shock (n = 2), primary dysfunction after LT (n = 1) and right-lobe hepatectomy (n = 5). Contraindications for LT were concomitant diseases (n = 10), acute tubular necrosis requiring CRRT (n = 2), active infections (n = 4), advanced age (n = 1) and severe drug dependence (n = 1). MARS therapy started 6 days after admission (ranges: 1-65). Patients received a median of 22 h of therapy (ranges: 5-53), with no treatment-related complications.

Seven patients (39%) survived after a mean follow-up of 34 days (ranges: 7-820). Ten non-survivors died from multiorgan failure following sepsis and one from massive alveolar hemorrhage. Patients dying on follow-up differed from survivors in the presence of EH at admission (54 vs 14%; p = 0.08), a highest degree of EH (p = 0.02), severity of organ dysfunction other than liver (CRRT, need for vasoactive drugs or mechanical ventilation) and intensive MARS therapy (>15 h of therapy; 54 vs 100%; p = 0.036).

According to our data, MARS therapy may improve the extremely bad prognosis of patients with ALF reaching criteria for LT but who have contraindications for the procedure. The best results are observed in patients receiving intensive treatment with MARS.

0086**RESULTS OF A SECOND PROSPECTIVE STUDY: LIVER-CELLS BASED BIOSENSOR IN PATIENTS WITH SEPTIC SHOCK**M. Sauer^{1,2}, C. Haubner¹, J. Brenner¹, H. Potschka², T. Mencke¹, S. Mitzner^{2,3}, G. Nölde-Schomburg¹¹University of Rostock, Anaesthesiology and Intensive Care Medicine, Rostock, Germany, ²Fraunhofer Institut IZI, Leipzig, Germany, ³University of Rostock, Internal Medicine, Rostock, Germany

INTRODUCTION. Nearly 19% of patients with severe sepsis developed liver dysfunction or failure in the course of disease (1). The late diagnosis of liver failure is a major problem in critically ill patients. Early diagnosis of liver dysfunction and failure can enable early onset of therapy and may lead to an improvement of prognosis of these patients.

OBJECTIVES. To verify the clinical relevance of a new test device for early diagnosis of liver failure, we conducted a second study with severe septic patients. A first study revealed, that plasma from septic patients lead to an impairment of viability and function of sensor-cells (2).

METHODS. We developed a new test device for early diagnosis of liver failure (patent pending). The basic test compounds consist of human liver cells (HepG2/C3A). In a standardised mikrotiterplate assay the toxicity of patient plasma was tested (500,000 cells/well). After incubation with plasma from patients the viability of cells (XTT test, Trypan blue-staining), the cytochrome 1A2 activity (metabolism of etoxyresorufin) and synthesis of albumin are measured. In a prospective clinical study in 99 ICU-patients two test groups were studied: the septic shock group (n = 51, SSG) and the non-septic shock group (n = 49, NSG) as control group. At time of inclusion, after 3 and 7 days, 10 ml blood was drawn from the patients for testing with the cytotoxicity test. Patients were followed up for hospital survival. The results are expressed as median and range. Differences were considered significant at p < 0.05. Significance was determined with the Mann-Whitney U-test.

RESULTS. The in-hospital mortality was 23.5% in the SSG; one patient of the NSG died. The APACHE II-scores at ICU arrival were 32 (15) in the SSG and 9 (10) in the NSG. The SOFA-scores at inclusion were 13 (6.8) in the SSG and 2 (4.6) in the NSG. The values of bilirubin (SSG-Survivors: 19.2 μmol/l (26.6), SSG-Non-Survivors: 21.4 (88.2), NSG: 15.2 (17)) were significantly higher and the Prothrombin-time lower in the SSG (Survivors: 73% (32.8), Non-Survivors: 66 (22.8)) than in the NSG 90 (25.8). The plasma of patients with septic shock impaired significantly viability and cellular functions of HepG2/C3A cells in all parameters compared with the plasma of non-septic patients. These effects were more pronounced with plasma of non-survivors in the SSG at inclusion, after 3 and 7 days (data not shown).

CONCLUSIONS. The presented liver cells based biosensor showed hepatotoxicity of plasma from patients with septic shock in a second study; moreover, these effects were more pronounced in non-survivors. The new test may contribute to an early diagnosis of liver failure in septic patients.

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0087**USE OF STRESS ULCER PROPHYLAXIS IN THE INTENSIVE CARE UNIT. A EUROPEAN UNIT EVALUATION IN 70 ICUs**M. Krag¹, and the SUP-ICU Investigators¹Copenhagen University Hospital, Rigshospitalet, Department of Intensive Care 4131, Copenhagen, Denmark

INTRODUCTION. Critically ill patients are at risk of stress-related gastrointestinal (GI) bleeding (1), and stress ulcer prophylaxis (SUP) is recommended as a standard of care in ICU as outlined by the Surviving Sepsis Campaign guidelines (2). However, as a result of substantial changes in intensive care practice over the last 10-20 years, the incidence of stress ulceration and use of stress ulcer prophylaxis in critically ill patients may have changed.

OBJECTIVES. The objective of the present unit evaluation was to assess current use of SUP in 70 European ICUs.

METHODS.

DESIGN. A European survey of current SUP practice in 70 ICUs.

Study population: ICUs participating in the ongoing "Stress ulcer prophylaxis in the intensive care unit. A multicentre 7-day inception cohort study" (<http://www.sup-icu.com>). **Data:** country, type of hospital, type of ICU, size of ICU, use of SUP guideline, criteria for prescribing SUP, criteria for discontinuation of SUP, and type of SUP used.

Statistics: frequencies and per cent.

RESULTS. A total of 70 European ICUs were included (Denmark 24, Finland 6, Italy 1, Norway 1, Iceland 1, The Netherlands 2 and United Kingdom 35): 53 % (37/70) university hospital ICUs, 91 % (64/70) mixed ICUs, 31 % (22/70) small ICUs (<10 beds), 41 % (29/70) medium ICUs (10-20 beds), and 27 % (19/70) large ICUs (>20 beds). All but one unit (69/70) used SUP. Some 60 % (42/70) of the participating ICUs had a guideline for the use of SUP. The most commonly SUP agents used were: 61 % proton-pump inhibitors (PPIs) and 36 % histamine 2 receptor antagonists (H2RAs). Criteria for prescribing SUP varied considerably between units. The three major reasons for discontinuation of SUP were: enteral nutrition (30 %), discharge from ICU (21 %) and suspension of mechanical ventilation (10 %). Some 19 % of the ICUs continued SUP upon ICU discharge.

CONCLUSIONS. Ninety-nine per cent of the participating ICUs used SUP; both PPIs and H2RAs. However, only 60 % had a guideline for the use of SUP. Correspondingly, criteria for prescribing SUP were very heterogeneous, and 1/5 of the participating ICUs continued SUP upon ICU discharge.

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0088

HYPOGLYCEMIA IS ASSOCIATED WITH INCREASED MORTALITY IN PATIENTS WITH ACUTE DECOMPENSATED LIVER CIRRHOSIS

C.A. Pfortmueller^{1,2}, C. Wiemann², G.-C. Funk³, A.B. Leichtle⁴, G.M. Fiedler⁴, A.K. Exadaktylos⁵, G. Lindner²

¹Medical University of Vienna, Department of Anesthesiology, Vienna, Austria, ²University Hospital and University of Bern, Department of Emergency Medicine 3, Bern, Switzerland, ³ Otto Wagner Hospital Vienna and Ludwig Boltzmann Institute for COPD and Respiratory Epidemiology, Department of Respiratory and Critical Care Medicine, Vienna, Austria, ⁴Inselspital-Bern University Hospital, Center of Laboratory Medicine, University Institute of Clinical Chemistry, Bern, Switzerland

PRINCIPALS. The liver plays an important role in glucose metabolism, in terms of gluconeogenesis and gluconeogenesis. Several studies have shown that hyperglycemia in patients with liver cirrhosis is associated with progression of the liver disease and increased mortality. However, no study has ever targeted the influence of hypoglycemia. The aim of this study was to assess the association of glucose disturbances with outcome in patients presenting to the emergency department (ED) with acute decompensated liver cirrhosis.

METHODS. Our retrospective data analysis comprised adult (≥ 16 years) patients admitted to our emergency department between 1 January 2002 and 31 December 2012 with the primary diagnosis of decompensated liver cirrhosis.

RESULTS. A total of 312 patients were eligible for study inclusion. 231 (74.0 %) patients were male; 81 (26.0 %) were female. The median age was 57 years (range 51-65). Overall 89 (28.5 %) of our patients suffered from acute glucose disturbances; 49 (15.7 %) of our patients were hypoglycemic and 40 (12.8 %) hyperglycemic. Patients with hypoglycemia were significantly more often admitted to the ICU than hyperglycemic patients (20.4 % versus 10.8 %, $p < 0.015$) or than normoglycemic patients (20.4 % versus 10.3 %, $p < 0.011$) and they significantly more often died in hospital (28.6 % hypoglycemic versus 7.5 % hyperglycemic $p < 0.024$; 28.6 % hypoglycemic versus 10.3 % normoglycemic $p < 0.049$). Survival analysis showed a significantly lower estimated survival for hypoglycemic patients (36 days) than for normoglycemic patients (54 days) or hyperglycemic patients (45 days) (hypo- versus hyperglycemic $p < 0.019$, hypo- versus normoglycemic $p < 0.007$, hyper- versus normoglycemic $p < 0.477$).

CONCLUSION. Hypoglycemia is associated with increased mortality in patients with acute decompensated liver cirrhosis. It is not yet clear whether hypoglycemia is jointly responsible for the increased short-term mortality of patients with acute decompensated liver cirrhosis or is only a consequence of the severity of the disease or the complications.

0089

THE LIFE (LIVER INJURY FAILURE EVALUATION) SCORE AND OUTCOME PREDICTION IN CRITICALLY ILL CIRRHOTIC PATIENTS

M.J.W. McPhail¹, C. Edmark², M. Bell², T. Whitehouse², J. Wernerman², J. Wendon⁴, K.B. Christopher⁵

¹King's College Hospital, Liver Intensive Care Unit, London, United Kingdom, ²Karolinska University Hospital Solna, Anesthesiology and Intensive Care, Stockholm, Sweden, ³University Hospital Birmingham, Critical Care and Anaesthesia, Birmingham, United Kingdom, ⁴King's College Hospital, Critical Care Division, London, United Kingdom, ⁵Brigham and Women's Hospital, Renal Division, Boston, United States

INTRODUCTION. Cirrhosis in the critically ill is associated with high mortality. There is no valid scoring system for liver dysfunction in the ICU.

OBJECTIVES. We sought to externally validate the LiFe score, a new prediction model to identify patients with liver dysfunction at greatest risk of in-hospital mortality.

METHODS. The LiFe (Liver Injury Failure evaluation) score prediction model was created with data from two Boston, USA hospitals and based on logistic regression describing the risk of 30-day mortality as a function of lactate, total bilirubin and INR at ICU admission

and transformed to a integer-based score (range 0-17). In a cohort of 972 cirrhotic patients admitted to a Liver ICU in London, UK we assessed the performance of the LiFe score prediction model. The discriminatory ability for in-hospital mortality was quantified using the C statistic. Calibration was assessed using the Hosmer-Lemeshow χ^2 goodness-of-fit test. We next evaluated the improvement in model performance introduced by the inclusion of the LiFe score to SOFA.

RESULTS. For the cohort, in-hospital mortality was 52 %. 63 % were male, 52 % had alcohol-related liver disease, 47 % required CVVHF, the mean Acute Physiologic and Chronic Health Evaluation (APACHE) II was 22 and the mean age was 50.5. The unadjusted odds ratio of in-hospital mortality corresponding to a single digit increase in LiFe score was 1.25 (95 % CI 1.21-1.29; $P < 0.001$). The LiFe score model showed good calibration (Hosmer-Lemeshow (HL) Chi squared 4.48, $P = 0.61$) and discrimination [(area under the curve (AUC)- receiver-operating characteristics (ROC) curve, 0.77 (95 % CI 0.74-0.80)]. APACHE II scores were as accurate as the LiFe score model, with AUC of 0.76 (95 % CI 0.74-0.80), and had good calibration (HL Chi squared $P = 0.70$). SOFA scores were similarly accurate as the LiFe score model, with AUC 0.80 (95 % CI 0.77-0.83), and had good calibration (HL Chi squared $P = 0.98$). Differences in model discrimination between LiFe score and SOFA were significant (Chi squared 5.77, $P = 0.016$). Evaluation of the addition of LiFe score to SOFA demonstrated significantly improved discrimination for in-hospital mortality with AUC of 0.81 (95 % CI 0.79-0.84). Differences in model discrimination between SOFA and SOFA + LiFe score are significant (Chi squared 8.86, $P = 0.003$). Further, the net reclassification improvement (NRI) was estimated at 0.062 ($P = 0.01$) and the integrated discrimination improvement (IDI) was estimated at 0.079 ($P < 0.001$). Both NRI and IDI suggest that including LiFe score with SOFA results in a significant improvement in performance. Based on the NRI, we conclude that addition of LiFe score improved classification for a net of 6.2 % of individuals with in-hospital mortality.

CONCLUSIONS. Risk of in-hospital mortality in cirrhotic ICU patients can be estimated using the LiFe score constructed from commonly available liver related synthetic, excretion and metabolic markers on ICU admission.

0090

ICG-PDR PREDICTS OUTCOME IN PATIENTS WITH HYPOXIC HEPATITIS

T. Horvatits^{1,2}, K. Nikolaus², A. Drolz^{1,2}, K. Rutter^{1,2}, S. Kluge¹, V. Fuhrmann^{1,2}

¹University Medical Center Hamburg-Eppendorf, Intensive Care Medicine, Hamburg, Germany, ²Medical University of Vienna, Gastroenterology and Hepatology, Vienna, Austria

INTRODUCTION. Hypoxic hepatitis (HH), is a frequent cause of acute hepatocellular damage in critically ill patients and is associated with high mortality. Indocyanine green plasma disappearance rate (ICG-PDR) is a clinical tool for assessment of liver function in acute and chronic hepatic disease.

OBJECTIVES. The present study aimed to analyse the prognostic value of ICG-PDR in patients with HH.

METHODS. ICG-PDR was assessed prospectively in patients with HH at ICU admission and 24 h thereafter. Delta (Δ), as difference between baseline and 24 h value was calculated for ICG-PDR, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and prothrombin time (PT). Patients' characteristics, admission diagnosis, SAPSII score at admission and ICU survival were recorded prospectively. SPSS (Version 21.0.0.1) was used for statistical analysis. P values < 0.05 were considered as statistically significant.

RESULTS. 32 patients (male: 22, female: 10) met criteria of HH mainly due to cardiogenic (63 %) or septic shock (28 %). ICU survival rate was 47 %. ICG-PDR at admission was significantly elevated in survivors in comparison to non-survivors (median, IQR: 9.1 /min (8.1-10.7) vs. 7.7 /min (4.9-7.6); $p < 0.05$). Δ -ICG-PDR was significantly higher in survivors (median, IQR: 2.6 /min (0.8-3.7) vs. -0.7 /min (-1.8-1.1); $p < 0.05$). Δ -ICG-PDR was associated with ICU survival independently of sex, age, SAPSII score at admission (OR: 6.2; 95 % CI: 1.4-27.6; $p < 0.05$). AUROC of Δ -ICG-PDR for predicting ICU survival was 0.89 in comparison to AUROC of Δ -AST (0.60), Δ -ALT (0.55) and Δ -PT (0.51). Best cut-off for predicting ICU survival in patients with HH within 24 h after admission was an increase of Δ -ICG-PDR > 1.9 /min (sensitivity was 68 % and specificity 100 %).

CONCLUSIONS. Δ -ICG-PDR is a strong predictor for ICU survival in patients with HH.

0091

DECOMPRESSIVE LAPAROTOMY FOR ACS: EFFECT ON ORGAN FUNCTION AND MORTALITY (WSACS CTWG STUDY 007)

J. De Waele¹, D. Debergh¹, M. Bjorck², M. Malbrain³, I. Nesbitt⁴, J. Cohen⁵, V. Kaijalainen⁶, R. Ivatury⁷, M. Mone⁸, T. Kimball⁸, WSACS Clinical Trials Working Group

¹Ghent University Hospital, Ghent, Belgium, ²Uppsala Universitet, Uppsala, Sweden, ³ZNA Stuyvenberg, Antwerp, Belgium, ⁴Freeman Hospital, Newcastle upon Tyne, United Kingdom, ⁵Rabin Medical Center, Tel Aviv, Israel, ⁶N.Kipshidze Central University Hospital, Tbilisi, Georgia, ⁷Medical College of Virginia, Richmond, United States, ⁸University of Utah, Salt Lake City, United States

Introduction. Surgical decompression is considered the definitive treatment for intra-abdominal hypertension (IAH), but the effect of decompression on organ function, as well as morbidity and mortality associated with decompressive laparotomy for abdominal compartment syndrome (ACS) has been poorly investigated.

Objectives. To describe the effect of decompressive laparotomy on intra-abdominal pressure (IAP) and organ function and to evaluate outcome (morbidity, and mortality).

Methods. We performed a prospective observational study in patients aged 18 years or older, who were treated with decompressive laparotomy for ACS. Primary endpoint was all-cause mortality; changes in IAP and organ function, and laparotomy-related morbidity were secondary endpoints. Data are reported as medians (interquartile range (IQR)). A p-value of 0.05 was considered statistically significant.

Results. Thirty-three patients were included in the study (20 male, 61 %). Most (82 %) were surgical admissions treated for abdominal conditions including peritonitis, trauma, ruptured AAA and acute pancreatitis, and the majority suffered from primary ACS (82 %). Median APACHE2 and SAPS2 score were 25 (19-32) and 56 (42-64), respectively. Midline laparotomy was mostly used and all patients required temporary abdominal closure. VacPac or similar technique was used most frequently (60 %). Baseline IAP before decompression was 23 (IQR 21-27) mmHg, and decreased to 12 (9-15), 13 (8-17), 14 (11-16) and 12 (9-14) mmHg after 2, 6, 24 and 72 h, respectively. The effect of decompression on measures of oxygenation, urinary output and organ function is summarized in table 1.

Overall 28d mortality was 30 % (10/33 patients), which increased to 55 % (18/33 patients) at 1 year follow up.

Local complication rate per patient was low; 14 complications developed in 8 patients (hernia 5, infection 4, recurrent ACS 2, bleeding 2, fistula 1). In all surviving patients the abdomen was considered surgically closed from an anatomic compartment integrity standpoint at 1-year follow up.

Conclusions. In this study of critically ill patients, as evidenced by APACHE II and SAPS 2 scores, the use of decompressive laparotomy was shown to be effective in reducing IAP, as well as early and direct improvement on oxygenation and urinary output. The overall effect upon organ dysfunction, as measured by SOFA scores, was not immediate. The 28-day mortality rate after decompressive laparotomy is in line with those of the underlying conditions leading to this surgical treatment. The complications related to decompression and open abdomen treatment occur in approximately 25 % of the patients.

	24 h prior to decompression	Baseline (prior to decompression)	6 h after decompression	24 h after decompression	72 h after decompression	7d after decompression
P/F ratio	162 (110-248)	121 (79-179)	135 (103-218)*	146 (107-203)*	164 (133-232)*	197 (161-280)*
Urinary output (2h period)	40 (20-200)	23 (0-118)	68 (9-185)*	41 (5-180)*	75 (5-186)	98 (14-220)
SOFA score	7 (6-13)	10 (7-12)		11 (9-14)	9 (5-13)	6 (4-11)

[Measures of organ function]
Table 1 legend
* = p < 0.05 compared to baseline

Sepsis fundamentals: 0098–0105

0098

CD69 EXPRESSION IS DYSREGULATED IN GRANULOCYTES AND MONOCYTES FROM SEPSIS PATIENTS

S. Shibata¹, N. Ishizuki¹, S. Akitomi¹, K. Inada¹, S. Endo¹

¹Iwate Medical University, Critical Care Medicine, Morioka, Japan

INTRODUCTION. CD69 is known as a very early activation antigen, or activation inducer molecule, as it was initially detected on the surface of recently activated lymphocytes. However, little is currently known about the expression or role of CD69 on neutrophils and monocytes in sepsis patients. Therefore, we investigated CD69 expression on leukocytes stimulated with LPS in vitro from both sepsis patients and healthy controls.

METHODS. This study was approved by our committee and informed consent was obtained from each volunteer or patient. Eight healthy volunteers, four Systemic Inflammatory Response Syndrome (SIRS) patients and ten sepsis patients were enrolled in the study. The diagnoses of SIRS and sepsis were due to: severe burns (n = 2), drug poisoning (n = 1) and hemorrhage shock (n = 1); and diffuse peritonitis (n = 8), pancreatitis (n = 1) and phlegmonous cellulitis (n = 1), respectively. Blood samples were collected in heparinized tubes from volunteers or patients. The ability of leukocytes to up-regulate CD69 was assessed by flow cytometry and various cytokines were evaluated by multiplex cytometric bead array.

RESULTS. First, we examined the kinetics of CD69 expression on granulocytes and monocytes stimulated by LPS in whole blood obtained from healthy volunteers. The maximal levels of CD69 were detected after 24 h incubation, but had returned to baseline by 72 h. We also evaluated CD69 expression on granulocytes and monocytes stimulated with various concentrations of LPS for 4 h. CD69 was dose-dependently up-regulated by LPS above a concentration of 0.1 ng/ml (P < 0.01; 0.1, 1, 10 ng/ml LPS vs. 0 ng/ml), and the range of the individual values was within the mean ± 2 SD. Next we examined CD69 expression on granulocytes and monocytes in whole blood obtained from SIRS and sepsis patients, stimulated by various concentrations of LPS for 4 h. The dose-dependent increase of CD69 with LPS stimulation was not evident in most patients tested (8 sepsis patients and 2 severe burns and 1 hemorrhage shock SIRS patients out of the 14 patients). Three patients (2 sepsis patients and 1 drug poisoning SIRS patient) displayed a dose-dependent response as seen in healthy volunteers. No differences between the granulocytes and monocytes of these two groups were found. Additionally, no correlation was found between CD69 expression and the production of IL-6 or IL-8 by either granulocytes or monocytes.

CONCLUSIONS. When the levels of CD69 on granulocytes and monocytes are elevated above the normal level (mean + 2 SD in normal volunteers) without LPS stimulation, the patient may have been infected within the previous 72 h. When a dose-dependent increase of CD69 in response to LPS stimulation is not evident, the severe inflammation and/or infection might be ongoing. Furthermore, CD69 expression may not be correlated with cytokine production. Further investigation into the role of CD69 is necessary to evaluate its potential as a novel biomarker in sepsis.

0103

IS CD 64 A VALUABLE TOOL IN EARLY DETECTION OF VENTILATOR ASSOCIATED PNEUMONIA (VAP) COMPARED TO C-REACTIVE PROTEIN AND PROCALCITONIN?

H. Mohammed¹, M. Ahmed¹, A. Mukhtar¹, A. Gado¹, R. Mahrous¹, M. Hafez¹, S. Farouk¹

¹Cairo University, Cairo, Egypt

INTRODUCTION. Ventilator-associated pneumonia (VAP) remains the second leading type of nosocomial infection with substantial increase in the risk of mortality (1, 2). However, the diagnosis of VAP is not a straightforward and many biomarkers have been developed to confirm the diagnosis of VAP (3).

OBJECTIVES. The aim of this study was to establish the diagnostic utilities of the levels of the biomarkers procalcitonin, CRP, and CD64 individually and in combination, for early diagnosis of VAP.

METHODS. Prospective observational study was conducted in the ICU of the emergency department. All consecutive patients who suspected of having developed VAP after 48 h of mechanical ventilation (MV) were included. serum CRP, Procalcitonin and CD64

expression on peripheral blood leucocytes were done at the following time points: T1 (baseline); at the time of intubation, T2 (day zero); at the time of VAP diagnosis (positive culture from tracheal aspirate), T3; 3 days after initiation of antibiotics, T4; 7 days of initiation of antibiotics.

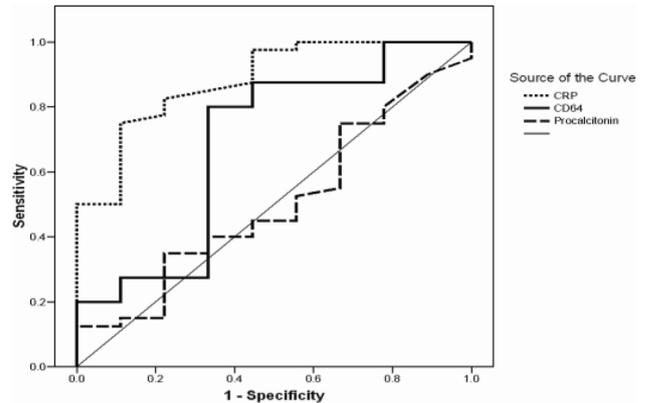
RESULTS. 49 patients were enrolled in the study. 40 patients developed VAP. The level of CRP was significantly high in VAP group compared to the non-VAP group at day 0 and 3 with p value = 0.005.

The time course of both CD64 and procalcitonin in patients with and without VAP did not vary significantly with p value = 0.11, 0.48 respectively.

CRP levels showed the largest AUC for D0 and D3 and CRP kinetic. AUC were 0.75 (95 % CI 0.58-0.9) for CRP at D0 and 0.82 (95 % CI 0.76-0.9) for CRP at D3 (P = 0.02, 0.001 respectively) figure (1). A change of CRP kinetic from D3 relative to base line yielded a greater AUC was 0.8 (95 %CI 0.65-0.95) (p = 0.005).

Both procalcitonin and CD 64 were not valuable to predict VAP. The AUC for Procalcitonin levels were 0.52 (95 % CI 0.33-0.7) at D0 and 0.5 (95 % CI 0.3-0.7) at D3 (P = 0.7, 0.8 respectively). A change of procalcitonin kinetic from D3 relative to base line yielded a greater AUC was 0.4 (95 %CI 0.2-0.6) p = 0.48.

CD64 levels showed AUC were 0.64 (95 % CI 0.4-0.87) for CD64 at D0 and 0.68 (95 % CI 0.46-0.9) for CD64 at D3 (p = 0.17, 0.08 respectively). A change of CD64 kinetic from D3 relative to base line yielded a greater AUC was 0.6 (95 %CI 0.46-0.8) p = 0.11.



[Figure (1): Receiver operating characteristic curve]

CONCLUSIONS. The study demonstrated that, the diagnostic utilities of CRP for detection of VAP was more accurate than procalcitonin and CD64 in critically ill mechanically ventilated patients.

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0105

SPECIFIC COMPONENTS OF THE INFLAMMATORY REFLEX: HEART RATE VARIABILITY (HRV) AND IL-6 PREDICT SEPTIC SHOCK IN CRITICAL ILL PATIENTS

M.J. Fernández-Sánchez^{1,2}, O. Sanabria³, A. Riveros¹

¹Pontificia Universidad Javeriana, Physiology & Pharmacology Department, Bogotá, Colombia, ²Hospital Universitario San Ignacio, Internal Medicine Department, Bogotá, Colombia, ³Hospital Universitario San Ignacio, Intensive Care Unit, Bogotá, Colombia

INTRODUCTION. In developing countries, such as Colombia, rates of septic shock are greater than those reported elsewhere (Rodríguez et al. 2011). However, we lack a reliable, sensitive and specific predictor of septic shock. Hence, identifying predictors of septic shock is a cornerstone to deliver early therapy to decrease mortality.

OBJECTIVES. We aimed to evaluate the reliability of the so-called inflammatory reflex (focusing on inflammatory response and autonomic dysfunction) as predictor of septic shock.

METHODS. We did a prospective study over 6 months in adults admitted to the ICU of Hospital San Ignacio, Colombia, meeting criteria for sepsis (Levy et al. 2001). Written consents were obtained. Besides standard analyses, a continuous 15 min ECG was recorded using a Powerlab[®] and measures of HRV were calculated. Levels of Epinephrine, Norepinephrine, TNF and IL-1, 10, and 6 were obtained from blood samples by chromatography and fluorometry. Blood chemistry and HRV were correlated with outcome (shock vs. no shock) after 24 h.

RESULTS. Regarding HRV, we observed an increase in the RMSSD (Student-test, $t_{11,22} = 2.59$, $p < 0.01$; mean ± SD: shock = 165.96 ms ± 182.4; no-shock = 50.10 ms ± 70.02) and the HF (Student-test, $t_{11,22} = 2.72$, $p < 0.01$; mean ± SD: shock = 11742.1 ms² ± 1963.87 ms²; no-shock = 777.38 ± 1513.2 ms²) in the baseline measurements for patients who developed shock. In contrast, we observed significantly lower levels of the LF (Student-test, $t_{11,22} = 2.12$, $p < 0.05$; mean ± SD: shock = 4086.62 ± 556.62 ms²; no-shock = 1245.93 ± 215.73 ms²) and LF/HF ratio (Student-test, $t_{11,22} = 2.69$, $p < 0.01$, mean ± SD: shock = 0.46 ms² ± 0.28; no-shock = 4.68 ms² ± 5.15) in the baseline measurement for those patients who developed shock. Moreover, patients exhibited lower levels of IL-6 (Student-test, $t_{9,20} = 2.11$, $p < 0.05$, mean ± SD: shock = 133.35 pg/ml ± 140.7; no-shock = 876.17 pg/ml ± 1038.45) in the baseline measurements for patients who developed shock. We did not observed significant differences across other variables.

CONCLUSIONS. Our results indicate that patients who progress to septic shock have an increased inflammatory reflex (altered autonomic response with a predominantly vagal activity and a decreased sympathetic-vagal ratio with a decreased inflammatory response). We conclude that specific components of the inflammatory reflex: HRV and IL-6 are reliable predictors of septic shock in critical patients. Using them will allow early intervention of patients, thus saving their lives.

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GRANT ACKNOWLEDGMENT. Hospital San Ignacio and Universidad Javeriana.

Weaning and assisted ventilation: 0106–0119

0106

CRITERIA TO ASSESS EXTUBATION READINESS AND PREDICTION OF SUCCESSFUL WEANING

H. Le Goff¹, A.-S. Debue¹, F. Daviaud¹, S. Cabon¹, C. Boulila¹, T. Joannon¹, M. Reffiena¹, A. Marincamp¹, C. Augustin¹, J. Busson¹, S. Ben Abdallah¹, J. Charpentier¹, C. Elie¹, J.-D. Chiche¹, Groupe de Travail sur la Ventilation

¹Cochin Hospital/Paris-Descartes University, Medical ICU, Paris Cedex 14, France

INTRODUCTION. Daily evaluation of pts for weaning from mechanical ventilation (MV) by nurses has been shown to decrease duration of MV. Evaluation is based on the search of weaning criteria allowing the start of a T-piece trial and the assessment of patient tolerance during spontaneous breathing. Nonetheless, reintubation occurs in 5-10 % of cases [1], increases the duration of MV and ICU stay, and is associated with significant morbidity and mortality. Failure to wean pts may result from respiratory failure (high respiratory workload, poor gas exchange) or extubation failure (inability to clear secretions, laryngospasm). Weaning criteria commonly used are poor predictors of extubation failure. We have tested the interest of adding to our weaning test specific criteria to assess muscle strength, cough effectiveness, airway patency and patient's consciousness.

OBJECTIVES. To test the effectiveness of a new component to evaluate readiness for extubation in addition to an existing nurse-driven weaning protocol.

METHODS. We have retrospectively reviewed charts of all pts mechanically ventilated in the 24-bed MICU of Cochin University Hospital from 01/07-12/13. These pts were assessed twice a day by nurses who look for the presence of weaning criteria. Pts who met those criteria underwent a spontaneous breathing trial on T-piece during which tolerance was assessed. All pts data were continuously recorded in a clinical information management system (Clinisoft[®], GE Healthcare), including data related to weaning success/failure. In 08/2008, we progressively introduced a 5-item new component to our weaning protocol to improve our ability to test muscle strength, cough effectiveness, airway patency and patient's consciousness. To evaluate the effectiveness of this strategy, we assessed the incidence of weaning failure (defined as respiratory or extubation failure requiring reintubation within 48 h), the incidence of self-extubation, the duration of MV and ICU stay, and survival before (T1), during (T2) and after (T3) implementation of the new component. Informed consent was waived by our IRB for this study. Data are reported as median and interquartile ranges. A $P < 0.05$ was considered significant for all statistical tests performed.

RESULTS. 4488 treated with invasive MV have been included in the study from 01/07-08/08 (T1, n = 982), 08/08-08/09 (T2, n = 642), and 08/09-12/09 (T3, n = 2864). Main results are summarized below.

	T1	T2	T3	P
Sex (M/F)	602/380	375/267	1818/1046	0.04
Age	58 [43;72]	60 [47;72]	62 [48;74]	<0.001
SAPS2	57 [43;70]	58 [45;74]	59 [45;74]	<0.001
Reintubation (%)	4.7	4.4	6.7	<0.01
Self-extubation (%)	3.7	6.7	6.6	<0.01
Duration of MV (d)	4 [2;9]	3 [2;8]	3 [2;8]	NS
ICU LOS	4.6 [1.7;10.8]	5 [2.1;11]	5.5 [2.5;10.7]	<0.05
Death (%)	28.9	31.9	27.6	NS

[Table 1]

CONCLUSIONS. Addition of a new component to an existing nurse-driven weaning protocol to evaluate readiness for extubation was not associated with improved ability to predict successful extubation. These results mandate a thorough analysis of causes of reintubation.

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0107

SONOGRAPHIC EVALUATION OF THE MAXIMAL RELAXATION RATE (MRR) OF THE DIAPHRAGM

E. Soilemezi¹, E. Koco¹, C. Tsimos¹, C. Sahpazis¹, D. Matamis¹

¹Papageorgiou General Hospital, ICU, Thessaloniki, Greece

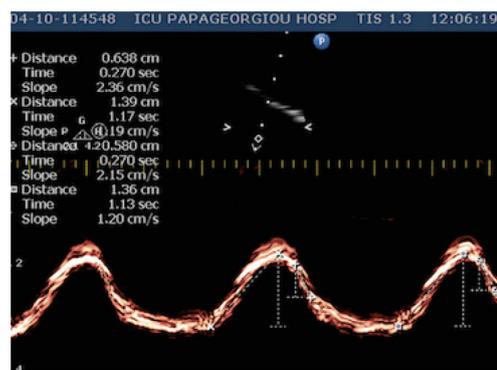
INTRODUCTION. Maximal relaxation rate of the diaphragm (MRR; percentage fall in pressure/10 ms) is an early index of diaphragmatic fatigue, and it is used as a predictor of weaning failure. This variable is, traditionally, measured from oesophageal pressure recordings thus impeding wide clinical use. Diaphragmatic motion can be obtained with M-mode ultrasonography (US) which allows very accurate measurements of the speed of the contraction and relaxation.

OBJECTIVES. The purpose of our study was to investigate whether M-mode US could provide a means of direct estimation of the diaphragmatic MRR rather than attempting to quantify the rate of diaphragmatic relaxation from measurements of the oesophageal pressure.

METHODS. MRR was calculated in patients who underwent a T-piece trial from oesophageal pressure waveforms by dividing dPoes/dt by Poes (fig.MRR-Poes). The assumed sonographic equivalent of MRR (MRR-US) was calculated from the M-mode diaphragmatic excursion which comprises contraction and relaxation. The slope of the initial-steepest part of the diaphragmatic relaxation was taken into account. The sonographic equivalent of the MRR was defined as the slope of diaphragmatic relaxation (cm/s) divided by the total distance (cm) run by the diaphragm during inspiration (fig.MRR-US). This way the sonographic MRR is expressed in the same units (sec⁻¹) as the MRR obtained by the Poes. In each patient studied, three simultaneous sequences of five consequent breaths were analyzed and compared for MRR- Poes and MRR-US. Statistics were performed using the SPSS statistical package.



[MRR-Poes]



[MRR-US]

RESULTS. Six patients were studied. Among the 95 breaths recorded 65 were fit for analysis due to artifacts on the Poes or M-mode US. Mean value for MRR- Poes was 4.4 ± 2 s⁻¹ and for MRR-US 1.5 ± 0.7 s⁻¹. Correlation coefficient between the two methods was 0.9 ± 0.3 ($p < 0.0001$) and the relationship was $y = 0.95x + 0.09$.

CONCLUSIONS. High correlation coefficients were observed between diaphragmatic MRR measured from oesophageal pressure tracings and the assumed diaphragmatic relaxation rate calculated from simultaneous M-mode sonographic recordings. Further clinical studies are required to evaluate this novel sonographic index of diaphragmatic MRR.

0109

PATIENT EFFORT DURING ASSISTED MECHANICAL VENTILATION: EVALUATION BY INSPIRATORY MUSCLES SURFACE ELECTROMYOGRAPHY (SEMG)

G. Bellani^{1,2}, M. Pozzi^{1,2}, E. Benzi^{1,2}, A. Bronco^{1,2}, G. Suriano^{1,2}, F. Rabboni¹, T. Mauri^{1,2}, N. Patróni^{1,2}, G. Grasselli², A. Pesenti^{1,2}

¹University of Milan Bicocca, Department of Health Science, Monza, Italy, ²San Gerardo Hospital, Department of Emergency Medicine, Monza, Italy

INTRODUCTION. Correlation between inspiratory patient effort and Electrical Activity (EA) of the Diaphragm is well known (1). A linear, but heterogeneous, correlation between neck muscles EA and static inspiratory effort was also previously described (2), suggesting a patient-based pattern of accessory muscles recruitment.

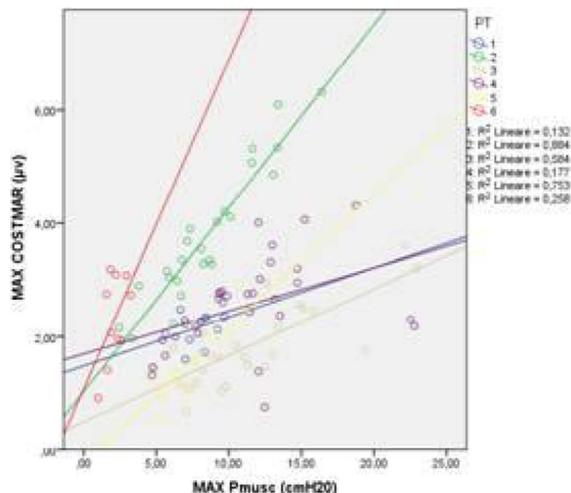
OBJECTIVES. To verify if taking into account EA arising from all inspiratory muscles might provide a better physiological monitoring of muscular activity in dynamic conditions than diaphragm alone.

METHODS. Seven ICU patients on assisted mechanical ventilation were studied in three consecutive phases lasting 30 min: baseline conditions (clinical ventilatory setting) and after a reduction and an increase of the pressure support level. sEMG of the Diaphragm (called "Costmar"), Intercostal, Sternocléid Mastoïd and Rectus Abdominis were simultaneously recorded with a dedicated device (Dipha 16, Inbiolab, Groningen). A nasogastric tube equipped with electrodes for EAdi detection and with a balloon for esophageal pressure (Pes) was positioned. The described waveforms were simultaneously recorded and respiratory cycles 30 s apart were sampled and analysed offline. Muscle pressure (Pmusc) was computed instant-by-instant as the difference between Pes and the chest wall elastic recoil curve, both as peak and as average over the respiratory cycle. Samples of respiratory cycles were aggregated according to percentiles of Pmusc of each patient. A Signal to Noise Ratio (SNR) analysis was performed for every sEMG trace and patients with a SEMG SNR < 1 were excluded.

RESULTS. One patient was excluded due to low SNR. Progressive reduction of support level resulted in a global, statistically significant increase in EAdi, Pmusc and Costmar sEMG signal ($p < 0.001$). In each patient Peak Pmusc well correlated with Peak Costmar and Sum of Inspiratory Muscles (Costmar, Intercostal and Sternocleid Mastoid) sEMG signals. sEMG of the diaphragm was well correlated with EAdi (R^2 0.59). Among the different sEMG signals the Sum of Inspiratory Muscles showed better (albeit not significantly) correlation with Pmusc than Costmar signal (Mean R^2 0.528 ± 0.268 vs 0.465 ± 0.320 , Fig. 1).

CONCLUSIONS. Monitoring sEMG of inspiratory muscle groups is feasible and provides a physiological signal that reflects patient's inspiratory effort during assisted mechanical ventilation.

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[Fig. 1]

0110 RELATIONSHIP BETWEEN RESPIRATORY MUSCLE PRESSURE AND THE ELECTRICAL ACTIVITY OF THE DIAPHRAGM

A. Rundo¹, F. Restuccia¹, H. Aguirre-Bermeo¹, F. Parrilla¹, T. Marafi¹, S. Italiano¹, F. Roche-Campo¹, J. Mancebo¹

¹Hospital de la Santa Creia i Sant Pau, Barcelona, Spain

INTRODUCTION. The electrical activity of the diaphragm (EAdi) can be measured through the Neurally Adjusted Ventilatory Assist (NAVA) probe. It is still poorly understood the relationship between the EAdi and inspiratory muscle effort.

OBJECTIVES. To analyze the relationship between respiratory muscle pressure (Pmus) estimated during Proportional Assist Ventilation (PAV) and the EAdi measured with the NAVA probe.

METHODS. Clinically stable patients during the weaning phase of mechanical ventilation were studied. They were ventilated in PAV modality with a GAIN of 25, 50 and 75 %. The EAdi was simultaneously recorded with a NAVA probe. Each level of assistance was maintained for at least 10 min. Ventilatory variables were continuously recorded with a laptop connected to the ventilator. The Pmus was calculated as: $Pmus = (P_{peak} - PEEP) \times (100 - \% GAIN) / \% GAIN$. A Pmus value between 5-10 cmH₂O was defined as a physiological range (1).

RESULTS. Nineteen patients were studied. The main results are listed in Table 1. Median EAdi within the Pmus physiological range was 12 (7-21) µV. In this study 43/57 (75 %) measures of Pmus were below of 10 cmH₂O (5 [4-8] cmH₂O) which corresponded to a median EAdi of 13 (6-21) µV. Fourteen (25 %) measures of Pmus were above of 10 cmH₂O (15 [12-22] cmH₂O) which corresponded to a median EAdi of 24 (20-31) µV.

CONCLUSIONS. We found that an increase in the assistance produces a decrease in muscle effort and EAdi. EAdi values >20 µV were associated with Pmus >10 cmH₂O in the 75 % of measures.

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GRANT ACKNOWLEDGMENT. Maquet.

0111 INTRA-ABDOMINAL PRESSURE MEASUREMENTS DURING SPONTANEOUS BREATHING TRIAL

M.O. Elghonemi¹

¹Cairo University, Critical Care, Cairo, Egypt

INTRODUCTION. There is a well-established interaction between the abdominal and thoracic compartments. IAP affects respiratory system, lung and chest wall elastance in an unpredictable way. During Spontaneous breathing trial (SBT), an increased in intra-abdominal pressure may be a marker for hindered lung compliance and elevated pressures and thus can predict failure of SBT.

OBJECTIVES. To assess the role of intra-abdominal pressure measurements in detecting success or failure during spontaneous breathing trial (SBT) and to study the role of intra-abdominal pressure measurements in detecting reintubation after extubation.

METHODS. 40 patients in the Intensive Care Unit of Cairo University diagnosed with respiratory failure due to COPD who were mechanically ventilated and for whom the first attempt was made to discontinue mechanical ventilator support. Patients who were found

ready for weaning by fulfilling readiness criteria were placed on a T- piece with high flow oxygen. During SBT each patient was closely monitored and IAP was measured via the urinary bladder at 15 min (IAP1), 30 min (IAP2), 60 min (IAP3) and 120 min (IAP4). Patients who showed any signs of failure of SBT were re- placed on ventilatory support and patients who passed the SBT were extubated. Patients who were extubated were monitored for 24 h and those who were reintubated for any reason were recorded.

RESULTS. The mean Intra-abdominal pressure was higher at all times in patients who failed SBT compared to those who successfully passed the SBT and were extubated. (IAP1 6.9 versus 8.9 p < 0.005, IAP2 11.2 versus 6.1 p < 0.005, IAP3 5.4 versus 10.5 p < 0.005, IAP4 4.7 versus 10.6 p < 0.005). Patients who were reintubated in the first 24 h after initially passing the SBT had a higher mean IAP during SBT at all times compared to those who were not reintubated in the first 24 h. ROC analysis showed a cut off values for Intraabdominal pressure readings in detecting failure of SBT. (IAP1 6.5 cmH₂O sensitivity 0.75, IAP2 7.5 cmH₂O sensitivity 0.95, IAP3 7.5 cmH₂O sensitivity 0.95, IAP4 6.5 sensitivity 1.0).

CONCLUSIONS. Increased measurements of IAP during SBT can serve as a sign for failure of SBT.

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0112 CONTINUOUS MONITORING OF PATIENT-VENTILATOR INTERACTION IN ICU PATIENTS UNDERGOING PROLONGED MECHANICAL VENTILATION

F. Mojoli^{1,2}, S. Bianzina¹, F. Torriglia¹, L. Viola¹, I.M. Bianchi¹, A. Orlando¹, M. Pozzi², A. Braschi^{1,2}

¹University of Pavia, Section of Anesthesia, Intensive Care and Pain Therapy, Pavia, Italy, ²Fondazione IRCCS Policlinico San Matteo, Anesthesia and Intensive Care Division I, Emergency Dpt, Pavia, Italy

INTRODUCTION. Patient-ventilator asynchrony is a challenging problem during mechanical ventilation, potentially leading to worsening of gas exchanges and damage of respiratory muscles and finally resulting in difficult weaning.

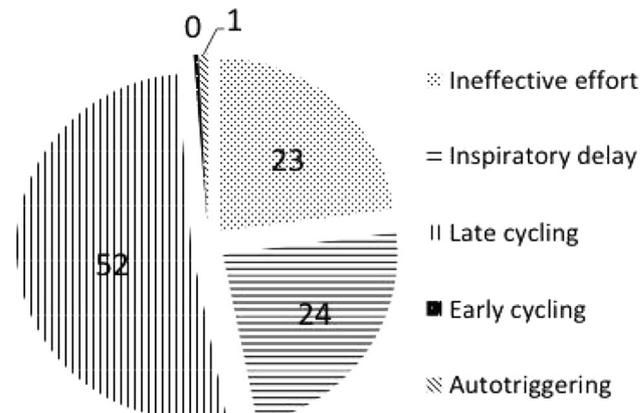
OBJECTIVES. To assess breath by breath 24/24 h patient-ventilator interaction in ICU patients undergoing prolonged invasive pressure support ventilation (PSV).

METHODS. We analyzed adult patients undergoing assisted mechanical ventilation (invasive PSV) for any form of acute respiratory failure and expected to remain ventilated for at least 48 h. Ventilator's parameters and waveforms were recorded continuously, by connecting a laptop to the serial port of the mechanical ventilator (G5, Hamilton Medical, CH) and using a dedicated software (Datalogger, Hamilton Medical, CH). Automatic data analysis was performed by applying a software developed at our institution (1). This software provided breath by breath detection of both inspiratory (inspiratory delays, ineffective efforts and autotriggerings) and expiratory (early and late cyclings) asynchronies. Vital parameters, blood gas analysis and sedation score were also recorded. For all the parameters, the average values over 2 h were considered.

RESULTS. We evaluated about 130 days (3100 h) of recordings in 12 mechanically ventilated patients. Asynchronies accounted for 18 ± 10 % of the analyzed time and in 10 % of cases asynchrony time (AT) was greater than 30 %. The most frequent form of asynchrony was late cycling (52 ± 34 % of AT); the relative contribution of the different asynchronies to AT is displayed in figure 1. Mechanical inspiratory time was longer (1229 ± 353 vs. 874 ± 186 ms; $p < 0.0001$), while mechanical respiratory rate was lower (18 ± 6 vs. 21 ± 6 ; $p < 0.0001$) than patient's one. Ineffective efforts accounted for 12 ± 14 % of patient's acts. AT was directly correlated with tidal volume ($r = 0.29$, 95 % CI 0.24-0.34; $p < 0.0001$) and patient's respiratory rate ($r = 0.25$, 95 % CI 0.2-0.3; $p < 0.0001$). In deeply sedated patients (Richmond Agitation Sedation Scale ≤ -3) AT was higher than in less sedated ones (30 ± 17 % vs. 16 ± 9 %; $p < 0.0001$). Both alarms and setting changes of the mechanical ventilator were not correlated with AT.

CONCLUSIONS. Continuous monitoring demonstrated that, during almost 20 % of time under patient-triggered mechanical ventilation, the patient and the ventilator were not synchronized. Late cycling, a usually disregarded asynchrony, accounted for more than 50 % of total asynchrony time. High ventilator tidal volumes, high patient respiratory rates and deep sedation facilitated asynchronies. Poor patient-ventilator interaction was not detected by ventilator alarms and did not lead to changes in ventilator settings by physicians.

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[Contribution of the different asynchronies to AT]

0113

DIFFERENCES BETWEEN PARAMETERS OBTAINED FROM ESOPHAGEAL AND RESPIRATORY MUSCLE PRESSURE

J.M. Serrano Simon¹, F. Ruiz Ferron²¹Hospital Universitario Reina Sofia, Intensive Care Unit, Cordoba, Spain, ²Complejo Hospitalario de Jaen, Intensive Care Unit, Jaen, Spain**INTRODUCTION.** Esophageal pressure (Peso) is a useful signal in mechanically ventilated patients, however it is difficult in the clinical practice. Probably because it is invasive and the especial instrument to register. Easier is the measurement of respiratory muscle pressure (Pmus), if this signals are interchangeable has not been studied enough.**OBJECTIVES.** Comparison of clinical variables obtained from Peso and Pmus.**METHODS.** We studied a group of mechanically ventilated patients during the weaning time, with different levels of ventilatory support. Low assistance (CPAP, PS 50 %, IPPV 50 %) and highest assistance (PS100 %, IPPV100 %). Esophageal and airways pressure (Paw), and airways flow were registered for posterior analysis. Respiratory mechanics were measured by multiple linear regression. Inspiratory and expiratory time, parameters related with respiratory effort (delta, PTP) were measured from Peso and Pmus. Pmus was calculated subtracting the passive (Paw,teor) from actual (Paw,a). Paw,teor was calculated using the equation of motion of the respiratory system (Paw = E·V + R·V' + P0). A Bland-Altman and linear regression analyses were performed.**RESULTS.** 10 patients were studied. The mean comparison of the variables did not showed statistical differences, and the correlations were significant. However the wide agreements limits were clinically unacceptable.

All data (N = 41)	Ti (s)	Te (s)	PTP (cmH ₂ O*s)	PTP/min (cmH ₂ O*s/min)	Delta P (cmH ₂ O)	Ers (cmH ₂ O/L)	Rrs (cmH ₂ O/L/s)	Peepi
Peso (mean ± SD)	1,14 ± 0,03	1,77 ± 0,79	9,23 ± 17,27	124,06 ± 111,29	8,14 ± 5,61	19,83 ± 16,89	11,39 ± 12,51	2,62 ± 3,48
Pmus (mean ± SD)	1,14 ± 0,34	1,79 ± 0,81	9,47 ± 14,03	147,76 ± 110,75	9,12 ± 6,27	23,40 ± 12,44	11,65 ± 7,97	2,35 ± 2,96
R	0,95	0,98	0,92	0,87	0,72	0,75	0,80	0,96
Bias (means differences)	0,02	0,01	0,23	23,69	0,98	3,56	0,26	-0,26
2SD (limits of agreement)	-0,22 / 0,22	-0,24 / 0,28	-13,32 / 13,80	-108,90 / 156,30	-7,94 / 9,91	-18,74 / 25,87	-15,08 / 15,06	-2,23 / 1,69

[Table 1. Variables. Esophageal vs muscle pressure]

Ti: inspiratory time. Te: Expiratory time. PTP: Pressure-time product. Ers: Total elastance respiratory system. Rrs: Total resistance respiratory system. Peepi: Intrinsic Peep.

CONCLUSIONS. Isolated parameters obtained from respiratory muscle pressure can not be representatives from esophageal pressure. But changes in pmsus may be useful to assess the level of ventilatory assistance.

0114

DETECTION AND ASSISTANCE OF WEAK COUGH AT EXTUBATION: IMPACT ON OUTCOME

P. Beuret¹, C. Roux¹, N. Pelletier¹, J.-C. Chakarian¹, B. Philippon-Jouve¹, X. Fabre¹, M. Kaak¹¹Centre Hospitalier, Intensive Care Unit, Roanne, France**INTRODUCTION :** Previous studies have shown that a weak cough strength is a strong predictor of extubation failure.**OBJECTIVES.** This before-after study aimed to evaluate the impact on extubation outcome of identifying weak cough at extubation by the measure of peak cough expiratory flow (PCEF) and assisting these patients with prophylactic noninvasive ventilation (NIV).**METHODS.** The PCEF was measured with an electronic flowmeter, the Piko-1 (Ferraris Respiratory, Hertford, UK) by the respiratory therapist before extubation for the patients mechanically ventilated for more than 24 h and who passed successfully a spontaneous breathing trial of 30 min of pressure support at 8 cmH₂O. The patients where then extubated irrespective of the value of PCEF. We compared two cohort of patients: a historical cohort of 141 patients in 2005-2006, where the physician was blinded to the value of PCEF (blinded cohort) and no prophylactic NIV was applied [1], and an open cohort of 151 patients in 2012-2013, where prophylactic NIV was applied to the patients identified by the previous study at risk of extubation failure: PCEF < 35 l/min or inability to cough at order [1]. In the two groups rescue NIV was used if patients developed post-extubation respiratory failure. Extubation failure was defined by the need of reintubation within 48 h following extubation.**RESULTS.** The two cohort were similar regarding age, SAPS II at admission, incidence of underlying chronic cardiac or respiratory disease and duration of mechanical ventilation before extubation. Prophylactic NIV was effectively applied to 71 % of patients identified at risk of extubation failure. The outcome of extubation is detailed in the following table, according to the cough strength:

	Blinded cohort	Open cohort	p
PCEF > 35 l/min	n = 86	n = 100	
Prophylactic NIV	0(0 %)	18(18 %)	<0.0001
Extubation failure	3(3 %)	5(5 %)	0.726
Total duration of ventilatory assistance	13.2 ± 15.6 days	14.2 ± 16.9 days	0.678
PCEF ≤ 35 l/min or inability to cough at order	n = 55	n = 51	
Prophylactic NIV	0(0 %)	36(71 %)	0.0002
Extubation failure	11(20 %)	3(6 %)	0.043
Total duration of ventilatory assistance	23.6 ± 20.4 days	19.9 ± 17 days	0.317

[Extubation outcome]

CONCLUSIONS. Prophylactic NIV was increasingly used after extubation. This study suggests that applying prophylactic NIV to the patients identified with a weak cough strength at extubation could reduce the risk of extubation failure without increasing the total duration of mechanical ventilation.**REFERENCE:** 1. Beuret P. Interest of an objective evaluation of cough during weaning from mechanical ventilation. Intensive Care Med 2009; 35: 1090-1093.

0115

THE USE OF INDIRECT CALORIMETER PARAMETERS TO OPTIMIZE RESPIRATORY SUPPORT AND WEANING FROM MECHANICAL VENTILATION IN STROKE PATIENTS

S. Beeharry¹, A. Butrov¹, M.V. Petrova¹, M. Storchai¹¹RPFU, Anesthesiology and Intensive Care, Moscow, Russian Federation**INTRODUCTION.** Stroke is the third leading cause of death in the world, approximately 800,000 people suffer a stroke yearly and three-quarters of all strokes occur in people over the age of 65. Mechanical ventilation is sometimes necessary during treatment of acute stroke. Prognosis in severe stroke patients requiring mechanical ventilation remains poor. Success in weaning from mechanical ventilation stays a challenging problem.**OBJECTIVES.** To identify changes in parameters of indirect calorimeter while weaning from mechanical ventilation and to optimize respiratory support**METHODS.** 21 patients suffering from stroke (14 women and 7 men with an average age of 72.4 ± 5.2) were randomly selected, from mid of 2013 to 2014 on Mechanical ventilation were studied. Engstrom Carestation Indirect Calorimeter's gas analyser (E-COVX) was used to measure the changes in oxygen consumption (VO₂) carbon dioxide production (VCO₂) on different modes of mechanical ventilation: stepwise reduction of mandatory breaths in Bi-level mode (from 12 to 6) with Pressure support of 16 mm H₂O, followed by continuous positive airway pressure (CPAP) mode with decreasing a Pressure support from 16 to 8 mm H₂O was used as weaning method. Weaning procedure lasted 16-24 h with changes in parameters every 2-3 h.**RESULTS.** The VO₂ and VCO₂ of patients in Bi-level mode were of 230 ± 34 ml/min and 158 ± 28 ml/min respectively. While weaning, there was a slight increase in the VO₂ to 248 ± 32 (7.8 %) and significant increase in VCO₂ to 181 ± 32 (14.6 %) that occurred gradually with a decrease in pressure support. 14 out of 21 patients were successfully weaned during the study, 4 patients were weaned but still needed further mechanical ventilation and 3 patients could not be weaned at all. The VO₂ and VCO₂ of these patients increased in the early phase of weaning but then rapidly decreased which prompted for increase in Psupp.**CONCLUSIONS.** Changes in VO₂ and VCO₂ during weaning may be used to understand the metabolic changes occurring in the organism. Increased production of carbon dioxide shows that there is an increase in energy production and consumption due to increased respiratory muscle work. The parameters may be used to optimize respiratory support in these patients.

0116

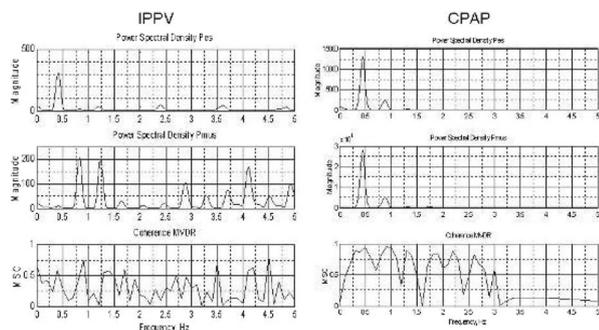
ANALYSIS OF THE SIMILARITY BETWEEN ESOPHAGEAL AND RESPIRATORY MUSCLE PRESSURE

F. Ruiz Ferron¹, J.M. Serrano Simon²¹Complejo Hospitalario de Jaen, Intensive Care Unit, Jaen, Spain, ²Hospital Universitario Reina Sofia, Cordoba, Spain**INTRODUCTION.** Some factors as, difficulties in measurements of respiratory mechanics, inercy and noisy produce differences between esophageal pressure (Peso) and respiratory muscle pressure (Pmus). However if the shape of respiratory muscle pressure can be useful during mechanical ventilation has not been studied enough.**OBJECTIVES.** We studied the similarity between Pmus and Peso in frequency domain with coherence function and time domain with cross-correlations.**METHODS.** Esophageal, airways pressure (Paw) and respiratory flow were registered in 10 patients on mechanical ventilation at different levels of respiratory assistance, from minimal to almost complete support (CPAP, PS50, PS100, IPPV50, IPPV100). Respiratory mechanics were measured by multiple linear regression. Pmus was calculated subtracting the passive (Paw,teor) from actual (Paw,a). Paw,teor was calculated using the equation of motion of the respiratory system (Paw = E·V + R·V' + P0). Signals were registered for 4096 s, sampling 100 Hz and windowing (Hanning) before used the fast Fourier transform. Power spectra was used to define the harmonics amplitude and frequency. Spectrum comparison with the magnitude squared coherence (MSC) using the minimum variance distortionless response (MVDR) method. MSC was measured at the harmonics frequency. The coefficient of cross-correlations at time lag = 0, between Peso and Pmus was calculated. Results as mean ± SD or median (25-75 %), and were compared using Mann-Whitney test. *p < 0,05; **p < 0,001.**RESULTS.** The spectrum frequency and amplitude was higher in pmsus than peso 2 ± 1.8 vs 1.6 ± 0.6 Hz and 7.2 vs 21.2·10³ cmH₂O². The complete signals were described by 3 harmonics, comparing Peso with Pmus his energy distribution were different (5.0,2,0,0,3 vs 14.2*,3,9*, 0.4 ·10³cmH₂²). MSC and cross-correlation improve at higher levels of respiratory effort (CPAP, low PS and IPPV), MSC 0.78 vs 0.98**; 0.85 vs 0.93*; 0.74 vs 0.89; and the cross-correlations in lag0, 0.38 vs 0.94**.

	Fundamental wave	Second Harmonic	Third Harmonic
(A)Maximum Coherence Peso-Pmus/Hz	0,88 ± 0,16/ 0,38 ± 0,16	0,87 ± 0,14/ 0,76 ± 0,33	0,79 ± 0,25/ 1,18 ± 0,52
(A)Cross-correlation, R(Lag0)/Rmax(Lag)	0,62 ± 0,33/0,69 ± 0,29 (Lag -1.87)		
(B)Maximum Coherence Peso-Pmus/Hz	0,78 ± 0,19/ 0,35 ± 0,12	0,85 ± 0,14/ 0,70 ± 0,26	0,74 ± 0,29/ 1,12 ± 0,44
(B)Cross-correlation, R(Lag0)/Rmax(Lag)	0,38 ± 0,31/0,45 (Lag -20)		
(C)Maximum Coherence Peso-Pmus/Hz	0,98 ± 0,06/ 0,41 ± 0,19**	0,89 ± 0,2/ 0,82 ± 0,38*	0,84 ± 0,02/ 1,23 ± 0,88
(C)Cross-correlation, R(Lag0)/Rmax(Lag)	0,83 ± 0,18 (Lag 0)/0,87 ± 0,15 (Lag -0.4)		
(D)Maximum Coherence Peso-Pmus/Hz	0,98 ± 0,01/ 0,45 ± 0,21**	0,93 ± 0,09/ 0,90 ± 0,42*	0,89 ± 0,13/ 1,36 ± 0,65
(D)Cross-correlation, R(Lag0)/Rmax(Lag)	0,94 ± 0,02/0,96 ± 0,01(Lag -1.62)		
(A): All Data. (B): Maximum support. (C): Minimum support. (D): Without support (CPAP)			

[Table 1. Coherence and Cross correlation Peso vs Pmus]

CONCLUSIONS. The respiratory muscle pressure calculated with this model, shown a weak relationship with the esophageal pressure measured, but this improve with higher respiratory effort.



Representative patient (case N° 7), during mechanical ventilation with maximum support (IPPV) versus spontaneously breathing (CPAP). Note the differences in spectral power and coherence between esophageal and muscle pressure.

[Figure 1. Power spectral density and Coherence.]

0117 EVALUATION OF INTEGRATED WEANING INDEX PREDICTIVITY FOR SUCCESSFUL WEANING IN MECHANICALLY VENTILATED PATIENTS

E.G. Hassanein¹, M.M. Shaheen¹, A.H. Kassem¹, H.M. Ghonim²

¹Alexandria University, Faculty of Medicine, Department of Chest Diseases, Alexandria, Egypt, ²Alexandria University Main Hospital, Alexandria, Egypt

INTRODUCTION. Weaning failure is commonly multifactorial in origin; making one index assessing a single function is unreliable. This has inspired many integrative indices like CROP and occlusion pressure with respiratory frequency to tidal volume product indices. The latest introduced was the integrative weaning index⁽¹⁾ which is the product of static respiratory compliance and arterial oxygen saturation divided by the respiratory frequency to tidal volume ratio, is showing promising results. Yet, it used static respiratory compliance in non-sedated patient and measured the respiratory frequency to tidal volume ratio with the standard method that is far from our usual clinical practice of weaning with the pressure support ventilation.

OBJECTIVE. The aim of the study is to evaluate the integrative weaning index with some modifications that make its measurement and calculation more applicable in the clinical practice and even with greater accuracy (naming it the integrated weaning index).

METHODS. The present study was conducted on forty patients who were invasively ventilated due to acute respiratory failure for more than 24 h and were decided for weaning from mechanical ventilation. Static respiratory compliance was measured before stopping the sedation of the patient in the semi-sitting position on volume assisted controlled mode. After the patient had become fully awake, the mode was switched to pressure support ventilation and during that the respiratory frequency, spontaneous exhaled tidal volume and occlusion pressures at 100 ms were recorded. An arterial blood gasometry was done while patient was on fractional oxygen of 0.35. Patients who passed a spontaneous breathing trial and were extubated were included in the study and were followed for the subsequent 48 h for deciding whether weaning was successful or not. Statistical analysis was done comparing either a single index or an integrated one to evaluate the predictivity for successful weaning.

RESULTS. Integrated weaning index has shown the highest diagnostic accuracy for prediction of weaning success with no significant difference from other weaning indices. The positive and negative likelihood ratios were 3.6 and 0.25 respectively.

CONCLUSION. Integrated weaning index can be an accurate and applicable tool to decide patients to undergo a weaning trial. Frequency to tidal volume ratio on pressure support ventilation cut-off value is much lower than the known 105 value and needs more evaluation with regards predictive accuracy. Static respiratory compliance may be a predictor for late resumption of ventilator support and intensive care unit readmission.

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0118 EVALUATION OF AIRWAY LENGTH OF KOREANS FOR OROFACIAL SURGERY USING A FIBEROPTIC BRONCHOSCOPE

W.H. Lee¹

¹Chungnam National University Hospital, Anesthesiology and Pain Medicine, Daejeon, Republic of Korea

INTRODUCTION. Knowledge regarding normal upper airway anatomy is essential for airway management in ICU mechanical ventilation and is required to prevent malpositioning of endotracheal tubes. Patients who receive the orofacial surgery are sometimes needed postoperative mechanical ventilatory support.

OBJECTIVES. We evaluated the length of the upper airway in Korean children and adults who had no abnormality of the upper airway using a fiberoptic bronchoscope.

METHODS. Eighty seven patients aged 5 to 81 years undergoing noninvasive elective orofacial surgery were included in this study. After induction of anesthesia was complete, we measured the distance from the upper incisor to various components of the upper airway by fiberoptic bronchoscopy. The experimental procedures were performed in accordance with the research guideline of the Korean Academy of Medical Science.

RESULTS. In adults, the mean length between the upper incisor and midtrachea was found to be 21.8 ± 1.8 cm in males and 19.9 ± 1.3 cm in females, while the mean length of the trachea was 10.1 ± 1.3 cm in males and 10.3 ± 1.6 cm in females. The length between the

upper incisor and midtrachea (IT) were correlated with height both in children (IT [cm] = 2.531 + 0.109 * height [cm]) and adults (IT [cm] = 0.167 + 0.127 * height [cm]), which shows that they differ from the western standard (length of tube [cm] = 5 + 0.1 * height [cm]).

CONCLUSIONS. In adults and children, the length from the incisor to the midtrachea was significantly different when compared with western standards. Therefore, re-evaluation of the proper and precise depth of endotracheal tube in Koreans should be considered.

0119 PREVALENCE OF WORK OF BREATHING DURING INVASIVE MECHANICAL VENTILATION

F.J. Garcia Rodriguez¹, A.M. Poulet Brea², C. Salazar Ramirez³, A. Robles⁴, J.A. Benitez Lozano⁵

¹Hospital Costa del Sol, Intensive Care Unit, Marbella, Spain, ²Hospital Regional Universitario de Málaga-Carlos Haya, Intensive Care Unit, Málaga, Spain, ³Hospital Regional de Málaga-Virgen de la Victoria, Intensive Care Unit, Málaga, Spain, ⁴Hospital Regional Universitario de Málaga-Carlos Haya, Málaga, Spain, ⁵Hospital Quiron Málaga, Málaga, Spain

INTRODUCTION. Studies on inspiratory asynchrony show that inspiratory asynchrony is related to a high patient work in breathing and difficulty in weaning. In addition, expiratory asynchrony, not only causes discomfort to patients but costs them unnecessary inspiratory and expiratory work as well.

OBJECTIVES. To establish which is the prevalence of work of breathing in patients who are in mechanical ventilation in ICU of a third level and a first level hospital.

METHODS. We studied all mechanically ventilated patients with a Draeger ventilator for ≥24 h or with respiratory disease that presumably lead to >24 h of mechanical ventilation during 1 day. 17 patients were included: 13 from 3rd level hospital and 4 from 1st level hospital. We connected a laptop to the output of ventilator and recorded airway pressure, volume and flow at 125 Hz. We performed in all cases an end-inspiratory pause and an end-expiratory pause for measuring compliance and total PEEP. Compliance was estimated according to this formula:

$$C_{RS} = \dot{V} / (P_{pl} - PEEP_t)$$

We assumed that average half of tidal volume was paralyzed in all cases and that relationship between elastic pressure and volume was lineal in this area. The time constant (τ) was determined for this zone (inverse of linear regression slope of the flow-volume loop).

The resistance was calculated from the equation

$$C_{rs} * R_{rs} = \tau$$

Muscular effort was estimated by this equation in all breaths:

$$P_{musc} = P_{aw} - (R_{rs} * \dot{V}') - (V'/C_{rs}) - P_{ex} \quad (P_{ex} = PEEP_t - PEEP_{extr}) \quad (V' = \text{flow})$$

We calculated work of breathing index and pressure-time product:

$$W_{pat} = \int_0^{V_{T}} (-P_{musc}) dV \quad PTP_{pmusc} = (\int_0^{V_{T}} P_{musc}) RR$$

We analyzed inspiratory and expiratory asynchronies.

RESULTS. 9 patients was in pressure-support ventilation (PSV) and 8 was in controlled ventilation (6 in volume-controlled ventilation- 3 of them with autoflow- and 2 in biphasic positive airway pressure- BiPAP -with high respiratory frequency).

Three volume-controlled patients had moderate spontaneous muscular activity but three hadn't it. All patients in BiPAP or PSV had muscle activity: 3 patients in PSV had exhausting muscle activity (PTPT de 366.8, 407.5 and 867.6 cm/min) and 2 on PSV and 1 on BiPAP had suboptimal one (47, 78 and 98 cm/min). The tidal volume average in PSV was 8.5 ml/kg (ideal body weight) and 7.8 ml/kg in controlled ventilation. Asynchronies was more important in patients in controlled-volume ventilation (4 of 8) than PSV patients (2 of 9).

CONCLUSIONS. Patient-ventilator asynchrony in controlled-volume ventilated patients and exhausting or suboptimal effort in pressure-support ventilated patients are very frequent. We believe we need to estimate in a easy way the work of breathing during any kind of invasive ventilation. A carefully monitoring of pressure, flow and volume is useful to detect asynchrony.

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Improving icu safety: 0120–0133

0120

ANALYSIS OF CONTRIBUTING FACTORS ASSOCIATED TO RELATED PATIENTS SAFETY INCIDENTS IN INTENSIVE CARE MEDICINE

M.C. Martín¹, P. Merino², G. Sirgo³, J. Alvarez⁴, I. Gutierrez⁵, B. Obon⁶, SYREC Group

¹Hospital Universitario Torrejon, Intensive Care Unit, Madrid, Spain, ²Hospital Can Misses, Intensive Care Unit, Ibiza, Spain, ³Hospital Universitario Joan XXIII, Instituto de Investigación Sanitaria Pere Virgili, Universidad Rovira i Virgili, Intensive Care Unit, Tarragona, Spain, ⁴Hospital Universitario de Fuenlabrada, Madrid, Spain, ⁵Hospital Clínico Universitario, Intensive Care Unit, Zaragoza, Spain, ⁶Hospital Clínico Universitario, Servicio de Medicina Preventiva y Salud Pública, Zaragoza, Spain

INTRODUCTION. High-risk organisations have adopted a systems approach to safety management, which recognises the fundamental role of the contributing factors in the genesis of adverse events (AE).

OBJECTIVES. To explore contributing factors (CF) associated to related critical patients safety incidents.

METHODS. This is a SYREC (from an acronym for the Spanish title 'Safety and Risk in Critical Patients) study pos hoc analysis. Observational, prospective, 24-h cross-sectional study with self-reporting. Seventy-nine intensive care units at 76 hospitals. The CF were classified into 8 groups: individual factors, team and social factors, communication factors, task related factors, equipment and supplies factors, working conditions related factors, patients factors and, finally, education and training factors. The incidents were classified into 11 classes. The severity of the incident was analysed adjusting the medication error classification from Ruiz-Jarabo group.

RESULTS. 1017 patients were included in the study; 591 (58 %) were affected by one or more incidents. Of the 1424 valid incidents, 943 (66 %) were no-harm events NHEs and 481 (34 %) were AEs. A total 2965 CF were reported. Of these, 1729 were associated to near miss and 1236 were associated to adverse events. The CF more frequently reported were patients factors. Individual factors were reported more frequently in near miss and task related factors in adverse events. CF were reported in all classes of incidents. Most CF were reported in the incidents classified as less serious although patients factors were associated to serious incidents. Individual factors mainly were considered avoidable categories and patients factors as unavoidable.

CONCLUSIONS. Patient factors, the most frequent, were associated to more severe and unavoidable incidents. By contrast, individual factors were associated to less severe and avoidable incidents. CF were reported most frequently associated to near miss. The identification of CF should be followed by the implementation of improvement actions

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0121

PROCEDURAL AND EDUCATIONAL INTERVENTIONS TO REDUCE VENTILATOR-ASSOCIATED PNEUMONIA RATE: PRELIMINARY RESULTS OF A NATIONAL REGISTRATION PROGRAM

P.A. Reper^{1,2}, D. Dicker¹, M. Laurent¹, P. Damas^{3,4}, E. Van Gastel¹, L. Huyghens^{4,5}, G. Haelfterman¹

¹Belgian Public Health Organization, Brussels, Belgium, ²Brugmann University Hospital, Critical Care, Brussels, Belgium, ³University Hospital Sart Tilman, Critical Care, Liege, Belgium, ⁴Belgian Public Health Organization, College of Belgian Intensivists, Brussels, Belgium, ⁵University Hospital UZ Brussel, Critical Care, Brussels, Belgium

BACKGROUND. Belgian Public Health Organization is concerned with rates of hospital acquired infections like ventilator-associated pneumonia (VAP) or central line-associated blood stream infection (CLA-BSI). Implementing best practice guidelines for these nosocomial infections VAP and CLA-BSI has variable success in the literature. This retrospective study was undertaken to see whether implementation of the evidence based practices as a bundle would influence compliance and reduce the rates of VAP without necessary resorting to more expensive interventions such as subglottic endotracheal (ET) tube suctioning or for example silver-impregnated ET tubes. We utilized easily collectable data to rapidly assess whether interventions already in place were effectively successfully applied. This avoided cumbersome data collection and review.

METHODS. Retrospective data review using National Healthcare Safety Network benchmarks. Compliance rates and VAP ratios were compared using z tests with P values < 0.05 considered statistically significant. This data review attempted to examine the impact of education campaigns, staff meetings, in-services, physician checklist, nurse checklist, charge nurse checklist implementation, systematic VAP bundle application and systematic protocols for oral care and sedation protocols. Additionally, VAP ratio could be registered by the participating centers but not always transmitted to the public ministry.

RESULTS. A total out of 76 of the 120 acute hospitals participated actively in this database. At the time of the analysis, the registry included a total of 10361 ventilated patients who were admitted to one of the 76 hospitals between February 2012 and 31 December 2012. The general compliance for VAP bundle raised from February to December 2012 (P < 0.001).

The incidence rate of VAP went from 21 occurrences/1000 vent days in February to 12 occurrences/1000 vent days in December 2012 (P < 0.001).

CONCLUSIONS. Efforts to improve physician, patient, and staff education, and checklist implementation resulted in an increase compliance for VAP bundle, a local reflection on specific practices like oral care and sedation protocols in ICU and in a decrease in VAP ratio. This study confirms the applicability of best practice guidelines and suggests a benefit to the use of checklists proposed by Health Organization. We utilize a practical approach for examining the success of these changes.

0122

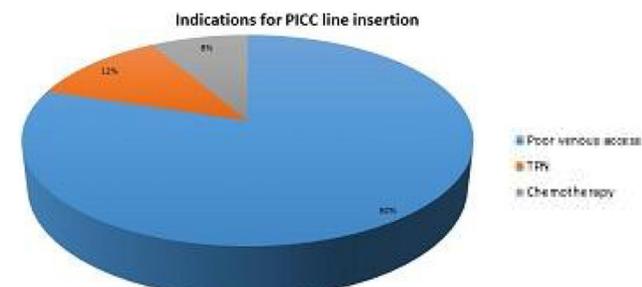
ISSUES ASSOCIATED WITH PERIPHERALLY INSERTED CENTRAL CATHETERS (PICC) IN ADULT PATIENTS

K. Krishnareddy¹, R. Varghese¹, V. Redona¹, A. Khwaja¹

¹Sheikh Khalifa Medical City, Abu Dhabi, United Arab Emirates
Peripherally Inserted Central Catheters are increasingly used both in the ICU and non-ICU setting and in many cases is used as an alternative to central venous catheters. They are commonly inserted for patients who have difficult or poor peripheral venous access, those requiring long term parenteral nutrition and for chemotherapy. The reported incidence of PICC line associated infection is 4.5-7.3 % and deep vein thrombosis 8.4 % (1,2). However risks associated with PICC lines are often underestimated especially in the adult population.

AIM. To assess risks associated with PICC lines in our Institute.
METHODS. A retrospective review of all PICC lines inserted in our facility was performed over a 2-year period (2011-2012). A total of 701 PICC lines were inserted during this period, of which 90 % were inserted by interventional radiologist and 10 % by trained physicians. All PICC lines were inserted under ultrasound guidance.

RESULTS. Indication for insertion of PICC line is shown in



[Figure 1]

Basilic vein was commonly used for cannulation in 77.7 % of patients, cephalic vein in 21 % and 10.9 % in other sites (brachial, IJV and femoral). In total complications occurred in 35.2 % (N = 247) of the patients. PICC line associated blood stream infections was the most common complication accounting for 42.5 % and 15.8/1000 catheter days, blockage/malfunction occurred in 19 %, malposition occurred in 18.2 %, deep vein thrombosis in 6.8 % and other complications 12.9 % (non-sustained broad complex tachycardia-1, retention of guidewire-1, accidental removal-4, leakage from site-22, superficial thrombophlebitis-4). Malposition was common for PICC lines inserted by non-interventional radiologist. Infections related to PICC lines occurred at an average of 17.1 days. Gram-negative pathogens were responsible for 68 % of infections, gram positive for 19 % and yeast for 13 % of infections. PICC line associated infections decreased from 15.75/1000 catheter days in 2011 to 9.9/1000 catheter days in 2012.

CONCLUSIONS. In our setting, PICC lines are associated with a very high incidence of complications particularly infection related complications.

REFERENCE(S). 1. Al-Tawfiq JA, Abed MS, Memish ZA. Peripherally inserted central catheter blood stream infection surveillance rates in acute care settings in Saudi Arabia. *Ann Saudi Med* 2012;32(2):169-73. 2. Wilson TJ, Stetler WR Jr, Fletcher TS. Comparison of catheter related large vein thrombosis in centrally inserted versus peripherally inserted central catheters in neurosurgical intensive care unit. *Clinic Neurol Neurosurg* 2013;115(7): 879-82.

0123

AN EFFICIENT SURVEILLANCE SYSTEM USING THE NEW CDC'S DEFINITIONS FOR COMPLICATIONS OF MECHANICAL VENTILATION IN A PEDIATRIC INTENSIVE CARE UNIT

S. Thammassitboon¹, S. Phongjitsiri¹, J. Cossbu¹, C. Kennedy¹, J. Starke¹, J. Graf¹

¹Baylor College of Medicine College of Medicine, Pediatrics, Houston, United States

INTRODUCTION. The CDC's proposed an alternate surveillance paradigm for patients receiving mechanical ventilation, moving from the current standard of ventilator-associated pneumonia to broader complications in general. These new surveillance definitions were designed to enable objective measures and efficient processes, so as to facilitate quality improvement initiatives, improve patient care and enhance standardized benchmark comparisons.

OBJECTIVES. To evaluate the new CDC's surveillance definitions for complications of mechanical ventilation in terms of their objectivity, ease of electronic surveillance and clinical predictability in a pediatric intensive care unit.

METHODS. We retrospectively identified patients meeting definition criteria for VAC by querying our locally developed decision support database (Invigilance) over 1-year period. The criteria included an increase in either PEEP or FiO2 lasting more than 48 h in patients receiving mechanical ventilation. All VAC cases were then assessed for infection-related ventilator-associated complication (IVAC), probable and possible pneumonia. A subset of patients with VAC were reviewed to determine possible etiologies. We compared ventilator, ICU and hospital days and hospital mortality of all groups.

RESULTS. The operational definition of VAC allowed an automated screening of a large database (606 patients, 3,787 ventilator days). With a single query that executed in less than one minute, a span of 12 months of PICU data were screened for VAC. One of our investigators spent 20 h performing manual review of the patients identified by Invigilance. Based on the manual review, we determined that automated screening resulted in a sensitivity of 84.1 %, specificity of 86.4 %, with an overall accuracy of 86.1 %. Of total 606 patients, 14.5 % had VAC (20,9/1,000 ventilator days), and 8.1 % had IVAC (12,9/1,000 ventilator days). The patients with IVAC were classified into probable pneumonia (55 %, 7,1/1,000 ventilator days), possible pneumonia (28.6 %, 3,7/1,000 ventilator days) and undetermined infection (16.3 %, 2,1/1,000 ventilator days). A large portion (44 %) of VAC cases were from other non-infectious etiologies (e.g. atelectasis, pulmonary edema, shock, etc.).

Patients who developed VAC had significantly worse outcomes compared to non-VAC group (see Table). Multivariate logistic regression identified VAC as an independent predictor of hospital mortality (OR 3.13, 95 % CI: 1.63, 6.15). Independent risk factors for VAC included chronic respiratory disease, immunocompromised status and tracheostomy-dependence. There were no differences in mortality rates within VAC subgroups (i.e., VAC with or without pneumonia).

CONCLUSIONS. The proposed definitions for VAC and other associated complications are highly objective, amenable to automated surveillance and good predictors of outcomes. It is imperative that the focus of surveillance shifts from pneumonia to broader complications in general.

Outcome	VAC	Non-VAC	P-value*	RR (95 % CI)
ICU days (median, IQR)	27(14,50)	6 (4,1)	<0.0001	
Hospital days (median, IQR)	42(24,72)	13 (8, 24)	<0.0001	
Ventilator days (median, IQR)	23(11,40)	5 (3, 8)	<0.0001	
Prolonged ventilator day (≥7 days), n (%)	81(92)	176 (34)	<0.0001	2.71 (2.37, 3.10)
30-day mortality, n (%)	12 (13.6)	35 (6.8)	0.032	2.02 (1.09, 3.73)
Hospital mortality, n (%)	17 (19.3)	36 (6.9)	0.0007	2.78 (1.64, 4.72)

[: Comparison of Clinical Outcomes (VAC vs. Non-VAC)]

0124

THE IMPACT OF ENVIRONMENTAL NOISE IN AN INTENSIVE CARE UNIT. IT IS POSSIBLE A CHANGE?

M.-V. de la Torre-Prados¹, P. Lara-Dominguez¹, J. Perez-Vacas¹, B. Rufz-Gómez¹, C. Trujillano-Fernandez², J.-A. Lara-Muñoz¹, E. Camara-Sola¹, T. Tsvetanova-Spasova¹, P. Nuevo-Ortega¹, A. García-Alcántara¹

¹Hospital Universitario Virgen de la Victoria/IBIMA Institute, Intensive Care Medicine, Málaga, Spain

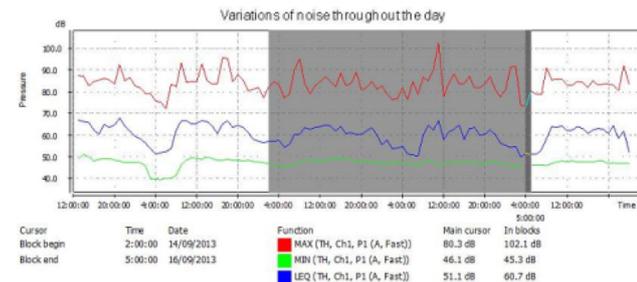
INTRODUCTION. An essential aspect of the UCI is the environmental control in relation to the noise level arising from professional interventions and alarms. Levels higher than

45 dB during the day, 40 dB in the evening and 20 dB at night, are considered to be detrimental to patients and contribute to suffer sleep deprivation.

OBJECTIVES. On environmental noise to study the perceptions of patients, in an adult intensive care unit (ICU), identification and assessment of recommended limits, involving actions to reduce them.

METHODS. The population studied were patients admitted to an 18 beds ICU. Ninety questionnaires was used to assess the perceptions that patients had on environmental noise from July and August 2013. Structured interviews were developed to analyze the noise perceived and schedules that were produced. Also, during September and October 2013 a 21 days record for 24 h were made to obtain measurements of ambient noise with a sound level meter, a Svan 971 class 1 with built-in filters and broadband results. Data obtained by the sound level meter was extrapolated to the software Svantek, which obtained the measurements and the graphics.

RESULTS. The analysis from the questionnaires answered, together with annotations from interviews show that the major sources of ICU sound were conversations between the staff, medical professionals, visitors and medical equipment alarms. Measurements of sound level meter showed periods with more noise (during the day average noise level was close 60 dB and during night close 50 dB), maximum noise level o peak were between 90 and 100 dB during the day, and 75 and 85 dB at night. Periods of greatest noise are related with activities of nursing care and physicians during the day, while at night there is a decrease of noise. In all periods average levels noise were higher than those recommended.



[Figure 1. Variations of noise throughout the day]

CONCLUSIONS. It is appropriate to carry out a strategy toward the lowering of environmental noise in ICU. A wide noise reduction programme and mechanical means of isolating patients from ambient noise, such as earplugs, should be considered.

REFERENCES. Darbyshire JL, Young JD. An investigation of sound levels on intensive care units with reference to the WHO guidelines. Crit Care. 2013 Sep 3;17(5):R187.

0125

USE OF A SEVEN QUESTION CHECKLIST TO IMPROVE ICU WARD ROUND RELIABILITY AND PATIENT SAFETY

L. Brodie¹, C. Wood¹, F. McIlveney¹, M. Hawkins¹

¹Forth Valley Royal Hospital, Anaesthesia and Intensive Care Medicine, Stirling, United Kingdom

INTRODUCTION. Promotion of patient safety has been a most influential development for patient care over the last decade. Data from the UK and worldwide suggests as many as 1 in 10 patients will suffer an adverse event whilst in hospital, and up to half of these could be prevented with routine safety protocols [1]. To ensure safe clinical care is optimised daily, we devised a checklist that encompassed important aspects of patient safety including diagnosis, care bundles, medicines reconciliation and escalation status. These questions are easily incorporated into the daily ward round, taking less than one minute to complete. They should be asked for each patient and verify that all appropriate safety measures are taken.

OBJECTIVES. Our audit challenged whether this checklist was undertaken for every patient, if the prompt promoted a change in management and if the questions added value during a prolonged ICU stay.

METHODS. Data was collected by trainee staff at the daily ICU consultant-led ward round for 30 days. Each time the questions were asked was counted as a single episode. The number of episodes per day was recorded as well as the total number of patients in the intensive care unit at that time. Patients in whom it was deemed inappropriate to ask the questions, for example, palliative care patients, were not included. Data of interest included whether asking a question prompted a change in management or care (a positive prompt), which question prompted the change and the length of time the patient had been in ICU (in days).

RESULTS. Over the 30 days, the questions were asked on 379 occasions. The total number of patients present in ICU who had the questions asked was 426. This places our compliance rate at 89%. Each time a single question prompted a change in care was a positive prompt. The total number of positive prompts was 365 out of a potential 3411 (10.7%). Medication and prescribing was the most common area where the checklist identified a potential for error. There was no relationship between length of stay and positive prompts with need for changes in care still occurring after a prolonged admission.

CONCLUSION. This audit demonstrates that incorporating our ICU patient safety checklist into the daily ward round had a positive impact on care. In theory, 365 adverse patient events could have occurred had the protocol not been in place. Analysing the data by length of stay in ICU has shown the importance of asking the questions for every patient every day. Even after a lengthy ICU stay with regular review, there are still points of care that may be missed if routine safety protocols are not implemented rigorously.

REFERENCES. 1. Scottish Patient Safety Programme. 2012. Evidence Base. <http://www.scottishpatientsafetyprogramme.scot.nhs.uk/programme/about/evidence-base>. Accessed 27/09/2012.

0126

INVESTIGATION INTO STANDARDS OF DISCHARGE SUMMARY COMPLETENESS ON PATIENT TRANSFER FROM THE INTENSIVE CARE UNIT (ICU) TO THE GENERAL WARD

A. Skorko¹, G. Sivasubramanian², V. Kakar², P. Hopkins²

¹Guy's and St Thomas' Hospital, Department of Anaesthetics, London, United Kingdom,

²King's College Hospital, Intensive Care Unit, London, United Kingdom

Discharge from the Intensive Care Unit (ICU) is a period fraught with potential risks and good handover is a vital tool in minimising this. To this end, In 2007 the National Institute for Clinical Excellence (NICE) published guidelines outlining the information that should be handed over when a patient leaves the ICU¹. This states that there should be a formal structured handover of care from ICU to ward staff on the parts of both the medical and nursing staff, which should be supported by written plans. The handover should include: a summary of the ICU stay including diagnosis and treatment, a monitoring and investigation plan, a plan for ongoing treatment, current drugs and therapies, a nutrition plan, infection status, agreed limitations of treatment, physical and rehabilitation needs, psychological and emotional needs and communication/language needs.

There is no nationally standardised discharge protocol in the UK. In our tertiary centre ICU once a decision to discharge is made an ICU doctor telephones the accepting team to verbally handover the patient. A discharge proforma is completed electronically and uploaded to the patient's electronic notes. The nursing staff fill in a paper proforma which they file in the paper hospital notes and use to handover face-to-face on transfer to the ward. In order to assess our unit's adherence to the NICE standards we audited the completeness of the summaries produced by doctors and nurses for every patient discharged from the ICU. We excluded patients who were transferred out of the hospital, to another ICU or who died. A 4 week audit period in February 2013 captured 106 discharges (100 % of eligible discharges). The results were presented to the department at a training meeting. A re-audit occurred in June 2013 and 110 discharges were audited (100 % of eligible discharges). Comparison of each data field in the initial audit and re-audit periods are presented in table 1.

	Audit period	Re-audit period
Percentage of patients for whom a formal structured handover of care from ICU to ward staff occurred	29 %	59 %
Percentage of patients for whom the handover was supported by a written plan	96 %	93 %
Summary of the ICU stay including diagnosis and treatment present	95 %	93 %
A monitoring and investigation plan	89 %	91 %
A plan for ongoing treatment, A list of drugs and therapies	87 %, 45 %	92 %, 89 %
Infection status documented	79 %	84 %
Nutrition plan documented, Physical and rehabilitation needs documented	82 %, 80 %	77 %, 76 %
Psychological and emotional needs assessment, Communication or language needs documented	53 %, 32 %	44 %, 40 %
Agreed limitations of treatment documented	85 %	89 %

[Table 1. Results from initial and re-audit periods.]

In summary, the standard of paperwork completeness did not meet those set out by NICE. Although the vast majority of patients had written documentation, very few were verbally handed over by medical staff. Additionally, the holistic aspects of patient care such as psychological, emotional and communication needs were very poorly documented.

REFERENCE(S). National Institute for Health and Care Excellence (2007) Acutely ill patients in hospital. CG50. London

0127

DRUG-RELATED CRITICAL INCIDENTS IN A MULTIDISCIPLINARY INTENSIVE CARE UNIT

J. Morrison¹, R. Wenstone¹, L. Cloherty¹, I. Welters^{1,2}

¹Royal Liverpool and Broadgreen University Hospital, Intensive Care, Liverpool, United Kingdom, ²University of Liverpool, Institute of Ageing and Chronic Disease, Liverpool, United Kingdom

INTRODUCTION. The impact of critical incidents (CIs) and medical errors on patient morbidity and mortality in the UK is largely unknown with study estimates ranging widely from 840 to 34000 deaths per year. Patients on the intensive care unit (ICU) are exposed to more invasive procedures and polypharmacy. Studies have shown that pharmaceutical errors represent a significant proportion of critical incidents on intensive care units¹.

OBJECTIVE. Our study aimed to analyse the frequency of pharmaceutical errors and to identify common causes of error and specific drugs and drug classes involved.

METHOD. We conducted a prospective, observational study over a 138 month period in a 17-bed, city centre, intensive care unit. Incidents were reported by staff using either a hospital-wide electronic reporting form or an intensive care specific paper format. All CIs were collected in a database and analysed using excel and SPSS version 21.

RESULTS. 1610 incidents were reported of which 284 were drug-related. These incidents were subdivided into drug administration errors, procurement errors, labelling or recording errors, prescription errors and miscellaneous. The miscellaneous group included incidents such as theft or wastage of controlled drugs (CDs) and patients abusing CDs or street drugs on the unit. Drug administration errors represented by far the largest (57 %) proportion of drug-related incidents and included errors in dose, rate or route, incorrect medication and omitted drugs. In 105 of the 162 administration errors reported, an incorrect dose was administered. The three most frequently involved drugs were Noradrenaline (n = 31), Insulin (n = 19) and Potassium Chloride (n = 18).

CONCLUSION. Critical incident monitoring has been shown to be an effective way to improve clinical practice and is being increasingly used. Whilst regular review of recent incidents is essential, the assessment of problems over a longer period is also necessary to assess serious incidents which recur over months or years. Through this method, policies can be changed to reduce systems based error. Measures to reduce frequency of human error, such as continued staff education and the introduction of new guidelines, require evaluation after implementation to assess effectiveness. Common problems identified in our analysis included: recurrent peripheral administration of drugs intended for central use and incorrect administration and dosing of potentially harmful drugs such as insulin, noradrenaline and potassium chloride. Further research is required to assess whether education and particular care in administration of high-risk drugs may help to reduce the number of these incidents.

REFERENCES. 1. Welters ID, et al. *Critical Care* 2011;15(5):R232.

0128**DRUG ADVERSE REACTIONS PROFILE IN ADULT ICU UNIT**L.M. Barbosa¹, R.S. Melo¹, I.M. Almeida¹, M.C. Ribeiro¹, D.M. Carvalho¹, G.B. Moreno¹, J. Arikava¹¹Hospital Sírío Libanês, Pharmacy, São Paulo, Brazil**INTRODUCTION.** An Indian study (2009) demonstrated 28.4 % incidence of adverse drug reactions (ADRs) in intensive care units. This result could be explained by the criticality of the patient in intensive care due to exposure to multiple drug therapies.**OBJECTIVES.** To analyze adverse drug reactions that occurred in 2013 in an adult intensive care unit.**METHODS.** A retrospective, descriptive and analytical study. Adverse drug reactions notifications were collected from January 1, 2013 to December 31, 2013.**RESULTS.** During the studied period, 34 reactions were reported. The four criteria used were severity, type of reaction, drug class and notifier professional class. Concerning severity: 22 (64.7 %) were mild, 6 (17.7 %) moderate and 6 (17.6 %) severe. Moderate and severe ADRs were reported to the Brazilian regulatory agency (ANVISA). Regarding the type of reaction: 14 (41.1 %) were dermatological (skin rash, pruritus, and mucosal edema); 5 (14.7 %) hematologic, 4 (11.7 %) gastrointestinal, 3 (8.8 %) kidney, 2 (5.8 %) hepatic (liver enzyme level alterations), 2 (5.8 %) neurologic (seizure by carbapenems), 1 (3.0 %) cardiovascular, 1 (3.0 %) muscle, 1 (3.0 %) ineffectiveness and 1 (3.0 %) nonspecific. Regarding drug class: 12 (35.2 %) antibiotic (8 being skin rash), 5 (14.6 %) anticoagulants, 4 (11.7 %) opioids, 4 (11.7 %) anticonvulsants, 3 (8.8 %) NSAIDs (2 severe), 1 (3.0 %) antidiabetic, 1 (3.0 %) antifungal, 1 (3.0 %) antithyroid, 1 (3.0 %) cardiotonic glycoside, 1 (3.0 %) immunobiological and 1 (3.0 %) unidentified class. All notifications were made by pharmacists.**CONCLUSIONS.** Data analysis allows us to conclude that skin reactions were the most common, but also low gravity. Serious ADRs were associated with the bleeding caused by NSAID and anticoagulants use. Neurological reactions were associated with carbapenems (meropenem and ertapenem). The detection of adverse drug reactions is an important part of critical care pharmacist role. This study detected only this professional class as notifier.**REFERENCE(S).** Joshua, L., Devi, P. and Guido, S. (2009). Adverse drug reactions in medical intensive care unit of a tertiary care hospital. *Pharmacoepidem. Drug Safe.*, 18: 639-645**0129****HOSPITAL BED-DAY CONSUMPTION DUE TO COMMUNITY-ACQUIRED SEVERE SEPSIS OR SEPTIC SHOCK IN ADULTS. AN EPIDEMIOLOGICAL POPULATION - BASED STUDY**L. Campins Bernadàs¹, J.C. Yébenes Reyes¹, J.A. Mendez Barraza¹, A. Albis Guimet¹, M.D.C. De la Torre Terrón¹, J. Almirall Pujol¹¹Hospital de Mataró, Mataró, Spain**INTRODUCTION.** Mataró Hospital is a community-hospital in the Eastern coast of Spain that provides acute health-care services for a population of 197.000 habitants.**OBJECTIVES.** The aim of this study is to estimate the number of ICU beds required by 100.000 inhabitants per year to treat patients with severe sepsis or septic shock from a prospective population-based study.**METHODS.** Prospective analysis until death or discharge from the intensive care unit of all episodes of infection in patients older than 15 years old, in our reference area and admitted to ICU with diagnosis of community-acquired severe sepsis or septic shock over a period of 9 years (2002-2011).**RESULTS.** During the study period were admitted to the intensive care unit, 831 patients with diagnosis of severe sepsis or septic shock which resulted in 45 episodes (36-62) per 100,000 inhabitants/year. 65.3 % were male, the mean age was 65.2 years and the average SAPS II was 37.5. The most prevalent focus of infection was respiratory (51.3 %), followed by abdominal (20.2 %) and urinary (10.8 %). The average stay was 7.1 days and mortality in ICU was 21.9 %. Microbiological etiology of infection was identified in 59.9 % of episodes. Multivariate analysis of prognostic factors associated with mortality shows that the SAPS II (OR: 1.07) and the known etiology (OR: 2.53) were independently associated with mortality in the intensive care unit.**CONCLUSIONS.** The medial annual incidence of community-acquired severe sepsis or septic shock in adults requiring ICU admission was 45 cases per 100,000 inhabitants/year. This represents 1 bed per day occupied by this pathology per 100,000 inhabitants, adults.**REFERENCE(S).** 1. Epidemiology of severe sepsis in the United States: Analysis of incidence, outcome, and associated costs of care; Angus DC, Linde-Zwirble WT, Lidicker J, Clermont G, Carcillo J, Pinsky MR. *Critical Care Med* 2001;29:1303-10. 2. The Epidemiology of Sepsis in the United States from 1979 through 2000; Martin GS, Mannino DM, Eaton S, Moss M; *New England Journal of Medicine* 348;16 April 2003. 3. Sepsis incidence and outcome: Contrasting the intensive care unit with the hospital ward; Esteban A, Frutos-Vivar F et al. *Critical Care Med* 2007;35:128489. 4. Epidemiología y costes de la sepsis grave en Madrid. Estudio de altas hospitalarias; Iñigo J, Sendra JM, Díaz R, Bouza C, Sarriá-Santamera. *Medicina Intensiva* 2006;30(5):197-203**0130****RETROSPECTIVE STUDY OF INFERIOR VENA CAVA FILTER INSERTION AND CLINICAL GOVERNANCE IN CRITICALLY ILL PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT**K. Sundararajan¹, D. Ncomanzi¹, M. Moss², S. Edwards³¹University of Adelaide, Royal Adelaide Hospital, Intensive Care Unit, Adelaide, Australia,²University of Adelaide, Royal Adelaide Hospital, Department of Radiology, Adelaide,³University of Adelaide, Data Management and Analysis Centre, Adelaide, Australia**BACKGROUND.** Inferior vena cava (IVC) filters are used to treat venous thromboembolism when there are contraindications, complications or lack of adequate response to conventional anticoagulant therapy. Retrievable filters were introduced to avoid long-term complications and morbidity associated with permanent filters. However, failure to follow up patients in a timely fashion can lead to serious complications and worse outcomes.**AIMS.** The purpose of this study was to review the case records of patients admitted to ICU who underwent IVC filter placement at the Royal Adelaide hospital. The specific objectives were to describe in our ICU cohort of patients, the indications, complications, clinical stewardship, filter retrieval and follow-up amongst these patients.**METHODS.** Retrospective study of medical and electronic records in a single tertiary referral center.**RESULTS.** Sixty six patients had retrievable IVC filters inserted. The median age of patients was 43. The majority (62 %) of patients had filters inserted for presence of venous thromboembolism in which anticoagulation was contraindicated. Twenty-four (36 %) patients received no clinical follow up after leaving hospital. There was a significant association between successful retrieval attempt and documentation of a retrieval plan (RR 3.78, 95 % CI 1.69, 8.44, P = 0.0012). An attempt at filter removal was made in 56 % of filters (37/66). Procedural success was achieved in 34 of 37 attempted filter removals. Twelve types of complications were noted among patients. Patients who had a successful filter retrieval attempt were 3.5 times more likely to have clinical follow up after leaving the hospital than patients who did not have a successful filter retrieval attempt (RR 3.54, 95 % CI: 1.95, 6.44 P < 0.0001). Patients who had filters inserted in the setting of poly-trauma were 1.8 times more likely to have clinical follow up on hospital discharge (RR 1.84, 95 % CI 1.16, 2.91, P 0.009). Patients who had a documented follow up plan by the home team were 4.5 times more likely to be seen post discharge (RR 4.51 95 % CI 2.05, 9.95, P 0.0002).**CONCLUSIONS.** Majority of retrievable IVC filters had clinical follow up in this institution. Rates of attempted retrieval within 1 year of filter insertion are high compared to previous studies. Clinical stewardship greatly enhanced the success of filter retrieval and minimise complications. Trauma patients had a high chance of successful filter removal and clinical follow-up.**0131****ACCOMPLISHMENT OF THE MOST RELEVANT QUALITY INDICATORS IN THE IMPLEMENTATION OF A QUALITY SYSTEM IN CRITICALLY ILL PATIENTS**M. García¹, R. Herrán¹, L. Tamayo¹, P. Enríquez¹, J. Blanco¹, M. Gonzalez-Sagrado²¹Hospital Universitario Rio Hortega, Intensive Care Medicine, Valladolid, Spain, ²Hospital Universitario Rio Hortega, Investigation Department, Valladolid, Spain**OBJECTIVES.**

1- To evaluate the performance of the SEMICYUC most relevant quality indicators in the context of a quality system implementation in a critical care unit.

2- To develop improvement ways according to the results.

METHODS. Prospective observational study carried out in a medical-surgical and cardi-ological 17 beds ICU. A quality system was built by brainstorming, according EFQM model and SEMICYUC's quality indicators (1). 54 indicators constituted the model, supported by EFQM criteria (leadership, people, strategy, partnerships and resources, processes, products and services, and people, customers, society and business results (2)). The most important indicators selected by SEMICYUC which were included in the model were monitored. The period of study was 1-12 months as appropriate. The results are shown as percentages and incidence density.**RESULTS.** Are shown in table 1 and 2.

INDICATOR	PERIOD	RESULTS (%)	STANDARD (%)
1. Hypothermia in cardiac arrest	1 year	100	90
2. Semirecumbent position(IMV)	3 months*	75	97
3. Prevention of thromboembolism	1 month	100	100
4. Palveolar >30 cmH ₂ O	3 months*	6,2	10
5. Bacteriemia related CVC	1 year	0,6ep/1000 days CVC	4ep/1000 days CVC
6. Ventilator-associated pneumonia	1 year	8,8ep/1000 days MV	9ep/1000 days MV
7. Early antibiotic in severe sepsis	3 months	38	100
8. Prophylaxis against gastrointestinal bleeding	3 months	100	97
9. Early enteral nutrition	3 months	75	100

[Table 1-Results and comparison with standard]

INDICATOR	PERIOD	RESULT (%)	STANDARD (%)
10. Appropriate sedation	3 months*	60	85
11. Organ donors	1 year	77	60
12. Hand-washing protocols	3 months*	66	90
13. Information to families	3 months	100	100
14. Perceived quality at discharge	3 months	67	50
15. Limiting life support	1 year	71	100

[Table 2-Results and comparison with standard]

* daily sample measure.

Once results were analyzed, meetings with the whole workers were performed. Many multidisciplinary teams were organized to put in practice improvement strategies, pending evaluation.

CONCLUSIONS.

1- The most important quality indicators accomplishment is highly heterogeneous.

2- Indicators monitoring contributes to notice improvable aspects.

3- To develop improvement methods and to monitor results once again are needed.

REFERENCE(S). (1) *Med Intensiva*. 2008 Jan-Feb;32(1):23-32;(2) <http://www.efqm.org>**0132****EFFECTIVENESS OF A RAPID RESPONSE SYSTEM FOLLOWING THE INTRODUCTION OF AN OBSERVATION CHART**G. Radeschi¹, A. Mina¹, G. Berta¹, C. Di Pietrantonio², F. Rubulotta³¹Intensive Care Unit, St Louis Hospital, Turin, Italy, ²Servizio di Epidemiologia di Alessandria, Alessandria, Italy, ³Imperial College London, London, United Kingdom

INTRODUCTION. He role of a Rapid Response System (RRS) is to enable early detection and management of acutely deteriorating patients in hospital wards. Observation charts (OC) are the main tool for recording vital signs.

OBJECTIVES. We studied the effectiveness of a RRS following the introduction of an OC. **METHODS.** The study was performed in a 376 beds teaching hospital, with >10,000 admissions/year. We conducted a pre and post-implementation study analysing the data from the 1st of January 2012 to the 31st of December 2012 (control period) and comparing those to data from the 1st of January 2013 to the 31st of December 2013 (intervention or study period). The response arm to a RRS call was the Medical Emergency Team (MET) ICU-led (physicians and nurses), available 24 h a day, 7 days a week. The triggering criteria were based on a multiple parameters system. The call was initiated in the ward by any member of staff when the patient presented with a single red criterion or two yellow criteria. A colour-coded OC was developed in order to facilitate understanding of the calling criteria. The response team used a standard form to collect patients' data since the 1st of January 2012. This database allowed us to perform a descriptive statistical analysis. Ethical approval was obtained by the hospital joint research committee.

RESULTS. There were no significant differences in the age and gender of patients enrolled in the two groups. Yearly calls increased from 18 per 1000 admissions/year in the control group to 22 in the intervention group. The calls were started mainly by nurses from the medical wards.[1] In the intervention group a greater number of patients required management of the airway (28.1 % vs 22.1 %) and breathing (47 % vs 40.8 %). The number of patients stabilized in the ward increased from 33.7 % to 38.2 %. The number of patients admitted to the ICU decreased (see table 1). The Rate of not for resuscitation (NFR) orders increased from 13.3 % in the control to 15.2 % in the study group and the number of ICU admissions decreased from 16 % in the control group to 11.5 % in the study group (Table 1).

Table 1. Hospital, patient and event characteristics

Study period	Control (n)	Intervention (n)	Difference % (CI)	P value
Admission	2020	2024		
MET calls	181	217		
Age - Median (SD)	73 (19.79)	73 (16.80)		
Male - n (%)	97 (53.6)	101 (49.9)	6.69	0.222
Female - n (%)	83 (45.9)	113 (55.1)	6.69	0.222
Present time - n (%)				
- Daytime	124 (66.3)	156 (71.9)	8.39	0.043
- Nighttime	66 (35.7)	59 (28.4)	6.75	0.158
ICU admission	15 (0.7)	16 (0.8)	0.71	0.507
ICU readmission	27 (14.3)	27 (13.4)	-0.46	0.371
Other medical admissions	30 (16.3)	34 (16.7)	0.39	0.309
Staff member activating MET (n, %)				
- Nurses	72 (40.3)	104 (47.9)	8.13	0.138
- Doctors	73 (40.3)	71 (33.7)	-7.58	0.149
- Other	30 (16.4)	31 (14.3)	-2.31	0.618

(a) Control period: January 1st 2012 to December 31st 2012. (b) Intervention period: January 1st 2013 to December 31st 2013. (c) Difference: intervention - control. * Treatment total more than the total number of patients due to patients having more than 1 treatment. Abbreviations: DR, Operating Room; ED, Emergency Department; NI, Non-Invasive Ventilation; CPAP, Continuous Positive Airway Pressure

[Table 1]

CONCLUSIONS. The number of calls for a MET increased in the hospital since the implementation of the OC. [1,2] Data showed a reduction of ICU admissions, an increase in NFR orders and an increase in the number of patients resuscitated and stabilized in the ward. Further multicentric studies will be needed to confirm the efficacy of this OC in improving RRS's effectiveness. The authors have no conflicts of interest to disclose.

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0133

CONSUMPTION OF RESOURCES IN SEPTIC CRITICALLY ILL PATIENTS

J. Ruiz Moreno¹, E. González Marín¹, R. Corcuera Romero de la Devesa¹, M.J. Esteve Panos¹, N. Suárez Álvarez¹, M. Julia Mill¹, M. Moral Guiteras¹, A. Artigas Raventós²

¹IDC Salud Hospital Universitari Sagrat Cor, Critical Care Department, Barcelona, Spain, ²Parc Taulí General Hospital and IDC Salud Catalan Hospitals, Critical Care Department, Sabadell, Spain

INTRODUCTION. It is considered that the consumption of resources (CR) of septic critically ill patients (CIPs) is higher than the overall CIP population. However, both the identification of specific ICU procedures and the relative weight (RW) of the diagnostic related groups (DRG) case - mix system related to each CIP have not been researched sufficiently.

OBJECTIVES.

- To identify and evaluate the CR of the septic CIPs in comparison with the CIPs without.
- To evaluate and compare the RW of the DRGs between septic CIPs and non septic CIPs.

METHODS.

- Prospective, analytical, longitudinal, and observational study
- Period: Between January 1-2012 and August 31-2013 (20 months)
- SETTING. Medical/Surgical ICU belonging to a 290 acute care teaching hospital
- Population and sample: All the CIPs admitted consecutively to the ICU. Sample: 1090 CIPs.
- Exclusion criteria: CIPs < 16 years, major burn patients, incomplete clinical documentation, and voluntary discharge
- Variables analyzed: a) length of stay (LOS), readmission, RW of DRG (AP-DRG 25.0 version, TISS 28 scale, NAS scale, invasive mechanical ventilation (IMV), non invasive mechanical ventilation (nIMV), percutaneous tracheostomy.
- Statistical analysis: χ squared and contrast of means (T student)

RESULTS. Global CIPs: 1090. The results are shown in Tables I and II

	Global CIPs	Septic CIPs	Non septic CIPs	'p' value
Age	66,(SD 16,7)	72,8 (SD 14,0)	64,5 (SD 16,8)	0,0001
LOS	3,3 (SD 6,4)	8,7 (SD 12,4)	2,1 (SD 2,9)	0,0052
Readmission	47 (3,8 %)	19 (8,5 %)	28 (2,7 %)	0,0001
RW	4,02 (SD 4,44)	7,07 (SD 8,72)	3,33 (SD 2,19)	0,0069
TISS 28	87,3	92,7	78,2	0,0001
NAS	78,7	81,8	77,9	0,0056

[Results I]

	Global CIPs	Septic CIPs	Non septic CIPs	'p' value
IMV	375 (30,0 %)	130 (58,0 %)	242 (23,7 %)	0,0001
nIMV	117 (9,4 %)	59 (26,3 %)	55 (5,4 %)	0,0001
Tracheostomy	23 (1,84 %)	20 (8,9 %)	3 (0,3 %)	0,0001
Isolation meas.	29 (2,3 %)	25 (11,2 %)	3 (0,3 %)	0,0001
Cardiac catheter.	34 (2,7 %)	2 (0,9 %)	32 (3,1 %)	0,0623

[Results II]

CONCLUSIONS.

- LOS, readmission and RW are remarkably higher in the CIPs with sepsis RRT
- IMV and nIMV are also remarkably higher in the CIPs with sepsis
- TISS and NAS scores are higher in the CIPs with sepsis
- Isolation measures are used more in septic CIPs.

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Sepsis clinical management i: 0134–0147

0134

SEPSIS SIX: AUDIT, AWARENESS AND EDUCATION

C. Lynch¹, N. Williams², E. Dawe²

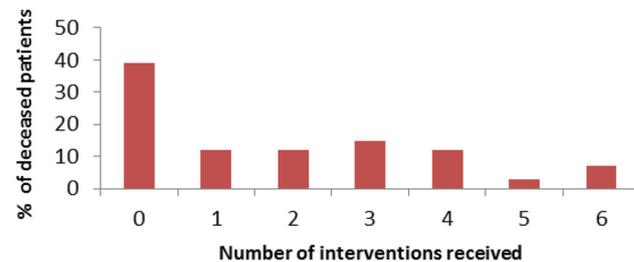
¹University Hospital of Wales, Anaesthetics and Intensive Care, Cardiff, United Kingdom, ²Royal Gwent Hospital, Anaesthetics and Intensive Care, Newport, United Kingdom

INTRODUCTION. Sepsis is the second biggest killer in the UK after heart disease, accounting for 30 % of intensive care admissions and 40 % of costs. 30-50 % of patients admitted to intensive care with severe sepsis die. Simple early interventions, known as the 'Sepsis Six', introduced by the Survive Sepsis Campaign in 2012, can help reduce mortality.¹

OBJECTIVES. To improve the recognition and early management of sepsis in our region. **METHODS.** Prospective 3 month audit of every patient admitted to intensive care with sepsis in Aneurin Bevan Trust, Wales (across two hospitals with a total 1200 beds). Notes were reviewed to identify signs and symptoms of sepsis, number of 'Sepsis Six' interventions completed, and timing of these. The gold standard is all 6 interventions within 1 h of onset of severe sepsis. Results were presented at medical, surgical and critical care audit meetings and we mounted an education campaign including junior doctor teaching sessions and wide distribution of credit-card sized aides-memoires and posters highlighting the 'Sepsis Six'. We re-audited for a further 3 months exactly a year later (to reduce the potential confounding impact of seasonal illnesses).

RESULTS. Patients demonstrated several signs of sepsis and severe sepsis, particularly hypotension and hypoxia. Only 2.5 % of patients received all of the Sepsis Six within an hour and disappointingly 27.8 % received none in this time. 36.6 % of patients in our audit died. Of those who died, 39 % had received none of the sepsis six, with only 7 % receiving all 6 interventions. We wonder if a higher compliance with the sepsis six would have reduced mortality rates? The results of the re-audit are currently being analysed and will be available in time for the conference. We hope there will have been an improvement in performance.

Number of Sepsis Six interventions received by patients who subsequently died



[Number of interventions and mortality]

CONCLUSIONS. Sepsis is a common cause of hospital admission, morbidity and death, however early interventions save lives. In our audit only 2.5 % of patients received the Sepsis Six in <1 h. Hopefully our local education campaign will improve recognition and management of septic patients. However, we have identified barriers to the timely performance of the sepsis six including inability to locate equipment on wards and lack of confidence in administering intravenous antibiotics. Further targeted teaching has been arranged. The introduction of 'sepsis bags' containing the required equipment (a popular and successful innovation in other hospitals) is underway. We aspire to improve early management of sepsis and ultimately reduce mortality.

REFERENCE(S). Daniels R, Nutbeam T, McNamara G, Galvin C The sepsis six and the severe sepsis resuscitation bundle: a prospective observational cohort study. Emerg Med J 2011;28:507-1

GRANT ACKNOWLEDGMENT. No grant was received for this work.

0135 IMMUNOSTIMULATION WITH INTERFERON GAMMA TO TREAT PERSISTENT INFECTIONS IN ICU PATIENTS: A PILOT STUDY

A.-C. Lukaszewicz¹, V. Faivre¹, D. Payen¹

¹Université Paris Diderot/APHHP Hôpital Lariboisière, Paris, France

INTRODUCTION. Post aggressive immunodepression (PAID) following acute inflammation related to sepsis or injuries like trauma or burns favours the persistence of infections, suggesting that immunostimulating therapies may improve outcome (1).

OBJECTIVES. To report the safety, the immune modifications and the clinical evolution of 10 patients in the context of PAID treated by interferon gamma (IFN γ).

METHODS. The diagnosis of PAID was made when monocyte HLA-DR (mHLA-DR) expression was lower than 5000 AB/C associated with persistent positive bacterial cultures and persistent moderate inflammation (fever, leukocytosis, elevated fibrinogen) despite adapted anti-microbial therapy. Subcutaneous IFN γ (100 mcg/day), Imukin[®], Boehringer, Ingelheim, Germany) was injected until mHLA-DR increased above 8000 AB/C for 2 consecutive measurements, for a duration <8 days. Daily mHLA-DR measurements and every 2 day bacterial screening were performed associated with determination of plasma IL-6 (Electro-chemoluminescence immunoassay) and IL-10 (ELISA) until 2 days after stopping IFN γ . Results are expressed in median (25-75th percentiles, test of Wilcoxon).

RESULTS. IFN γ injections started after 16 days (10-29) of ICU stay, 8 patients presented a persistent bacterial pneumonia associated with *Aspergillus fumigatus* in 2, 1 patient had a persistent peritonitis and pneumonia and 1 had a cervical cellulitis with mediastinitis. IFN γ treatment duration was from 3 to 8 days according to the level of HLA-DR expression, microbiological tests and clinical status. HLA-DR increased from 1730 (1621-3289) to 12331 (4166-30093) AB/C ($p = 0.0051$), with a clinical improvement and negative bacterial cultures in 9 over 10 patients. Leukocytes count did not change (17.0 (11.9-25.6) to 16.9 (11.0-18.3) 10⁹/L) and plasma IL-6 and IL-10 decreased from 464 (201-770) to 108 (89-140) ng/mL and from 29 (12-59) to 9 (1-15) pg/mL respectively.

CONCLUSIONS. A short stimulation of innate immunity by IFN γ treatment in patients with PAID seemed safe and rapidly efficient on clinical presentation and control of infection. All patients except one survived the next 2 weeks. IFN γ may "reprogram" immune cells reducing the level of cytokine release. Such treatment implies careful monitoring. Randomized clinical trial has to be performed to demonstrate the benefit on length of stay and potentially on outcome.

REFERENCE(S). Hotchkiss et al. Nature Reviews Immunology 2013; doi:10.1038/nri3552

0136 DISTRIBUTION OF ESKAPE MICROORGANISMS IN PATIENTS WITH SEVERE SEPSIS/SEPTIC SHOCK. ONE YEAR SEPSIS UNIT EXPERIENCE

S. Sancho¹, F. Puchades², C. Hurtado³, J. Camarena⁴, R. González⁴, R. Zaragoza¹

¹Hospital Universitario Dr. Peset, Sepsis Unit, Intensive Care, Valencia, Spain. ²Hospital Dr. Peset, Internal Medicine, Valencia, Spain. ³Hospital Dr. Peset, Sepsis Unit, Intensive Care, Valencia, Spain. ⁴Hospital Universitario Dr. Peset, Microbiology, Valencia, Spain

OBJECTIVES. To describe the incidence and epidemiological characteristics of ESKAPE microorganisms in a tertiary hospital with sepsis unit, and analyze the mortality and inadequate empiric treatment before and after implementation of this unit.

MATERIALS AND METHODS. Prospective and descriptive study of the clinical and epidemiological characteristics of the ESKAPE infection, admitted to the hospital from 1-October-2012 to 30-September 2013. Patients were classified by services (intensive care units (ICU), medical ward, surgical ward and haematology-oncology ward) and also by the kind of infection (Community, health care and Nosocomial). Two different periods were established: 1-October-2012 to 15-January-2013 (no intervention), and 16-January-2013-30-September-2013 (active intervention). An univariate analysis was performed to define de differences using SPSS package (17.0). Statistical significance was considered when p value < 0.05.

RESULTS. From 1-October-2012 since 30-September-2013 there were 403 severe sepsis episodes (141, 35.1 % septic shock). 211 (52.4) were identified at medical ward, 128 (31.8 %) in ICU, 28 (6.9 %) at surgical ward, and 36 (8.9 %) at Haematology/Oncology. 247 (61.3 %) were community infections (CI), 77 (19.1 %) were healthcare infections (HCI), and 14,1 were nosocomial infections (NI). ESKAPE microorganisms were identified in 51 patients (0 Vancomycin resistant *E. faecium*, 5 MRSA, 6 *K pneumoniae* BLEE, 2 Acinetobacter sp, 20 *P. aeruginosa* and 18 *E. coli* BLEE). The mortality by groups were (28.6 % *Pseudomonas*, 50 % MRSA, 33 % Klebsiella, and *E. coli* 12 %). Global mortality was 15.38 %. In ESKAPE group 39.2 % were CI, 45 % were HCI, and 15.6 % were NI, $p = 0.003$. The foci more frequent in ESKAPE infections were urinary tract (45 %), respiratory focus (29.4 %), soft tissues (13.7 %) and abdominal focus (5.8 %), $p = 0.008$. The distribution of patients were 27.4 % (14) in ICU, 50.9 % (26) in medical ward, 9.8 % (5) in surgical ward, and 11.7 % (6) in haematology/oncology ward. The foci more frequent in ICU were respiratory (35.7 %) and urinary tract (35.7 %); in medical ward were urinary tract (50 %), soft tissue (23 %) and respiratory (23 %); in surgical ward was urinary tract (75 %), and in haematology/oncology ward was respiratory (5 %). Global mortality in ESKAPE group was 22.5 % without differences with no ESKAPE group. Empirical antibiotic treatment in ESKAPE group were adequate in 41 episodes (80.3 %) and inadequate in 11.7 %, $p = 0.048$. There were no differences in global mortality between two periods, but there were statistical significance in adequate empirical treatment between two groups (0 % without intervention vs 83.6 % with intervention, $p = 0.000$).

CONCLUSIONS. ESKAPE microorganisms are not frequent in our hospital. The microorganisms more frequent isolated were *P. aeruginosa* and *E. coli* BLEE, the infections generally were related with healthcare, and the foci were urinary tract and respiratory. Inadequate empirical treatment diminished with sepsis unit intervention.

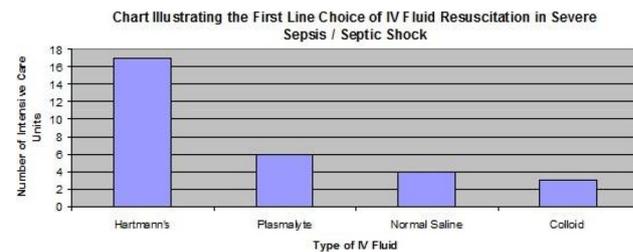
0137 SEPSIS: THE FLUID CHALLENGE - VARIATIONS IN THE MANAGEMENT OF HYPOTENSION IN 30 INTENSIVE CARE UNITS IN ENGLAND

K. Grailey¹, C. Peel¹, K. Eigener¹, S. Robert¹

¹Homerton University Hospital, Intensive Care Unit, London, United Kingdom

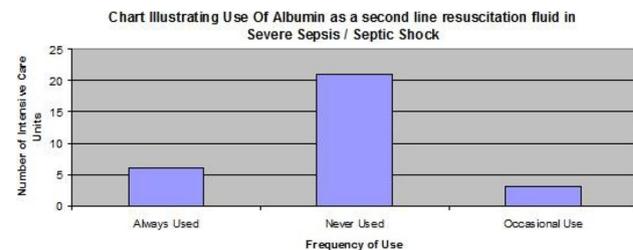
INTRODUCTION. We conducted an audit evaluating the management of septic shock in adult patients in 30 intensive care units (ICU's) in England. The Surviving Sepsis Campaign (SSC) Guidelines (1), originally published in 2002, were updated in 2012, resulting in quite a few changes. Current recommendations are to use crystalloids as the initial resuscitation fluid, followed by albumin. Colloids are no longer recommended. The guidelines recommend noradrenaline as the first line vasopressor and dobutamine as the first line inotropic. Corticosteroids, given as a continuous infusion, should only be used in exceptional cases.

OBJECTIVES. The aim was to evaluate adherence with the updated SCC guidelines, with a particular focus on fluid resuscitation and the use of vaso-active drugs. Additionally, we looked at whether the units had a sepsis protocol in place and were regularly auditing their practice. **METHODS.** A 12 part questionnaire was developed and data collection was achieved by phoning 30 participating ICU's in and around London, between July and September 2013. **RESULTS.** Whilst the majority of intensive care units were using the recommended targets for fluid resuscitation in accordance with the guidelines (Figure 1), there was significant variation in patient management.



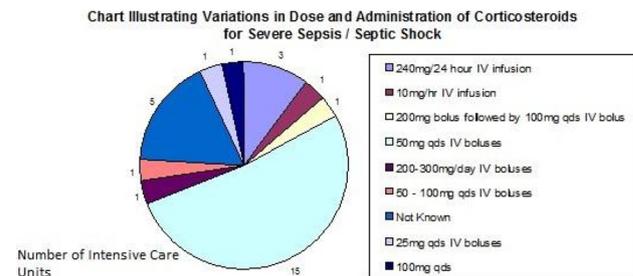
[Figure 1]

Some units were still using intravenous fluids which are no longer recommended, such as synthetic colloids (7 units [23 %]) and even starches (5 units [17 %]). Only 6 units [20 %] were using albumin in patients with septic shock (Figure 2).



[Figure 2]

As per SSC Guidelines, 29 units [97 %] used noradrenaline as their first line vasopressor. The recommended first choice inotrope, dobutamine, was used in 22 units [73 %]. 27 units [90 %] administered corticosteroids in form of intravenous hydrocortisone; however there was significant variability in dosage and mode of administration (Figure 3).



[Figure 3]

Only 10 units [33 %] regularly audited their management of sepsis.

CONCLUSIONS. This audit demonstrated that most units managed septic shock in accordance with the SSC Guidelines. Our project does however highlight significant variability in the choice of intravenous fluids and vaso-active drugs, and as such there is room for improvement.

REFERENCE(S). Dellinger R P et al. Critical Care Medicine 2013; 41:580-637 Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012

0138 SEPSIS RAPID RESPONSE TEAM: EFFECTS ON HOSPITALIZED PATIENTS WITH BACTEREMIA

E. Mantovani¹, V. Ferrari¹, A. Andreotti¹, A. Verzelloni¹, M. Girardi¹

¹Azienda Ospedaliero-Universitaria Policlinico di Modena, Intensive Care Unit, Modena, Italy

BACKGROUND AND AIMS. A rapid response team (Sepsis Team, ST) devoted to the early management of patients with severe sepsis or septic shock in emergency department and in no-intensive wards has been instituted in our Hospital since 2007. The ST includes an intensivist and an infectious disease specialist and is available 24 h/day. In this retrospective study we analyzed whether the institution of the ST modified the mortality of patients admitted to hospital with bacteremia or fungemia.

MATERIALS AND METHODS. All adult patients with a positive blood culture admitted to the Modena University Hospital from January 1st 2005 to December 31st 2010. For each patient we collected: age, patient type (medical, surgical, onco-hematological), comorbidity, infection type (Gram-positive, Gram-negative, fungus, polymicrobial infection) and hospital outcome. We compared data of patients hospitalized before ST institution (2005-2007) with those of patients after ST institution (2008-2010).

RESULTS. 2135 patients were included in the analysis: 1024 (48 %) before ST institution. Mean age and number of poly-microbial and Gram-negative infections increased throughout the study period. The hospital mortality of the before group (n = 252; 24,6 %) was similar of that observed in the after group (n = 272; 24,5 %).

CONCLUSIONS. The institution of a multidisciplinary rapid response team activated by signs of severe sepsis did not provide any survival benefit in hospitalized patients with bacteremia or fungemia.

0140
COMPLEX THERAPY OF SEVERE SEPSIS WITH A COMBINATION OF EXTRACORPOREALTECHNIQUES IN PATIENTS AFTER CARDIAC SURGERY

M. Yaroustovsky¹, M. Abramyan², N. Krotenko², M. Plyushch², D. Popov², E. Rogalskaya²

¹Bakulev Center for Cardiovascular Surgery, Blood Purification, Moscow, Russian Federation, ²Bakulev Center for Cardiovascular Surgery, Moscow, Russian Federation

INTRODUCTION. The research of new strategies in the complex treatment of sepsis remains an important problem of intensive therapy, due to consistently high mortality. Recently widely used extracorporeal techniques allowed optimizing significantly the prognosis of severe sepsis in some cases.

OBJECTIVES. To assess the effectiveness of combined extracorporeal therapy in the complex treatment of severe sepsis in patients after cardiovascular surgery.

METHODS. The prospective study included 55 patients with severe sepsis in postoperative period who received standard therapy recommended by Surviving Sepsis Campaign. The complex therapy of 20 patients contained a combination of LPS - adsorption and coupled plasma filtration adsorption (CPFA). The control group consisted of 35 patients. Illness severity in both groups was determined with the APACHE II and SOFA having 26-27 points and 13 points, respectively. All patients showed clinical signs of severe sepsis confirmed by bacteriological analyses of biological samples, SIRS, multi-organ failure, a high level of Endotoxin Activity Assay (EAA > 0,6), the level of PCT > 2 ng/ml. In the study group a combination of LPS- adsorption (Toraymyxin - PMX- F, Japan) and the CPFA (Bellco, Italy) was used. Two joint procedures of LPS-adsorption and CPFA were conducted for the each patient within 8-10 h, the LPS-adsorption was stopped in 3 h after the procedures began.

RESULTS. In the study group there was a significant improvement of hemodynamics (increase of MAP from 71 to 86 mm Hg on the background of lower epinephrine and norepinephrine doses) and the increase of oxygenation index from 206 to 266 (the improvements were not statistically significant in the control group). Laboratory data showed the decrease of EAA (from 0.77 to 0.53 (p = 0.01)), PCT (from 6.23 to 1.85 ng/ml), leukocytosis (from 18.6 to 14.6 × 10⁹/l), inflammatory mediators TNF-α (from 7.8 to 2.6 pg/ml), IL- 6 (from 11.5 to 7 pg/ml) and IL- 10 (from 39.8 to 14 pg/ml). The 28-day survival of the studied patients was 60 % compared to 37 % in the control.

CONCLUSIONS. Our results demonstrate the effectiveness of the complex extracorporeal treatment of severe sepsis began.

0141
PRO-ADRENOMEDULLIN, PROCALCITONIN, C-REACTIVE PROTEIN AS PROGNOSTIC MARKERS OF MORTALITY IN PATIENTS WITH SEVERE SEPSIS

F. Valenzuela Sanchez¹, B. Valenzuela Méndez², R. Bohollo de Austria¹, J.F. Rodríguez Gutiérrez³, M.A. González García⁴, M. Recuerda Núñez¹, M. Jaen Franco¹, A. Estella⁵, A. Jareño Chaumel¹

¹Associate University Hospital SAS of Jerez, Critical Care Medicine, Jerez de la Frontera, Spain, ²Seville University, Seville, Spain, ³Associate University Hospital SAS of Jerez, Hematology, Jerez de la Frontera, Spain, ⁴Associate University Hospital SAS of Jerez, Clinical Analysis Laboratory, Jerez de la Frontera, Spain, ⁵Associate University Hospital SAS of Jerez, Jerez de la Frontera, Spain

INTRODUCTION. Biomarkers are necessary in order to provide an early diagnosis, management and prognosis of sepsis; Proadrenomedullin has recently joined to this broad panel of biomarkers.

OBJECTIVE. The objective of this study is to evaluate the usefulness of Proadrenomedullin (Pro-ADM), Procalcitonin (PCT) and C-reactive protein (CRP) levels in the prognosis of severe sepsis patients admitted to the ICU.

METHODS. Prospective observational single-center study. We recruited patients admitted consecutively to the ICU of Jerez Hospital (Spain) with a diagnosis of severe sepsis during a period of 6 months. Epidemiological data, number of leukocytes, neutrophils, lymphocytes and monocytes, as well as lymphocyte subpopulations, HLA-DR expression on CD14+ cells, immunoglobulin levels, CRP, PCT, Pro-ADM, NT-proBNP, lactate and iron metabolism parameters were collected at admission, at 48 h, on the 5th day and at discharge. Biomarkers clearance was calculated and compared at 48 h and on the 5th day.

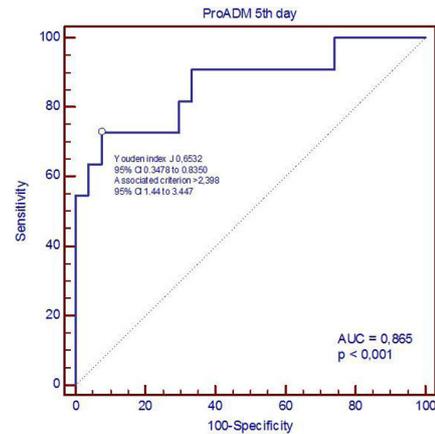
RESULTS. After implementation of the protocol 51 patients were included in the study. The mortality was 35.3 % (18/51). The levels of the markers are shown in Table 1

Median * p < 0.05	Total Grup	Survivors	Non survivors	p survivors/ non survivors
CRP (mg/dl) admission	24.65	23.05	25.5	ns
CRP (mg/dl) 48 h	20.90	18.80	24.5	ns
CRP (mg/dl) 5th day	10.20*	10*	12	p = 0.026
PCT (µg/l) admission	12.00	12.89	9.94	ns
PCT (µg/l) 48 h	6.0*	5.30*	6*	ns
PCT (µg/l) 5th day	2.50*	1.45*	5.3	p = 0.0087
ProADM (nmol/l) admission	3.14	2.72	5.39	ns
ProADM (nmol/l) 48 h	2.38*	1.77*	2.47	ns
ProADM (nmol/l) 5th day	1.60*	1.33*	4.5	p = 0.005

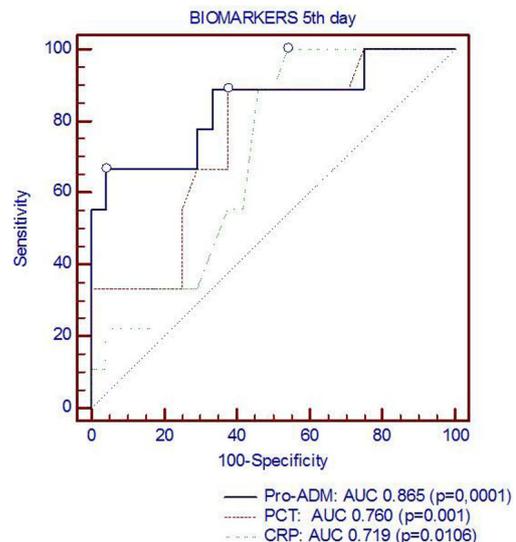
[Table 1: Biomarkers values]

A significant decrease was observed in the evolution of the levels of all the markers. In groups of survival, on the 5th day following admission the survivor biomarkers levels were

statistically lower in the septic patients who died in the ICU: CRP 10 vs 12 mg/dl (p = 0.026); PCT 1.45 vs 5.3 ng/ml (p = 0.0087); Pro-ADM 1.33 vs 4.5 nmol/l (p = 0.0005). The area under the curve (AUC) (ROC curve analysis) for mortality prognostic was only significant at the 5th day for the three of them: CRP 0.719 (p = 0.0106); PCT 0.760 (p = 0.0010); Pro ADM 0,865 (p = 0,0001). The optimal cut-off point for mortality of Pro-ADM levels at the 5th day was 2,398 nmol/l, with sensitivity of 73 % and specificity of 92.6 %. In the multivariate analysis Pro-ADM levels at the 5th day following admission, were statistically significant predictive factors for mortality.



[Figure 1: Pro Adm ROC curves]



[Figure 2: Comparison ROC curves]

CONCLUSIONS. RCP, PCT and proADM levels on the 5th day following admission are related to the prognostic but Pro-ADM levels are the most effective to determine unfavorable evolution and the risk of mortality in patients with severe sepsis admitted to the ICU.

0142
PROGNOSTIC VALUE OF BRACHIORADIALIS MUSCLE OXYGEN SATURATION INDEX AND VASCULAR OCCLUSION TEST IN SEPTIC SHOCK PATIENTS

J. Marin-Corral¹, L. Claverias¹, V. Blazquez¹, I. Leache¹, G. Moreno¹, M. Llaurado¹, M. Bodi^{1,2}, S. Pascual^{2,3}, J. Gea^{2,3}, A. Rodriguez^{1,2}

¹University Hospital Joan XXIII - IISPV-URV, Critical Care Department, Tarragona, Spain, ²CIBERES (CIBER Enfermedades Respiratorias), ISC III, Bunyola, Palma de Mallorca, Spain, ³Hospital del Mar - IMIM. Dept CEXS, UPF, Respiratory Department, Barcelona, Spain

INTRODUCTION. Septic shock patients have a microvascular dysfunction that can be early detected by the tissue oxygen saturation index (rSO₂) assessment by NIRS (Near Infrared Spectroscopy) which might have prognostic implications. Some studies suggest that vascular occlusion test (VOT) can improve the prognostic ability of baseline rSO₂.

OBJECTIVES.

- 1) To determine rSO₂ and VOT-derived parameters in the brachioradialis muscle in septic shock patients and healthy control subjects.
- 2) To determine its association with mortality and 3) To determine the discriminatory power relate to mortality of static baseline rSO₂ and the dynamic parameters derived from a VOT.

METHODS. Baseline rSO₂ was measured by NIRS (INVOS 5100®) in the brachioradialis muscle. VOT was made by compressing the brachial artery using a cuff inflated to 200 mmHg for a period of 3 min or until the 50 % decrease of baseline rSO₂. We determined in both groups baseline, minimum and maximum rSO₂ values, as well as the deoxygenation rate (DeOx), the slope of reoxygenation (ReOx) and the difference between the maximum and baseline rSO₂ (delta). In the septic shock group the association between these variables with mortality was also evaluated. Differences between groups were assessed using Student's t-test. We considered p < 0.05 to be significant.

RESULTS. A total of 35 septic shock patients (age 68 ± 11; 48.6 % males, APACHE II 21 ± 7) and 20 healthy control subjects (age 55 ± 8; 45 % males) were included. Septic shock patients had lower baseline rSO₂ (63.8 % ± 12.2 vs. 69.3 % ± 3.3, p = 0.018), slower DeOx (-0.54 %/seg ± 0.31 and -0.91 %/seg ± 0.35 p = 0.001), slower ReOx (2.67 %/seg ± 2.17 vs. 9.46 %/seg ± 3.5, p = 0.000) and lower delta (3.25 % ± 5.71 vs. 15.1 % ± 3.9, p = 0.000) when compared to healthy subjects. Among septic shock patients, non-survivors showed lower baseline rSO₂ (57.0 % ± 9.6 vs. 69.8 % ± 11.3 p = 0.001), lower minimum rSO₂ (36.0 % ± 12.8 vs. 51.3 ± 14.8 p = 0.003) and lower maximum rSO₂ values (60.6 % ± 10.6 and 73.3 ± 11.2 p = 0.002) than survivors respectively. No differences were found in any of the slopes neither in the delta value between two groups. Baseline rSO₂ showed a good discriminatory power for mortality (AUC 0.79; 95 %CI: 0.63-0.94, p = 0.004). In contrast, any of the dynamic parameters obtained with the VOT showed a significant AUC.

CONCLUSIONS. Septic shock patients present an important alteration of microcirculation that can be early evaluated by NIRS with prognostic implications. The monitoring of microvascular reactivity by rSO₂ in the brachioradialis muscle after a VOT in this group of patients doesn't seem to improve the prognostic value of baseline rSO₂.

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GRANT ACKNOWLEDGMENT. Partially funded by FIS PI13/02011 and SEPAR 264/2012.

0143

IMPACT OF AN EARLY GOAL-DIRECTED THERAPY PROTOCOL IN THE TREATMENT OF SEVERE SEPSIS AND SEPTIC SHOCK: A HOSPITAL REALITY

N. Fernandes¹, M. Câmara¹, M. Faria¹, M. Jardim¹, S. Escórcio¹, G. Silva¹, R. Duarte¹, J.J. Jardim², C.A. Pereira¹, E.R. Maul¹, J. Nóbrega¹

¹33017, Madère, Portugal

INTRODUCTION. Portuguese data shows that 22 % of the intensive care stays is due to acquired community sepsis. These cases are from an overall hospital mortality of 38 %.

OBJECTIVES. Impact of Implementation of an Early Goal-Directed Therapy Protocol (EGDTP) in the Treatment of Severe Sepsis and Septic Shock in Hospital of Funchal, Madeira Island.

METHODS. Retrospective study. From all the patients admitted to the ICU from 1st January 2008 to 31th December 2012 (N = 2223) we selected those with severe sepsis and septic shock (N = 817). These were divided into subgroups: patients with severe sepsis and septic shock; those with community and hospital acquired sepsis and septic shock and those admitted before (2008) and after implementation of the EGDTP (2009-2012).

The authors studied the demographic data of the population and the impact of the implementation of the EGDTP using ICU mortality, hospital mortality and ICU and hospital length of stay as endpoints.

Continuous variables were expressed as mean ± standard deviation and categorical variables as absolute value and percentage. The comparison of continuous variables was performed by Student t test and Mann-Whitney test and comparison between categorical variables was performed by Fisher's exact test and Chi-square test.

Multivariate logistic regression analysis used hospital mortality as the dependent variable. The variables included in the analysis were those that had a significant association with the risk of death in hospital in the univariate analysis (p < 0.1).

The data were analyzed using SPSS for Windows V 15.0 (SPSS, Chicago, IL).

RESULTS. After implementation of the EGDTP the number of admissions increased. The overall frequency of patients with sepsis and septic shock before the implementation of the protocol was high (45.1 %).

The comparison of patients before and after implementation of the protocol revealed that after 2009 patients were older and more severe with a higher incidence of gastrointestinal and metabolic/renal failure. A shorter time of mechanical ventilation, shorter ICU and hospital stay, but no change in mortality in the ICU and hospital.

The incidence of severe sepsis decreased and increased incidence of septic shock.

The incidence of nosocomial sepsis ICU decreased significantly.

CONCLUSIONS. With the implementation of the EGDTP the authors found a decrease in the ICU and hospital length of stay and a diminished percentage of ventilated patients but no change in the number of days of mechanical ventilation.

In sepsis admitted to the ICU, there was no statistically significant change in ICU and hospital mortality. The categorization of sepsis from the community and hospital before and after the intervention also showed no difference in mortality.

0144

SEVERE SEPSIS: CRAIGAVON AREA HOSPITAL

R. McKeague¹

¹Craigavon Area Hospital, ICU, Craigavon, United Kingdom

INTRODUCTION. The application of evidence based pathways in the recognition and early management of severe sepsis improves outcomes.¹ Despite debate over the role of EGDTP, the key remains early recognition, resuscitation and escalation.^{1,2} No pathway exists within this District General Hospital outside of the Emergency Department. The Surviving Sepsis Campaign has attempted to improve awareness outside of the ED and Critical Care.¹

OBJECTIVES. Ascertain and compare baseline compliance with the Surviving Sepsis bundles of care for patients admitted to Critical Care via ED and the general wards. The audit also aimed to investigate where interventions could be targeted to improve compliance.

METHODS. A retrospective review of patients admitted to this ICU from January to November 2013 with septic shock who grew clinically significant blood cultures. Compliance with the Surviving Sepsis care bundles from the point of development of severe sepsis was measured. Systems of care were analysed including time to various interventions, grade of doctor review and appropriateness of nursing observations.

RESULTS. Of a total 21 patients, compliance with all aspects of the 6 h bundle was 14 %. 48 % of patients were severely septic in the ED. 60 % of these patients received all aspects of the 3 h bundle. No patient who developed severe sepsis on a general ward received all the aspects of recommended care within 3 h. They waited longer for antibiotics, received less fluid with delayed critical care referral (see Table 1). Transient responders experienced even further delayed referral and increased fluid resuscitation (1082.5 min and 4146 ml). 72 % of ward reviews were carried out by junior staff, with 82 % of presentations occurring outside normal working hours (9-5). 27 % of nursing observations were carried out appropriately according to the patients Early Warning Score.

	Emergency Department	General Wards
Average Time to Antibiotics (min)	67	189
Lactate <3 h	70 %	27 %
Initial Lactate (mmol/l)	4.5	2.6
Vol of Fluid <3 h (ml)	1798	898
Vol of Fluid prior to Referral (ml)	2020	1503
Time to ICU Referral (min)	176	566
Present Outside 9-5	40 %	82 %

[Table 1]

CONCLUSIONS. Variation between the ED and general wards highlights the role a pathway can play in early recognition and resuscitation. Additions to the ED pathway based on lactate are planned to identify potential transient responders who may benefit from early critical care follow-up. A high proportion of ward presentations occurred outside normal working hours where the majority were reviewed by junior staff with inappropriate EWS charting. These elements highlight the systemic challenges to improving ward level recognition and management in the critical early phases of severe sepsis though provide valuable sources for intervention.

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0145

ROLE OF ULINASTATIN IN REDUCING MORTALITY FROM SEVERE SEPSIS - A RETROSPECTIVE ANALYSIS

Y. Mehta¹, A. Gupta², A. Kumar²

¹Medanta - The Medicity, Critical Care and Anesthesiology, Gurgaon, India, ²Medanta - The Medicity, Gurgaon, India

INTRODUCTION. Sepsis remains a critical problem with significant morbidity and mortality. Inflammatory cytokines, Tumour necrosis factor alpha and interleukin 6 activate coagulation and inhibiting fibrinolysis resulting in endothelial injury and multiorgan failure. Ulinastatin is a glycoprotein and a serine protease inhibitor found in human urine and blood. Ulinastatin attenuates the elevation of neutrophil elastase release, thereby blunting the rise of pro-inflammatory cytokines and also inhibits secretion of pro-inflammatory cytokines IL-6 and IL-8.^{1,2}

OBJECTIVES. To study the outcome in severe sepsis patients who received Ulinastatin along with standard supportive care and antibiotic therapy. Primary outcome - To evaluate the mortality benefit. Secondary outcome -To monitor reduction in organ dysfunction.

METHODS. A retrospective cohort study was conducted in a tertiary care hospital. Data of patients admitted with severe sepsis from Nov-2012 to Aug 2013 were analyzed and were allocated into two groups of 67 patients each. Group A patients; who received Ulinastatin 200,000 Units intravenously twice daily for 5 days with antibiotics and standard care. Group B patients; who received antibiotics and standard care for severe sepsis.

Demographic profile, clinical parameters, APACHE II Score, SOFA scores on 1st and 5th day of ICU admission and on discharge or death were studied. Outcome was analysed in terms of mortality, reduction in organ dysfunction, length of stay (LOS), ventilator days, PaO₂/FiO₂ ratio, improvement in renal functions, improvement in liver functions and requirement of vasopressors support. Statistical analysis was done with paired t-test.

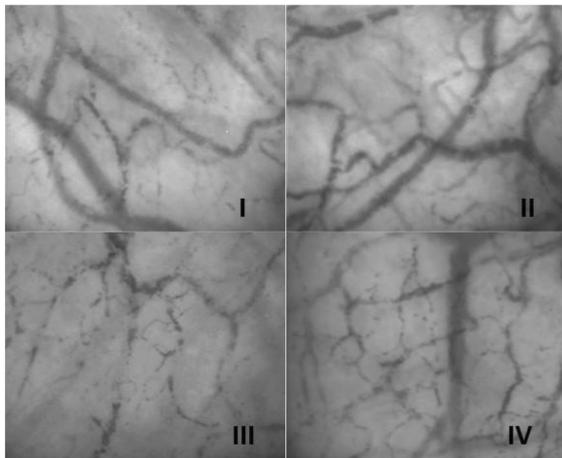
RESULTS. There was no difference in the baseline characteristics. However, the mean ICU stay was reduced (9.8 ± 5.4 days vs. 12.2 ± 8.8 days, p 0.52), the duration of vasopressor requirement was reduced (4.5 ± 3.8 days vs. 4.5 ± 3.8 days) and showed a significant decrease in mortality (32.8 % vs. 56.7 %, p 0.005). There was improvement in SOFA Score in patients administered Ulinastatin (14 %, p 0.003) and improvement in Serum Creatinine (p 0.003) on day 5 of admission and at the time of discharge from ICU. However, the study was unable to document improvement in PaO₂/FiO₂ or decrease in duration of ventilation.

CONCLUSIONS. The retrospective study showed that Ulinastatin is associated with significant decrease in mortality and improvement in haemodynamic parameters and organ dysfunction in severe sepsis.

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GRANT ACKNOWLEDGMENT. No grants for this study.

0146**EFFECTS OF DOPAMINE VERSUS NOREPINEPHRINE ON THE RECOVERY OF MICROVASCULAR PERFUSION IN SEPTIC SHOCK**T.C. Rossetto¹, A. Silva-Neto¹, M. Faustino¹, F.S.R.M. Andrade¹, D.T. Fantoni^{1,2}¹University of São Paulo, Veterinary School, Department of Surgery, São Paulo, Brazil, ²University of São Paulo, Medical School, Laboratory of Medical Investigation 8, Anaesthesiology, São Paulo, Brazil**INTRODUCTION.** There has been considerable debate as to the relative benefits of dopamine and norepinephrine in shock states. Although both have been an effective treatment for refractory hypotension, the role of increasing mean arterial pressure (MAP) with dopamine vs. norepinephrine on microvascular perfusion remains unclear in septic shock.**OBJECTIVES.** The aim of this study was to evaluate the effects of dopamine vs. norepinephrine on the sublingual microcirculation impairments when used as treatment for septic shock-induced hypotension.**METHODS.** Fourteen bitches with septic shock associated with *Escherichia coli* pyometra and undergoing ovariectomy were included in the study if they had persistent hypotension (either a mean arterial pressure (MAP) < 65 mmHg, a central venous pressure (CVP) < 8 mmHg, or a CVP that failed to increase 2 mmHg following fluid challenge of 15 ml/kg lactated Ringer's solution in 15 min). The animals were randomised to receive dopamine (DOPA group; 5 mcg/kg/min followed by a 2 mcg/kg/min increase every 2 min) or norepinephrine (NORE group; 0.1 mcg/kg/min followed by a 0.05 mcg/kg/min increase every 2 min) until MAP > 65 mmHg was achieved. The capillary density, total flow rate and De Backer's score were evaluated using orthogonal polarization spectral (OPS) imaging (Microvision scan probe) in the sublingual mucosa, with concurrent assessment of cardio-respiratory function prior to (baseline) and after vasopressor therapy (TG). All microvascular values were analysed using the software Automated Vascular Analysis.**RESULTS.** Total vessel density ($p = 0.0431$) and De Backer's score ($p = 0.0003$) were significantly improved at TG compared to baseline in the DOPA group. In the NORE group, there was a significant increase in the De Backer's score at TG compared to baseline ($p = 0.0361$) (Figure 1).

[Figure 1]

No statistically significant difference was found in any parameters between the groups.

CONCLUSIONS. Both dopamine and norepinephrine were equally effective to improve sublingual microcirculation disturbances in septic shock-induced hypotension.**REFERENCE(S).** **GRANT ACKNOWLEDGMENT.** São Paulo Research Foundation (FAPESP 12/07990-3).**FIGURE 1.** Representative images of the sublingual microcirculation assessed by Microvision Scan showing an animal from the DOPA group at baseline (I) and TG (II), and an animal from the NORE group at baseline (III) and TG (IV).**0147****COMBINED USE OF TRANSPULMONARY THERMODILUTION TECHNIQUE IN FLUID MANAGEMENT FOR SEPSIS PATIENTS**K. Morisawa¹, M. Yanai¹, Y. Takamatsu¹, M. Takita¹, S. Fujiwara¹, B.D. Lohman¹, J. Matsumoto¹, S. Fujitani², Y. Taira¹¹St. Marianna University School of Medicine, Department of Emergency and Critical Care Medicine, Kawasaki, Japan, ²Tokyo Bay Urayasu Ichikawa Medical Center, Urayasu, Japan**INTRODUCTION.** Treatment for sepsis requires proper fluid transfusion as well as close monitoring of hemodynamic changes. Although the main guidelines recommend central venous pressure (CVP) for fluid management, several studies reported that CVP may not adequately reflect the hemodynamic changes involved^{1,2}. The volume of fluid to be administered based on CVP monitoring may lead to excessive fluid balance resulting in pulmonary edema and therefore prolong mechanical ventilation therapy.³ Transpulmonary thermodilution (TPTD) is a technique that can safely and precisely estimate the intrathoracic blood volume as a volumetric parameter and may therefore be useful in limiting unnecessary excessive fluid administration.**OBJECTIVES.** We assessed retrospectively 43 patients in severe sepsis or septic shock subjected to mechanical ventilation in the intensive care unit (ICU) during the study period from September 2012 to August 2013.**METHODS.** During the first 72 h post-admission to the ICU, we compared the clinical outcomes and total fluid balance between patients who were managed with TPTD (TPTD group) and CVP (CVP group).**RESULTS.** The TPTD group demonstrated both a significantly reduced ICU hospitalization time and total volume fluid (6 ± 5 days, 2900 ± 2700 ml) compared to the CVP group (9 ± 3 days, 7100 ± 5200 ml); p values were 0.01 and 0.001, respectively. There was no significant difference in 28-day mortality (18 % of TPTD group vs. 33 % of CVP group) and ventilation days (4 ± 2 days TPTD group vs. 6 ± 2 days of CVP group) between the two groups.**CONCLUSIONS.** TPTD monitoring is a helpful method that provides timely and accurate information regarding the fluid management in sepsis patients. It may also help to reduce any excess fluid transfusion and thus avoiding pulmonary edema. TPTD monitoring method may help to shorten the length of ICU stay in sepsis patients.**REFERENCE(S).** 1. Michard, Chest, 2002, 121(6): p. 2000-8. 2. Marik, P.E., Chest, 2008, 134(1): p. 172-8. 3. Singer, M., Crit Care Resusc, 2006, 8(3): p. 244-5.**GRANT ACKNOWLEDGMENT.** We declare this study has no grant support.**Cardiovascular monitoring: 0148–0161****0148****EVALUATION OF THE INCIDENCE OF CENTRAL VENOUS THROMBOSIS FOLLOWING CANNULATION OF THE RIGHT INTERNAL JUGULAR VEIN IN PATIENTS AFTER CARDIAC SURGERY**K. Tizard¹, A. Prenter¹, O. Al-Rawi¹¹Liverpool Heart and Chest Hospital, Liverpool, United Kingdom**INTRODUCTION.** In our institution, most patients undergoing cardiac surgery have a central venous catheter (CVC) placed prior to surgery under ultrasound guidance. This is usually a quad-lumen catheter inserted into the right internal jugular vein (RIJV) with a number of patients also having a Swan Introdncer catheter inserted into the same vein. Previous international studies^{1,2} have reported a high incidence of venous thrombosis despite the catheters remaining in situ for relatively short periods of time. This can present with discomfort, erythema, fever, swelling of the affected limb and dilated collateral veins. Thrombosis can also be asymptomatic, diagnosed during coincidental imaging or during screening.**OBJECTIVES.** Evaluation of the incidence of RIJV CVC related thrombosis post-cardiac surgery in our UK tertiary referral centre population.**METHOD.** Over a 2 week period, patients undergoing elective cardiac operations who had placement of RIJV CVC(s) pre-operatively were screened on post-operative day 2 for the presence of an intravenous thrombus. Emergency patients and patients with pre-existing thrombosis of internal jugular vein were excluded.2-dimensional ultrasonography \pm colour Doppler of the RIJV were used on vein cannulation and on post-operative day 2. The presence or absence of a thrombus in the RIJV was noted, as well as the configuration of any thrombus and whether there was any obstruction to venous blood flow.

Anticoagulant therapy and patient demographics (including age, sex, BMI, co-morbidities, risk factors for DVT, type of surgery, off-pump/on-pump and length of CPB) were also noted.

RESULTS. 60 elective cardiac patients with RIJV CVCs were scanned on day 2 post-surgery. 20/60 (33 %) patients had evidence of RIJV thrombosis. 10/20 (50 %) were in the shape of a sleeve, 6/20 were compact (30 %) and 13/20 (65 %) were attached to the vein wall at the site of CVC insertion. 18/20 (90 %) of patients who had developed thrombus had had their CVCs removed <48 h after insertion.

19/20 (95 %) of patients who had developed a thrombus were already receiving prophylactic LMWH alone (5/20) or in addition to anti-platelet therapy (14/20).

CONCLUSIONS. The incidence of catheter related thrombosis is high in this population despite generally having the catheter in situ for short periods and receiving prophylactic anti-coagulation. Thrombus appears to be most commonly formed at the site of insertion and around the catheter. This highlights the importance of early removal of unnecessary catheters in our patients.**REFERENCES.** 1. High incidence of intravenous thrombi after short-term central venous catheterization of the internal jugular vein. Wu et al. J Clin Anaesth. 1999 Sep; 11 (6) 482-5.

2. Deep vein thrombosis of the neck and pulmonary embolism in patients with a central venous catheter admitted to cardiac rehabilitation after cardiac surgery: a prospective study of 815 patients. Frizzelli et al. Intern Emerg Med 2008 Dec;3(4):325-30.

0149**THE ARTERIAL PRESSURE FLOW LOOP AS CONTINUOUS DEVICE TO ASSESS VENTRICULAR-ARTERIAL COUPLING IN HIGH RISK PATIENTS**A. Le Gall¹, O. Passouant^{1,2}, M. Bucciero¹, A. Mebazaa^{1,2}, E. Gayat^{1,2}, F. Vallée¹¹Hôpital Lariboisière, Département d'Anesthésie-Réanimation, Paris, France, ²INSERM U 942, Paris, France**INTRODUCTION.** Ventricular-arterial coupling is defined by the relationship between the ventricular and the arterial elastances and is a cardiovascular system efficiency's measure. However, this measure is unusable in our daily practice. Simultaneous measurements of aortic flow by esophageal Doppler and of invasive arterial pressure, allow us to draw Arterial Pressure/Aortic Flow (P/F) loop.**OBJECTIVES.** This preliminary study was design to evaluate P/F loop derived parameters, in anesthetized patients, as cardiovascular system characteristics, and to describe their evolution before and after vasoconstriction drugs.**METHODS.** This study was approved by an institutional review board (CE SRLF n°11-356). 15 neurosurgical patients were included. Two cardiovascular risk factors or more were found in 8 patients, others patients had 0 or 1 cardiovascular risk factor. After general anesthesia's induction, a continuous and simultaneous cardiac output (CO) and arterial pressure monitor (CombiQ, Deltex Medical) was inserted. An arterial tonometer (Sphygmocor, Nellcor System©) was also used in order to obtain central arterial pressure, and arterial rigidity indexes, such as Augmentation Index (Aix). Four points of interest were derived from the P/F loop: A (Diastolic Arterial Pressure), B (Arterial pressure at maximal instantaneous aortic flow), C (Systolic Arterial Pressure), and D (Dicrotic Arterial Pressure). These points defined two straight lines (AB and AC), and 4 surfaces, the total surface (Stot), S1, S2 and S3. Three angles (α , β and γ) were derived.

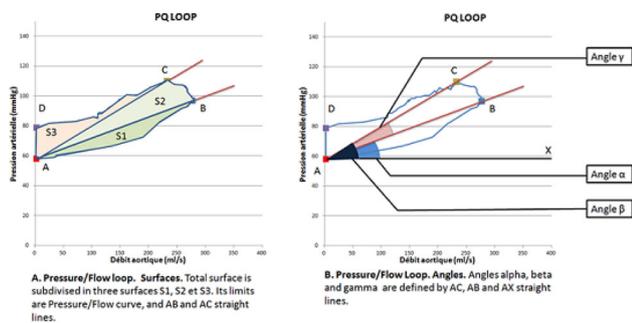


Figure 1. Aortic Pressure/Flow loop description

[Pressure-Flow loop description]

When vasoconstrictors was necessary (20 % Arterial Pressure fall), P/F parameters was recorded before (T0) and at maximal vasoconstrictor's peak effect (T1) RESULTS. 90 vasoconstrictor's boluses were studied. At T0, α , β and γ was significantly higher in "high risk" patients, whereas Stot didn't differ between the two groups. In "high risk" patients, arterial pressure at T1 was similar to "low risk" patients, but γ was significantly higher when compared to "low risk" patients ($+4^\circ \pm 17\%$ versus $+2^\circ \pm 3\%$, $p = 0.05$). At T1, S1/Stot ratio was significantly lower in "high risk" patients compared to "low risk" patients ($41\% \pm 17\%$ versus $32\% \pm 12\%$, $p = 0.0074$). β and γ angles were well correlated with Aix ($r^2 = 0.66$ and 0.69 respectively).

CONCLUSIONS. Shape of P/F loop and its evolution after vasoconstriction varied with cardiovascular status and is a continuous arterial rigidity's monitoring. P/F loop will allow a continuous ventricular-arterial coupling monitoring in anesthetized patients. Further studies are needed in order to confirm and complete these results.

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0150

RADIAL ARTERY APPLANATION TONOMOMETRY FOR NONINVASIVE CARDIAC OUTPUT MEASUREMENT: A COMPARISON WITH INTERMITTENT PULMONARY ARTERY THERMODILUTION IN PATIENTS AFTER CARDIOTHORACIC SURGERY

J.Y. Wagner¹, H. Sarwari¹, M. Kubik^{2,3}, S. Kluge³, D.A. Reuter¹, B. Saugel¹

¹University Medical Center Hamburg-Eppendorf, Department of Anesthesiology, Hamburg, Germany, ²University Medical Center Hamburg-Eppendorf, Department of Cardiovascular Surgery, Hamburg, Germany, ³University Medical Center Hamburg-Eppendorf, Department of Intensive Care Medicine, Hamburg, Germany

INTRODUCTION. Measuring cardiac output (CO) is highly important for adequately monitoring and treating surgical and intensive care unit patients. In the recent years, non-invasive technologies for CO determination became available. Whether these new noninvasive technologies can replace invasive methods in regard to accuracy and precision is still a subject of discussion.

OBJECTIVES. To compare CO measurements obtained completely noninvasively using radial artery applanation tonometry (T-Line 400, Tensys Medical Inc, San Diego, CA, USA) (AT-CO) with invasive CO measurements using intermittent pulmonary artery thermodilution (pulmonary artery catheter (PAC); PAC-CO).

METHODS. In this interim analysis, simultaneously obtained AT-CO and PAC-CO measurements were analyzed in 12 patients during the first hours after cardiothoracic surgery. Three independent sets of three consecutive thermodilution measurements each were performed per patient resulting in 108 paired measurements. No data were excluded. Agreement between the two methods was statistically assessed by Bland-Altman analysis and by calculating the percentage error.

RESULTS. The Bland-Altman analysis resulted in a bias of -0.08 L/min, a standard deviation of 0.6 L/min and limits of agreement of -1.29 to $+1.13$ L/min. The percentage error was 25 %.

CONCLUSION. In this clinical study in patients after cardiothoracic surgery, CO determination with noninvasive radial artery applanation tonometry using the T-Line 400 technology showed good accuracy and precision when compared with intermittent pulmonary artery thermodilution.

GRANT ACKNOWLEDGMENT. BS received unrestricted research grants from Tensys Medical Inc. (San Diego, CA, USA).

0151

TRANSIENT STOP-FLOW ARM ARTERIAL-VEIN EQUILIBRIUM PRESSURE MEASUREMENT: DETERMINATION OF PRECISION OF THE TECHNIQUE

H.D. Aya^{1,2}, A. Rhodes^{1,2}, N. Fletcher^{1,2}, M. Grounds^{1,2}, M. Cecconi^{1,2}

¹St George's Healthcare NHS Trust, Adult Critical Care Directorate, London, United Kingdom, ²St George's University of London, Clinical Sciences, London, United Kingdom

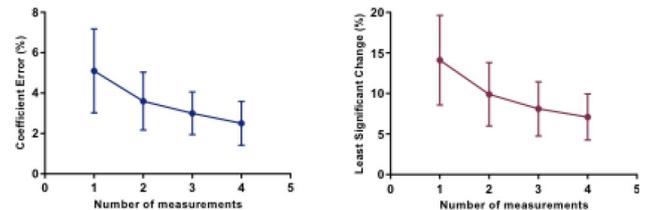
INTRODUCTION. Transient stop-flow arm arterial-venous equilibrium pressure (Parm) is a validated technique for measuring the mean systemic filling pressure (Pmsf) [1]. Pmsf is a functional measure of the effective intravascular volume status.

OBJECTIVES. To assess the precision of the Parm measurement.

METHODS. Parm was measured by inflating a pneumatic tourniquet around the upper arm 50 mmHg above systolic pressure for 60 s, 4 times consecutively, separated by an interval of 5 min, in each patient. Arterial (Pa) and peripheral venous pressure (Pv) were recorded every 10 s. Mean difference between Pa and Pv was calculated in order to determine the adequate stop-flow time. One way ANOVA test with Bonferroni correction was used to compare the mean values of the four determinations of Parm and to detect systematic changes in Parm during repeated measurement. The coefficient error (CE) was determined

and used to derive the least significant change (LSC) in Parm that this technique could reliably detect.

RESULTS. 10 patients were included in the study, 40 measurements of Parm were recorded. Arterial and venous pressure equilibrated after 60 s of inflation with a difference of 0.65 ± 0.5 mmHg, so we chose the 60 s value of arterial pressure for Parm. There were no significant increases or decreases of Parm during repeated determinations (Table 1) For a single measurement, the CE was 5 % ($\pm 2\%$) and the LSC was 14 % ($\pm 6\%$). Averaging two, three and four measurements the CE improves to 4 % ($\pm 1\%$), 3 % ($\pm 1\%$) and 3 % ($\pm 1\%$) respectively, and the LSC was reduced to 10 % ($\pm 4\%$), 8 % ($\pm 3\%$) and 7 % ($\pm 3\%$) respectively.



[Figure 1 Relationship between the precision and th]

Determination	First	Second	Third	Fourth	p
Parm mmHg	23.5 ± 9.5	23.2 ± 9.5	23.1 ± 9.1	23 ± 9.2	0.08

[Table 1 Parm values in consecutive determinations]

CONCLUSIONS. At least two determinations are necessary in order to reliably detect changes on Parm of 10 %, or 2 mmHg in this sample. More determinations will not detect any change with our current clinical tools.

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0152

A COMPARISON OF A STANDARD VS. MINIATURIZED ECHOCARDIOGRAPHIC SYSTEM IN THE DIAGNOSIS OF HAEMODYNAMIC SHOCK

R. Rooplalsingh¹, P. McCanny¹, B. Marsh¹, P. Diamond¹, F. Colevray¹

¹Mater Misericordiae University Hospital, Dublin, Ireland

INTRODUCTION. Transthoracic echocardiography (TTE) is a first-line diagnostic test for the assessment of haemodynamically unstable critically ill patients.¹ Continuous progress in electronics has led to the production of small (smartphone size), highly portable echocardiography machines that continue to improve in quality.²

OBJECTIVES. To evaluate the utility of a miniaturized echocardiographic system (MES), compared with a standard echocardiography machine (SD), to diagnose the cause of haemodynamic shock in critically ill patients.

METHODS. Following ethical approval, patients admitted to ICU in haemodynamic shock were prospectively enrolled from February 2013 - April 2014. Each patient underwent 2 TTE studies performed independently by 2 operators: a study with SD (Vivid q or iTM, GE) and within 15 min a study with MES (VscanTM, GE) or vice versa. Patients were randomly allocated to both device and operator for the initial TTE study. A bedside report of the SD TTE findings was immediately available to the attending Intensivist. All TTE studies were subsequently read by a 3rd investigator. Image quality was graded (1 = poor, 2 = good, 3 = excellent). Data collection focused on clinical indication, TTE findings, global image quality and therapeutic impact defined as a change in patient management.

RESULTS. Thirty-seven patients were included (characteristics table 1). The clinical questions and echocardiographic findings for each device are shown in table 2. The % of clinical questions answered by MES were comparable to the SD; 35/37 vs. 36/37 (94 % vs. 97 %). Echocardiographic findings led to a change in management in 17 (46 %) of cases. These changes included the following cases; fluid administration (5), coronary angiogram deferred (4), inotropes commenced (3), vasopressor commenced (3), pulmonary artery catheter removed (1), transoesophageal echocardiogram (1). Global image quality is illustrated in fig. 1. Both the SD and MES echo systems had the same number of cases with adequate image quality, however there were more poor image quality studies with the MES. The number of acoustic windows obtained with each system (fig. 2).

Baseline characteristics of patients and cardio-respiratory support.

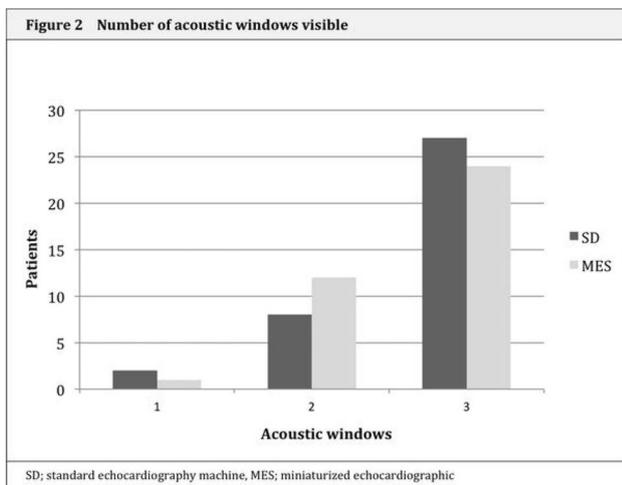
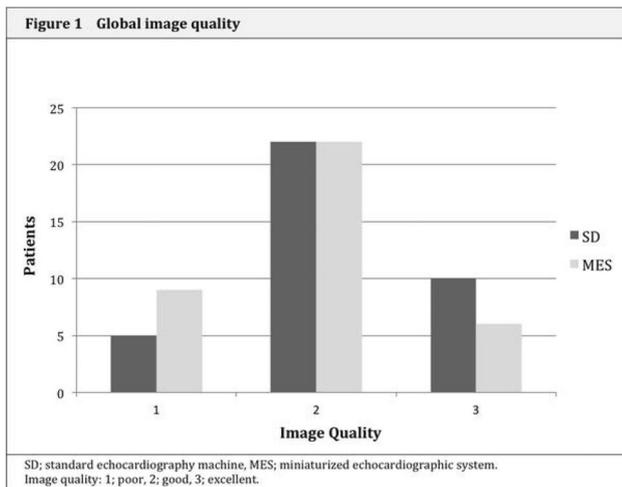
Patients (n = 37)	
Age (mean ± SD)	64 ± 15
Male (%)	25 (67)
APACHE II score ‡ (mean ± SD)	25 ± 8
SOFA score ¶ (mean ± SD)	9 ± 3
Mechanical ventilation (%)	33 (89)
Noradrenaline µg/min (32 patients) Mean dose ± SD	7.6 ± 7.4
Adrenaline µg/min (13 patients) Mean dose ± SD	6.2 ± 5

‡ Acute Physiologic and Chronic Health Evaluation II score. ¶ Sequential Organ Failure Assessment score.

[Table 1]

Indication	No.	TTE Findings	SD	MES
Assess filling status	9	Normovolaemia Hypovolaemia	5 3	5 3
Assess LV function	18	LV normal (>50%) LV abnormal (<50%)	12 6	11 6
Assess RWMA	6	Present Absent	1 5	1 5
Assess RV function	3	RV normal RV abnormal	3 0	3 0
Assess valvulopathy	1	Present	1	1
Assess tamponade	0	Present	0	0
		Not visible‡	1	2
Clinical Question Answered			36/37	35/37

TTE; transthoracic echocardiography, SD; standard echocardiography machine, MES; miniaturized echocardiographic system, LV; left ventricle, RV; right ventricle, RWMA; regional wall motion abnormality.
‡ There was one case where both SD and MES were unable to produce an image to assess filling status and one case where MES alone was unable to produce an image for LV assessment.



CONCLUSIONS.
 1. The MES system was comparable to the SD in providing a TTE finding to help diagnose the cause of haemodynamic shock despite the inferior image quality.
 2. Echocardiography had a therapeutic impact in 46 % of cases studied.
REFERENCE(S). 1. ICM 2004, 30:718-723. 2. J Am Soc Echocardiogr 2010, 23:1225-30.
GRANT ACKNOWLEDGMENT. This study was supported by a grant from the Intensive Care Society of Ireland.

0153 ESTIMATION OF THE MEAN SYSTEMIC PRESSURE CORRECTED BY THE PULMONARY PRESSURE TRANSMISSION INDEX

V. Chhor¹, A. Lancelot¹, D. Pasero¹, M. Rienzo¹, A. Follin¹, J. Chatelon¹, C. Lebard¹, B. Chollet¹, D. Journois¹, R. Pirracchio¹

¹HEGP, Paris, France

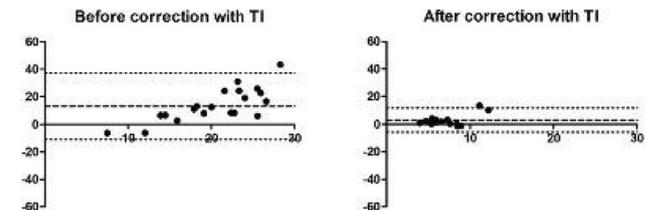
INTRODUCTION. The estimation of the mean systemic pressure (MSP, physiological value: 7 mmHg) may be helpful to guide fluid resuscitation therapy in ICU patients. The MSP may be estimated through stroke volume (SV) measurements at different levels of right atrial pressure (RAP), obtained by altering the intrathoracic pressure (ITP) [1]. However, the impact of ITP on RAP depends on how the ventilatory pressures are transmitted to the intravascular pressures [2].

OBJECTIVE. The aim of our study was to assess a corrected estimation of the MSP, taking into account the transmission index (TI) [2].

METHODS. After submission to an IRB, mechanically ventilated patients requiring a 250 mL fluid challenge and monitored with a transoesophageal Doppler were included. Two methods for MSP estimation were used: our reference method (MSP1) was a regression-based formulae taking as input variables a static measurement of the RAP, the arterial pressure, the cardiac output, and the patient's age, weight and size [3]; the second method (MSP2) was based on a linear regression of measured VES on RAP during end-inspiratory and end-expiratory pauses at two levels of ITP (PEP 5cmH20 and PEP set for a plateau pressure value of 30 cmH2O) [1]; eventually, we computed the corrected RAP (cRAP) before and after a fluid challenge: cRAP = RAP * TI with TI = ΔRAP/(Pplateau-PEP) [2]. We used a Bland and Altman plot to compare the values obtained with the MSP1 and MSP2 before and after correction by the TI.

RESULTS. Eight patients were included so far. The uncorrected MSP2 values did not lie in the physiological range (median [IQR]: 26.8 [19.1-35.4]), in contrast to those obtained after correction with the TI (7.5 [6.3-8.5]) and with the corrected MSP1 (5.2 [4.4-7.3]). The agreement between MSP2 and MSP1 was substantially improved by correcting the RAP (Figure).

The mean bias was 14.0 (95 % CI, -8.6 - 36.6) before correction and 2.7 (95 % CI, -5.0 - 10.3) after correction with the TI.



[Figure]

CONCLUSION. In this preliminary study, the MSP estimation using the linear regression method may be improved by correcting the RAP with the transmission index.

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0154 TISSUE DOPPLER IMAGING MYOCARDIAL PERFORMANCE INDEX AS A METHOD TO EVALUATE LEFT VENTRICULAR DIASTOLIC AND SYSTOLIC FUNCTION IN ICU PATIENTS

L. Zapata¹, P.A. Lopez-Garzon¹, J.C. Suarez-Montero¹, J. Mancebo Cortes¹

¹Hospital de la Santa Creia Sant Pau, Intensive Care Department, Barcelona, Spain

OBJECTIVE. To evaluate the usefulness of myocardial performance index (MPI), a tissue Doppler (TDI) derived parameter of global ventricular function, to detect systolic (LVSD) and diastolic (LVDD) dysfunction and elevated left ventricular filling pressures (EFP) in mechanically ventilated patients.

METHODS. Prospective, observational study in a university hospital. We included 50 patients under mechanical ventilation for more than 48 h. Patients with atrial fibrillation (n:5) or severe mitral valve disease (n:3) were excluded. Echocardiography was performed at admission. LVSD was defined as a left ventricular ejection fraction <50 % and LVDD as an early diastolic mitral annular velocity (e') obtained by TDI < 10 cm/s. EFP was defined by a ratio of early transmitral velocity (E) to e' (E/e') > 15, or 9-14 with a left atrium volume >34 mL/m². MPI was calculated by TDI as (a - b)/b where a is the time interval from the end of late mitral annular diastolic wave (a') to the onset of e', and b is the time interval between the start and the end of mitral annular systolic wave (s').

RESULTS. 42 patients were analyzed, echocardiography was normal in 42.8 %, 40.5 % showed any degree of LVDD and 16.7 % LVDD + LVSD. Patients with LVDD or LVSD are more likely to be older (Normal 48.9 ± 14.8 vs LVDD 66.41 ± 11.9 vs LVSD 67.7 ± 11.1; (p < 0.001) and to have previous history of cardiac heart failure, COPD and hypertension. MPI showed significant differences (p < 0.001) between echocardiography showing normal cardiac function (0.31 ± 0.18), LVDD (0.50 ± 0.20) and LVSD + LVDD (0.69 ± 0.14). Cut-off values using the ROC curve of the MPI to detect LVDD was 0.37 with a sensitivity (Se) of 70 % and a specificity (Sp) of 70 %, to detect LVDD + LVSD was 0.54 with 85 % Se and 73 % Sp. Patients with EFP had higher MPI (0.58 ± 0.17 vs 0.40 ± 0.23, p = 0.015). The MPI cut-off to detect EFP was 0.47 with a 73 % Se and Sp of 63 %.

CONCLUSIONS. Our data suggest that the MPI is a sensitive tool to the study of filling pressures and systolic/diastolic function in the mechanically ventilated critically.

0155 SKIN BLOOD FLOW ASSESSED BY LASER DOPPLER IN PATIENTS WITH SHOCK

G. Stringari¹, D. Orbegozo Cortes¹, L. Gottin², D. De Backer¹, J. Creteur¹, J.L. Vincent¹

¹Erasme Hospital, Université libre de Bruxelles, Dept of Intensive Care, Brussels, Belgium, ²Azienda Ospedaliera Integrata, Università degli Studi di Verona, Intensive Care Unit, Verona, Italy

INTRODUCTION. Microcirculatory alterations are commonly observed in critically ill patients and are independent prognostic factors. Among the non-invasive techniques that have been developed to evaluate the microcirculation, skin laser Doppler (SLD) seems promising.

OBJECTIVES. The aim of this study was to evaluate skin perfusion before and after a thermal challenge (TC) in patients with circulatory shock.

METHODS. The skin perfusion at the level of the proximal anterior forearm was evaluated by SLD (PeriFlux 5000 monitor, PERIMED AB, Sweden) in 15 healthy volunteers (7 males) and in 13 patients (8 males) with circulatory shock (need for vasoactive agents to maintain arterial pressure). We measured the baseline perfusion at 37 °C for at least 3 min and registered the maximum flow during a 30 min period after a TC at 43 °C. We calculated the ratio and the difference between baseline and maximum flow after TC. A Mann-Whitney test was used to compare groups. Data are expressed as median and interquartile range (IQR) and a $p < 0.05$ was considered as statistically significant.

RESULTS. Of the 13 patients enrolled with circulatory shock (SOFA 11 (8.8-12), APACHE II 24 (22.8-29.3), 9 survivors), 8 had septic shock and 5 had cardiogenic shock. Four patients were admitted for a surgical reason and 9 for a medical reason. Twelve patients were mechanically ventilated, and 1 was breathing spontaneously. The median ICU length of stay was 3.7 days (2.3-9.3).

	Volunteers	Patients	
N	15	13	p
37 °C	11.0 (7.5-17.8)	20.0 (14.5-31.8)	0.045
43 °C	110 (77-142)	130 (67-160)	0.73
RATIO	10.9 (8.8-12.3)	5.0 (3.5-11.4)	0.08
DIFFERENCE	90 (68-130)	94 (48-141)	0.98

[SLD in healthy volunteers and shock patients]

	Survivors	Non-survivors	
N	9	4	p
37 °C	20.0 (13.3-27.5)	30.5 (14.0-70.5)	0.49
43 °C	130 (93-156)	98 (40-255)	0.70
RATIO	9.0 (5.0-12.8)	3.4 (2.4-3.8)	0.02
DIFFERENCE	103 (73-141)	67 (26-185)	0.41

[SLD in survivors and non-survivors shock patients]

CONCLUSIONS. The severity of disease influences the skin perfusion before and after a thermal challenge in critically ill patients. A smaller increase in skin blood flow after thermal challenge was associated with a worse outcome.

0156

CLINICAL EVALUATION OF A DECISION SUPPORT SYSTEM FOR HEMODYNAMIC MANAGEMENT - A PROSPECTIVE, OBSERVATIONAL STUDY

D. Schädler¹, C. Schuld¹, A. Caliebe², S. D'Aria¹, N. Schulz-Ruthenberg¹, T. Becher¹, G. Zick¹, I. Frerichs¹, N. Weiler¹, M. Grünwald¹

¹University Medical Center Schleswig-Holstein, Campus Kiel, Anesthesiology and Intensive Care Medicine, Kiel, Germany, ²University Medical Center Schleswig-Holstein, Campus Kiel, Institute of Medical Informatics and Statistics, Kiel, Germany

INTRODUCTION. The management of hemodynamically instable patients still remains challenging. A novel monitoring device (Navigator, Applied Physiology, St Leonards, Australia) provides additional hemodynamic variables and decision support for fluid management, cardiac inotropy and vascular resistance [1]. It is unknown whether this decision support is in agreement with the decisions made by the clinician.

OBJECTIVES. To assess whether the clinical assessment of fluid status, inotropy and vascular resistance is in agreement with the decision support by the Navigator device.

METHODS. Patients treated in the intensive care unit and monitored using a PiCCO monitor (Pulsion, Munich, Germany) were eligible for inclusion in this prospective, observational trial. Patients aged 18 years or less were excluded. The study was approved by the local ethics committee. All measurements were performed in the supine position. After calibration of the PiCCO monitor, the clinical assessment of fluid status, inotropy and vascular resistance were documented. Afterwards, the Navigator monitor was connected to the patient and a measurement period of at least 1 min was performed. Then, the decision support from the Navigator monitor was documented. Interrater agreement was determined using Cohen's kappa coefficient.

RESULTS. 49 measurement periods in 23 patients were performed. Clinical data of the patients are summarized in the Table.

Age [years]	66 ± 13
Heart rate [1/min]	89 (82-106)
Systolic blood pressure [mm Hg]	122 (109-133)
Mean arterial blood pressure [mm Hg]	77 (72-88)
Diastolic arterial blood pressure [mm Hg]	57 (52-63)
Central venous pressure [mm Hg]	14 (10-17)
Peripheral oxygen saturation [%]	98 (97-99)
Cardiac index [l/min/m ²]	4,1 (3,5-5,0)

[Clinical characteristics of patients.]

Values are given as mean ± standard deviation or median and interquartile range. An agreement of the clinical assessment and the decision support by the Navigator monitor was found in 45 % regarding the volume state (kappa 0.05 (-0.19 - 0.29) 95 % confidence

interval (CI)), in 61 % regarding vascular resistance (kappa 0.25 (-0.01 - 0.52 95 % CI) and in 80 % (kappa 0.23 (-0.19 - 0.66 95 % CI)) regarding inotropy.

CONCLUSIONS. This single-center study showed a weak concordance for fluid state, a slight concordance for vascular resistance and a slight concordance for inotropy between the clinical assessment and the decision support provided by the Navigator monitor.

REFERENCE(S). [1] Parkin, W. G. and C. A. Wright, *Int J Clin Monit Comput* 8: 35-42, 1991.

GRANT ACKNOWLEDGMENT. The study was supported by a restricted research grant from Dräger Medical (Lübeck, Germany).

0157

ICED OR ROOM TEMPERATURE SALINE FOR TRANSPULMONARY THERMODILUTION MEASUREMENTS?

S. Grimmer¹, M. Sander¹, S. Wolf²

¹Charité - Universitätsmedizin Berlin, Anesthesiology, Berlin, Germany, ²Charité Campus Virchow, Department of Neurosurgery, Berlin, Germany

INTRODUCTION. With transcatheter pulmonary thermodilution a bedside method is available for the intensivist to determine cardiac index, global enddiastolic volume index (GEDVI) and extravascular lung water index (EVLWI). These parameters allow assessment of cardiac function, volumetric preload and the extent of pulmonary edema of a critically ill subject. Recommendations of the device manufacturers allow measurements to be taken with iced or room temperature saline. Previous studies were carried out mostly with a pulmonary artery catheter and came to ambiguous results. The only available study using transcatheter pulmonary thermodilution [1] in 15 intensive care patients concluded both methods to be interchangeable, but lacked sufficient power to recognize subtle findings.

OBJECTIVES. To analyze the agreement and precision of Cardiac Index, GEDVI and EVLWI on data collected in daily routine on a neurosurgical intensive care unit.

METHODS. Measurements were performed sequentially with iced and room-temperated saline in any orders within a time window of 20 min. We analyzed data of 286 patients, 151 men, 135 women, with a median APACHE2 score 22 and 26, respectively. Examined were bias and limits of agreement following the approach by Bland and Altman [2], percentage error according to Critchley et al. [3] and coefficient of variation (CV), precision and least significant change (LSC) according to Monnet et al. [4].

RESULTS. The bias for Cardiac Index was -0.15 l/min/m² (95 % confidence interval (CI) -0.20 to -0.11) and percentage error -4.1 % (95 % CI -5.3 to -2.9 %). For GEDVI bias was -23.7 l/min/m² (95 % CI -34.3 to -13.0 l/m²) and percentage error -2.9 % (95 % CI -4.01 to -1.43 %). For EVLWI the bias was -0.41 ml/kg (95 % CI -0.57 to -0.24 ml/kg) and percentage error -0.4 % (95 % CI -1.8 to 1.0 %). Calculated for three measurements the precision for the median Cardiac Index with iced saline was 4.0 % and with room temperature saline 6.85 % (p < 0.001). The median precision for GEDVI with iced saline was 5.40 % and with room temperature saline 7.7 % (p < 0.001). The median precision for EVLWI using iced saline was 7 % and for room temperature saline 7.84 % (p = 0.0011).

CONCLUSIONS. Measurements performed with iced saline show statistically significant less scatter and are more precise than measurements taken with room temperature saline. Hence all measurements to determine Cardiac Index, GEDVI and EVLWI in intensive care patients should be taken with iced saline to capture more subtle differences and allow a more precisely guided therapy.

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0158

INFLUENCE OF CENTRAL VENOUS CATHETER SITE ON TRANSPULMONARY THERMODILUTION PARAMETERS

S. Soussi¹, F. Sisso¹, A. Lenoire¹, R. Heidar¹, M. Benyamina¹, V. Maurel¹, A. Ferry¹, A. Blet², B. Le Cam¹, A. Mebazaa², M. Legrand¹

¹Saint Louis Hospital, Department of Anesthesiology and Critical Care and Burn Unit, Paris, France, ²Groupe Hospitalier Saint Louis-Lariboisiere, Department of Anesthesiology and Critical Care and Burn Unit, Paris, France

INTRODUCTION. Transpulmonary thermodilution (TPTD) can be used to guide fluid management in burn patients by the measurement of cardiac index (CI), extra-vascular lung water (EVLW) and global end-diastolic volume index (GEDVI) [1]. A central venous catheter (CVC) and an arterial line (AL) in the same femoral side can produce a biphasic dilution curve. This is called the "cross talk phenomenon" [2]. It can be avoided by using different lengths of catheters.

OBJECTIVES. Assess the concordance of the CI measurements as a primary outcome, the EVLW and the GEDVI by TPTD via a femoral CVC (fem) homolateral to the AL with different lengths, and an internal jugular CVC (jug) which is the reference method.

METHODS. Prospective observational trial without the need for patient consent, performed from December 2013 to March 2014. Every patient with both a CVCjug and a CVCfem homolateral to the AL at the same time (e.g. catheter changing procedure) was included. Non-inclusion criterion: intracardiac shunt. All catheters were inserted under echoguidance. Jugular CVCs of 20 cm and femoral CVCs of 30 cm were used. A 20 cm thermistor-tipped AL was placed homolaterally to the femoral CVC and connected to a PiCCO monitor (PiCCO-2, Pulsion Medical Systems AG, Munich, Germany). TPTD was performed by injecting 15 mL of 0.9 % cold saline (0-6 °C), first using the jugular CVC and then the femoral one for the CI, the EVLW and the GEDVI measurements. The measurements were performed in the same respiratory and hemodynamic conditions for both sites. Statistics: Pearson's correlation test and the Bland-Altman analysis were used. A percentage error of 30 % for the CI was chosen to assess the measure's clinical relevance via the femoral site. Results were expressed as mean ± SD, or as numbers and %.

RESULTS. A total of 13 measurements in 7 patients were performed. Patients' characteristics: age = 68 ± 11, sex ratio = 2:5, SAPSII = 37 ± 16, SOFA = 8 ± 3. Measurement conditions: heart rate = 101 ± 13 beats per minute, Mean arterial pressure = 84 ± 12 mmHg, Central venous pressure = 8 ± 3 mmHg, mechanical ventilation = 10 (77 %), Plateau pressure = 20 ± 3 cmH₂O, Positive end-expiratory pressure = 7 ± 2 cmH₂O. The mean TPTD parameters with the reference method were: CI = 4.3 ± 1.5 l/min/m², EVLW = 8 ± 3 mL/Kg, GEDVI = 727 ± 179 mL/m². The 2 methods are compared in the table

	r	bias	95 % LOA	Percentage error
Cifem-CIjug	0.98	0.2 L/min/m ²	-0.42; +0.84 L/min/m ²	14 %
EVLWfem-EVLWjug	0.84	0.3 mL/kg	-1.5; +2 mL/kg	
GEDVfem-GEDVjug	0.89	35 mL/m ²	-151; +221 mL/m ²	

[Comparison of the TPTD parameters on the 2 sites]
 r, correlation coefficient; 95 %LOA, 95 % Limits of agreement.

CONCLUSIONS. Our results showed good correlation and agreement between the 2 measurement sites for the CI and the EVLW. The GEDV_{fem} overestimated the GEDV_{jug} with an acceptable bias but large limits of agreement. This is probably related to the increased dilution volume of the cold bolus.

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0159

EXTRAVASCULAR LUNG WATER AND PULMONARY VASCULAR PERMEABILITY AS EARLY WARNING SIGNS OF POOR PROGNOSIS IN SEVERE BURN INJURY

R. Yanhong¹, B. Mittermüller², C. Gore³, B. Schaefer², G.C. Ibra²

¹Beijing Chao-Yang Hospital, Beijing Institute of Respiratory Medicine, Beijing, China, ²Vienna Medical University, Anaesthesia and Intensive Care, Vienna, Austria, ³Imperial College Healthcare National Health Service Trust, Anaesthesia and Intensive Care, London, United Kingdom

INTRODUCTION. Mortality remains high in severe burns.¹ Transpulmonary thermodilution (TPTD) has been used successfully to guide therapy in critically ill patients.²

OBJECTIVES. The aim of this study was to analyse early predictive factors of prognosis in severe burn injury with minimally invasive TPTD technology.

METHODS. Our case series included 23 burn patients with severe burns (>20 % of burned total body surface area (TBSA) who were admitted to the hospital within 24 h after injury. TPTD measurements were performed using the PiCCO system (Pulsion Medical Systems, Munich, Germany). Cardiac index (CI), global end-diastolic volume index (GEDVI), pulmonary vascular permeability index (PVPI), extravascular lung water index (EVLWI) and oxygen delivery index (DO₂I) measurements were recorded at admission. Statistical analysis was performed using independent samples t test for intergroup comparisons.

RESULTS. Patients were divided into survivor group (n = 17) and non-survivor group (n = 6). Survivors were found to have significantly lower values of EVLWI and PVPI at admission than non-survivors. Heart rate, mean arterial pressure (MAP), and GEDVI were not different between the two groups. Values of age and burned TBSA were higher, values of CI and DO₂I were lower in non survivors, but did not reach statistical significance, respectively. Furthermore, incidence of renal failure at admission was higher in non-survivors (5.9 % vs 66.75 %, p = 0.033).

CONCLUSIONS. Our data suggest that elevated EVLWI and PVPI at admission may be valuable markers predicting poor prognosis in severe burn injury.

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0160

EVALUATION OF INDEXES RELATED TO ISOVOLUMIC RELAXATION TIME IN INTENSIVE CARE VENTILATED PATIENTS FOR ASSESSING LEFT VENTRICULAR END-DIASTOLIC PRESSURE (EVA-PRESS): A PROSPECTIVE OBSERVATIONAL TRIAL

T. Morichau-Beauchant¹, F. Daviaud^{1,2}, A. Bouglé¹, G. Geri^{1,2}, W. Bougouin^{1,2}, B. Champigneulle^{1,2}, S. Spagnolo¹, P. Royer¹, F. Pene^{1,2}, J. Charpentier¹, J.-D. Chiche^{1,2}, J.-P. Mira^{1,2}, A. Cariou^{1,2}

¹Hôpital Cochin, Réanimation Médicale, Paris, France, ²Université Paris Descartes, Sorbonne Paris-Cité, Paris, France

INTRODUCTION. Transthoracic echocardiography is often used to evaluate left ventricular end-diastolic pressure (LVEDP) in mechanically ventilated patients, particularly for the management of respiratory distress and the weaning from ventilation. However echographic indexes are poorly validated in this specific population for assessing LVEDP.

OBJECTIVES. The aim of this study was to evaluate the correlation between validated reference indexes E/A (ratio of transmitral E and A velocities) and E/E_a (ratio of transmitral and myocardial early diastolic velocities) with indexes related to isovolumic relaxation time (IVRT), which have only been assessed in non-ventilated patients. IVRT-IVRT_m and IVRT_m/IVRT are the time interval difference and the ratio of IVRT and tissue Doppler IVRT. IVRT/IVRT_{Ea-E} is the ratio of IVRT and the time interval difference between the onset of E and Ea. They are easily measurable and might offer an alternative when the reference indexes cannot be measured or are in the "grey zone". The secondary objective was to determine a threshold related to a pulmonary capillary wedge pressure (PCWP) > or ≤ 18 mmHg for the evaluated indexes, using reference indexes as surrogates for PCWP.

METHODS. This single-center prospective observational trial included mechanically ventilated patients treated in the ICU of a tertiary care academic center between December 2012 and May 2013. We evaluated the correlation of IVRT-IVRT_m, IVRT_m/IVRT and IVRT/IVRT_{Ea-E} to E/A and E/Ea on the total population and on the subgroups with a left ventricular ejection fraction (LVEF) ≤ 45 % and > 45 %.

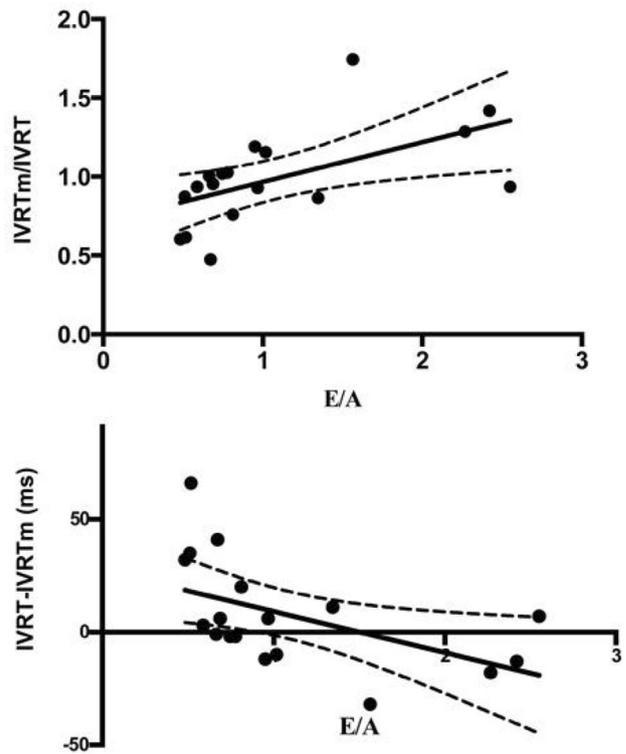
RESULTS. Fifty patients were included (mean age 65.5 ± 16.7, APACHE II 31 ± 9, mean LVEF 45 % ± 14.5, patients on catecholamines 34 %). There was a strong correlation between IVRT-IVRT_m (r = -0.60; p = 0.009), IVRT_m/IVRT (r = 0.57; p = 0.013) and E/A in the LVEF ≤ 45 % subgroup (fig. 1). There was no significant correlation with the other indexes in this subgroup and no correlation in the LVEF > 45 % subgroup. Using a threshold of E/A ≤ 1.4 validated in the literature for ventilated patients to identify a pulmonary capillary wedge pressure (PCWP) ≤ 18 mmHg¹, we found a threshold of IVRT-IVRT_m ≥ -12.5 ms (sensitivity 100 %, specificity 75 %) and ≥ 9 ms (sensitivity 43 %, specificity 100 %) in case of LVEF ≤ 45 %. The threshold for IVRT_m/IVRT is ≤ 1.24 (sensitivity 100 %, specificity 75 %) or ≤ 0.93 (sensitivity 50 %, specificity 100 %).

CONCLUSION. IVRT-IVRT_m and IVRT_m/IVRT are well correlated to the reference E/A index in a heterogeneous population of ventilated patients with LVEF ≤ 45 % and can help to distinguish patients with a low LVEDP. Further investigation will be required to validate the thresholds with a direct comparison to PCWP or LVEDP.

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Figure 1 :

Linear regression of IVRT_m/IVRT and IVRT-IVRT_m assessed with tissue Doppler imaging on patients with LVEF ≤ 45% (95% confidence interval)



0161

IMPLEMENTATION OF A BEDSIDE ECHOCARDIOGRAPHY PROGRAM IN A NON CARDIAC SECOND LEVEL ICU

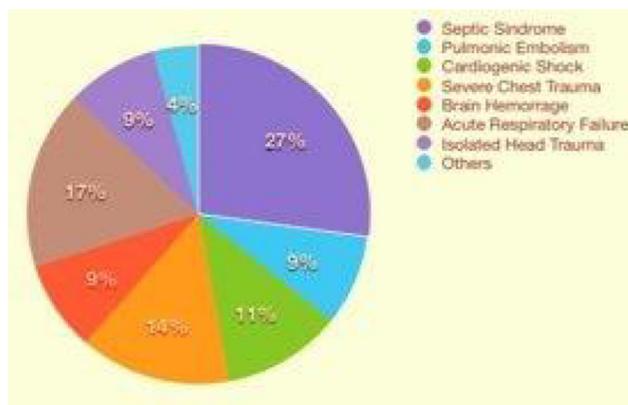
D. Atzeni¹, M. Sanna², P. Madeddu³, A. Farris¹, G. Lai⁴, S. Murre³, P. Isoni¹, P. Castaldi³

¹Ospedale Marino Cagliari, Intensive Care Unit, Cagliari, Italy, ²Università degli Studi di Cagliari, Institute of Anesthesiology and Intensive Care, Sestu Cagliari, Italy, ³Ospedale Marino Cagliari, Intensive Care Area, Cagliari, Italy, ⁴Ospedale Marino Cagliari, Intensive Care Department, Cagliari, Italy

INTRODUCTION. Echocardiography is a widely recognized procedure in the evaluation of critically ill patients admitted in ICU. We evaluated the diagnostic and therapeutic impact of echocardiography using the percentage of change of clinical management in the enrolled population as indicator of the therapeutic impact. Indications stated by cardiologic literature don't meet all issues encountered in ICU venue. We routinely performed TTE/TEEs in all patients admitted in our ICU over a period of 1 year even when no signs of circulatory failure were present. This program has been started in an Intensive Care Unit in a hospital with no 24/7 cardiologic ward. All examinations have been conducted by 2 advanced skilled intensivists of our team

OBJECTIVES. The present study was aimed to establish the diagnostic and therapeutic impact of routinely performed TTE/TEEs in all patients admitted in our ICU in order to identifying or unmasking potentially life threatening conditions previously undiagnosed and in order to optimize the treatment of hemodynamic imbalances.

METHODS. Data were collected retrospectively from 120 examinations in the period between January 2012 and January 2013. All examinations have been performed as screening basic study and secondarily as full study depending upon the clinical picture on admission. Cardiologic referral were requested when major or unclear findings were identified. We employed a hand carried Lab 70 esaoete device and all examinations have been stored electronically for further evaluations.



[Diagnoses on admission]

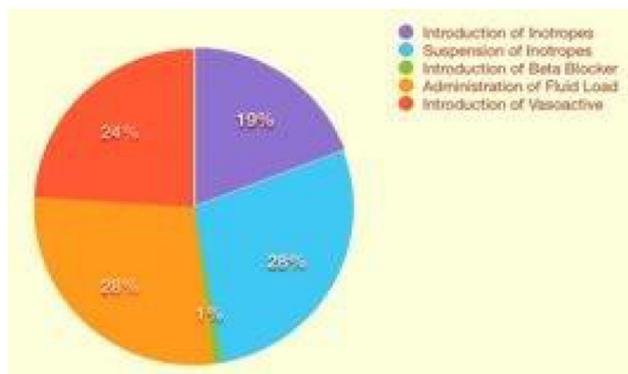
RESULTS. All patients admitted have been examined nevertheless we discarded 50 TTEs because of loss of clinical data and we left the remaining 70 for the final evaluation. Moreover echocardiography allowed the identification of disorders that caused the change of clinical decisions in all patients examined.

Diagnoses	Number of cases	EF < 35%	EF > 70%	Major valvular abnormalities	Aortic dissection	Cardiac Tamponade	LVOTO	Global management modified
Septic Syndrome	19	11/19	0/19	1/19	0	0	0/19	Yes
Pulmonic Embolism	4	4/4	2/4	0/4	0	0	0	Yes
Cardiogenic Shock	8	8/8	0	2/8	0	2/8	0	Yes
Severe Chest Trauma	10	0	0/10	0	0/10	0	0	Yes
Brain Hemorrhage	9	0	6/9	0	0	0	0	Yes
Respiratory Failure	12	0	6/12	0	0	0	11/12	Yes
AKI CVVH	1	0	1/1	0	0	0	0	Yes
Cardio Renal Syndrome	1	0	1/1	0	0	0	0	Yes
Aortic Dissection	1	1/1	0	1/1	1/1	0	0	Yes
Isolated Head Trauma	6	0	3/6	0	0	0	0	Yes
Total	70	24	35	10	1	2	2	

[Summary of Indications]

CONCLUSIONS.

We can conclude accordingly to previous and more comprehensive studies that routinely performed echocardiography in ICU venue is mandatory and represents an extension of physical examination. It allows the unmasking of cardiac and circulatory disorders and works as a guide of therapy in complex and misleading ICU scenario. In our hospital is not available a 24/7 cardiologic ward so the implementation of such a program allows an optimization of provided care.



[Changes on management]

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GRANT ACKNOWLEDGMENT.

PNEUMONIA: 0162-0175

0162

SELECTIVE OROPHARYNGEAL DECONTAMINATION (SOD) IN INTENSIVE CARE UNIT (ICU) PATIENTS IN A SETTING OF MULTIRESTANT PSEUDOMONAS AERUGINOSA

C. Bastida¹, A. Manzanque¹, P. Amorós¹, D. Soy^{1,2,3}, C. Codina¹, A. Torres^{2,3,4}

¹Pharmacy Service, Hospital Clinic Barcelona, University of Barcelona, Barcelona, Spain, ²IDIBAPS (www.idibapsrespiratoryresearch.org), Barcelona, Spain, ³Centro de Investigación Biomédica En Red de Enfermedades Respiratorias (CIBERES) 06/06/0028, Barcelona, Spain, ⁴Respiratory Intensive Care Unit, Institut Clínic Thorax (ICT), Hospital Clínic Barcelona, University of Barcelona, Barcelona, Spain

INTRODUCTION. SOD is proposed to reduce infections' incidence in critically ill patients, however its use is still controversial in a setting of multiresistant pathogens.

OBJECTIVE. Describe SOD's use in critically ill patients with suspected/confirmed Gram negative bacterial infection in a setting of multiresistant *Pseudomonas aeruginosa*.

METHODS. Pilot, observational, retrospective study conducted in a tertiary hospital. Patients under SOD were selected from the CPOE system. SOD consisted on: (i) a solution of amikacin/tobramycin, amphotericin B and colistin; (ii) an oropharyngeal paste with the same antibiotics. Collected variables: (i) demographic data (age, sex, diagnosis), (ii) clinical data (endotracheal intubation/mechanical ventilation (EI/MV), length of SOD treatment, SOFA, white cells and C-reactive protein (CRP)), (iii) microbiological data (cultures, antibiogram) and (iv) pharmacological data (systemic and nebulized antibiotics, steroids). Treatment success was defined as a negativization/decrease (2log) in microbiological cultures colony-counts and/or a clinical improvement during SOD treatment. Treatment failure was defined as exitus/increase in microbiological cultures colony-counts. Descriptive statistical analysis was performed with Microsoft Office Excel[®] 2007.

RESULTS. Eighteen patients (eight male) under SOD treatment were recruited. Mean age: 64.8 years (SD:13.2), median length of SOD treatment: 13.5 days (range [3-89]). Fifty percent of the patients were admitted to the hospital for a surgical reason. Baseline mean SOFA: 6.9 (SD:2.8), being in two cases higher than 11. Seventeen patients were under EI/MV with a median of 79 days; range [7-746]. Concomitant to SOD, systemic plus nebulized antibiotics were prescribed in 9/18 patients. Nebulized antibiotic monotherapy was observed in 5 cases. The 77.8 % (14/18) of the patients showed positive microbiological cultures to Gram negative pathogens in respiratory tract samples prior to SOD prescription, ten of which (71.4 %) showed reduced antibiotic sensitivity [*P. aeruginosa* (n:9), *Klebsiella pneumoniae* BLEE (n:1)]. Negativization of cultures during SOD treatment was seen in five patients (35.7 %). Four cases were discharged from ICU due to clinical improvement. Treatment failure was observed in the remaining six patients, two of which were exitus. Antibiogram was available in 12 patients. Antibiotic resistance appearance was detected in five of them (41.7 %). White cells and CRP values did not show significant differences between baseline and end of SOD therapy.

CONCLUSIONS. Taking into account microbiological and clinical results, a successful outcome was seen in 64.3 % of the patients. However, we should consider the 41.7 % of new resistance profile. Results suggest that further research in this area is needed.

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0163

CLINICAL AND ECONOMIC IMPACT OF THE IMPLEMENTATION OF THE "PNEUMONIA ZERO" PROJECT

F. Alvarez Lerma¹, J. Alvarez², M. Sanchez³, M. Palomar⁴, L. Lorente⁵, F. Gordo⁶, J.M. Anón⁷, R. Jam⁸, R. Garcia⁹, S. Arias¹⁰, M. Vázquez-Calatayud¹¹

¹Hospital del Mar. Parc de Salut Mar, Barcelona, Spain, ²Hospital de Fuenlabrada, Madrid, Spain, ³Hospital Clínico Universitario San Carlos, Madrid, Spain, ⁴Hospital Universitario Arnao de Vilanova, Lleida, Spain, ⁵Hospital Universitario de Canarias, Santa Cruz de Tenerife, Spain, ⁶Hospital Universitario del Henares, Madrid, Spain, ⁷Hospital Virgen de la Luz, Cuenca, Spain, ⁸Hospital Parc Tauli, Sabadell, Spain, ⁹Hospital Universitario de Basurto, Bilbao, Spain, ¹⁰Hospital Universitario de Getafe, Madrid, Spain, ¹¹Clínica Universitaria de Navarra, Pamplona, Spain

INTRODUCTION. The initial objective of the "Pneumonia Zero" project has been to reduce the rate of pneumonias associated with mechanical ventilation below 9 episodes per 1000 days on mechanical ventilation (MV).

OBJECTIVES. To assess the clinical and economic impact of the reduction of the rate of mechanical ventilation-related pneumonia (MVP) at nationwide level in Spain.

METHODS. Prospective, intervention and multicentre study. The clinical impact was evaluated by means of changes of MVP rates during the period of participation in the ENVIN-ICU registry (April-June months) for the last 6 years (2008-2013), mortality of assisted ventilated patients and consumption of antibiotics used for the treatment of ICU-acquired infections (% in relation to the total use of antibiotics). The economic impact was determined by estimating the number of days saved by the decrease of MVP. It is estimated that prolongation of ICU stay by MVP is 18.5 days and the cost per day of ICU stay of 3103€.

RESULTS. During the period analyzed, a total of 104,906 patients were controlled, 45,190 (43.5 %) of which required MV for more than 24 h during 414,828 days. Changes in the MVP rates, mortality among mechanically ventilated patients and the percentage of antibiotics used for the treatment of ICU-acquired infections are shown in the following table 1:

	2008	2009	2010	2011	2012	2013
Patients, total no.	13,824	14,983	16,950	18,829	19,521	20,799
Patients on MV > 24 h, no (%)	6,080 (44,0)	6,685 (44,6)	7,209 (42,5)	8,172 (43,4)	8,323 (42,6)	8,721 (41,9)
MVP, no	845	740	788	678	566	516
DI-MVP	14.95	11.44	11.48	9.41	7.27	6.87
Mortality in patients on MV (%)	21.2	21.4	21.2	20.7	21.2	19.4
Antimicrobials used for ICI acquired infections (%)	27.2	25.8	24.8	23.0	20.7	20.9

Between 2010 and 2013, MVP decreased from 788 to 516 episodes (↓272 episodes), which has been accompanied by 5,032 days of ICU stay saved per trimester and a sustained decrease in the global cost of more than 15 million Euros (each trimester).

CONCLUSIONS. The implementation of the “Pneumonia Zero” Project has decreased the mortality of mechanically ventilated patients and resulted in important savings of resources that could be applied to other patients.

0164

EFFECTIVENESS OF GRAM-STAINED SPUTUM SAMPLES OBTAINED IMMEDIATELY AFTER INTUBATION TO GUIDE SELECTION OF ANTIMICROBIALS

N. Okuda¹, E. Nakataki¹, Y. Tsunano², M. Onodera¹, M. Nishimura¹

¹Tokushima University Hospital, Emergency and Critical Care Medicine, Tokushima, Japan, ²Tokushima University Hospital, Emergency and Disaster Medicine, Tokushima, Japan

INTRODUCTION. Pending culture results, prompt administration of effective intravenous antimicrobials is essential when bacterial pneumonia is suspected. Meanwhile, allowing careful microscopic scrutiny of clinical specimens, Gram staining is the most commonly used tool for evaluating the morphology and arrangement of bacterial cells.

OBJECTIVES. For comparison with subsequent culture results, we obtained sputa immediately after intubation, and examined Gram-stained samples. We then evaluated the usefulness of Gram staining for providing of infection.

METHODS. From January to December in 2013, we prospectively collected sputa immediately after intubation. The samples were Gram stained and their quality was assessed from the number of neutrophil, and squamous epithelial cells present. We compared our Gram-stain findings with later laboratory-culture results, in which the most abundant microbes were considered to be pathogenic.

RESULTS. Fifty-six patients were recruited and 69 specimens were obtained: 51 (74 %) were judged to be good, and 33 of the good specimens (64 %) matched the culture results.

DISCUSSION. Because Gram-stain findings are easily confounded by poorly targeted sputum sampling, microbiological findings from Gram staining are considered unreliable for predicting lower respiratory infection: for example, examination of Gram-stained sputum samples has been found useful in guiding microbiological diagnosis of community-acquired pneumonia in only 14.4 % of hospitalized patients. Contamination by oral flora is less likely in lower-airway samples obtained from intubated patients, and decreased contamination probably accounts for the good correlation between our Gram-stain findings and later culture results.

CONCLUSIONS. Microscopic examination of endotracheally obtained Gram-stained sputum samples corresponded usefully with subsequent culture results and helpfully guided our selection of effective antimicrobials.

GRANT ACKNOWLEDGMENT. Departmental fund.

0165

A BEDSIDE SCORING SYSTEM FOR THE RESISTANCE TO A LIMITED SPECTRUM ANTIMICROBIAL THERAPY IN 631 BRAIN-INJURED PATIENTS WITH HOSPITAL-ACQUIRED PNEUMONIA

A. Roquilly¹, F. Feuillet², Y. Launey³, L. Thioliere⁴, R. Cinotti¹, N. Nessler³, B. Rozec¹, P. Seguin¹, S. Lasocki⁴, V. Sebille², K. Asehnoune¹, for the Atlanrea Study Group

¹CHU de Nantes, Nantes, France, ²Nantes University, EA 4275 SPHERE “Biostatistics, Pharmacoepidemiology and Human Science Research”, UFR des Sciences Pharmaceutiques, Nantes, France, ³CHU de Rennes, Rennes, France, ⁴CHU de Angers, Angers, France

INTRODUCTION. Recommendations for the initial empiric antimicrobial therapy for hospital-acquired pneumonia (HAP) were advocated by the American Thoracic Society (ATS) in 2005, since then, issues regarding the reliability and validity of these recommendations have emerged.

OBJECTIVES. We developed and validated a prediction score for the resistance to a limited spectrum antimicrobial therapy in brain-injured patients presenting with HAP.

METHODS. Data collected in a prospective multicenter study from 379 consecutive brain-injured patients presenting HAP in three intensive care units were used to develop a prediction rule of resistance to a limited spectrum antimicrobial therapy, which was then externally validated in 252 patients with HAP and compared to the ATS recommendations. Resistance to a limited spectrum antimicrobial therapy was considered when at least one bacteria was resistant to ampicillin/sulbactam, ceftriaxone or levofloxacin.

RESULTS. Patients with resistant bacteria had longer duration of ventilation and of hospitalization than patients with susceptible bacteria (P = 0.02 and 0.03 respectively). In multivariate analysis, the predictors of resistance to a limited spectrum antimicrobial therapy (incidence = 16.4 %) were antimicrobial therapy ≥48 h in preceding hospitalization and current hospitalization of 10 days or more. The area under the receiver operating curve (AUC) for this simplified score was 0.822 (95 % confidence interval (CI), 0.770-0.883) vs 0.735 (95 %CI, 0.697-0.786) when using the ATS criteria. In the validation cohort, the AUC for the simplified score was 805 (95 %CI, 732-0.877) vs 0.762 (95 %CI, 0.713-0.825) when using ATS criteria. The percentage of patients correctly classified was 73 % with the simplified score versus 33 % with the ATS score.

CONCLUSIONS. We demonstrate the high performance of a simplified score including preceding antibiotherapy ≥48 h or pneumonia onset ≥10 days in predicting resistance to a limited spectrum antimicrobial therapy in brain-injured patients with HAP. Using this approach may be crucial for conducting probabilistic antibiotherapy in brain-injured patients

GRANT ACKNOWLEDGMENT. Institutional funds.

0166

EARLY TREATMENT OF ATYPICAL BACTERIA DIAGNOSED BY PCR VIA BRONCHO-ALVEOLAR LAVAGE IN VENTILATOR ASSOCIATED PNEUMONIA: INCIDENCE AND IMPACT ON OUTCOMES

A.A. Elrakaiby¹, M.I. Mahmoud², A.M. Fayed¹, T.H. Elbadawy³, N.F. Hanafi⁴

¹Faculty of Medicine, University of Alexandria, Critical Care Medicine, Alexandria, Egypt, ²Faculty of Medicine, University of Alexandria, Chest Diseases, Alexandria, Egypt, ³Faculty of Medicine, University of Alexandria, Cardiology and Angiology, Alexandria, Egypt, ⁴Faculty of Medicine, University of Alexandria, Medical Microbiology and Immunology, Alexandria, Egypt

INTRODUCTION. Ventilator associated pneumonia (VAP) is a major ICU health problem (at least 28 % of patients receiving mechanical ventilation are complicated by an episode of VAP with crude mortality rates of 24 to 76 %⁽¹⁾) so every effort should be made to introduce non-traditional treatment protocols; especially with emerging of wide spread multi-drug resistant pathogens as causative agents for such problem.

OBJECTIVES. Estimating the potential benefit of early diagnosis and treatment of atypical bacteria in VAP, and if there other macrolides induced bio-molecular effects on these patients category.

METHODS. The study was conducted on 150 adult patients admitted to the ICU in the Alexandria Main University Hospital who acquired VAP. All patients received routine VAP antibiotic treatment (based on American Thoracic society Guidelines⁽²⁾) followed by antibiotic modification guided by culture results). Patients were randomized into three groups, 50 patients each. In the 1st group Azithromycin (500 mg once daily for 10 days) was given only for the patients with positive PCR for atypical bacteria, in the 2nd group Azithromycin was given empirically to all patients, and in the 3rd group routine treatment protocol was applied without Azithromycin.

RESULTS. For the 1st group atypical bacteria were detected in 29 patients (58 %), there was statistically significant difference in the number of patients who achieved Clinical Pulmonary Infection Score (CPIS) < 6 at the 10th day of the study in the 2nd group (72 %) compared to 56 % in the 1st group, and 42 % in the 3rd group (p = 0.010). The CPIS was <6 at day ten in 92.3 % of the patients with multidrug resistant or pan-resistant *Pseudomonas aeruginosa* in the 2nd group compared to 60.9 % in the 1st group and 10 % in the 3rd group (p < 0.001). The 2nd group had a significant reduction of days of mechanical ventilation (17.42 ± 6.09, p < 0.001), ICU stay (28.86 ± 7.33, p = 0.004), hospital stay (29.96 ± 7.59, p < 0.001), 28 days sepsis related mortality (p = 0.046), and the total ICU cost (34,808 LE ± 7986, p = 0.008).

CONCLUSIONS. Azithromycin is an effective treatment that could be added to routine VAP treatment through its action on atypical bacteria, which are not uncommon VAP pathogens, and through its anti pseudomonal activity by the inhibition of bacterial communication (quorum sensing) and/or reduction of inflammation.

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0167

THE EFFECT OF SUBGLOTTIC SECRETION DRAINAGE FOR PREVENTING VENTILATOR-ASSOCIATED PNEUMONIA

A. Koker¹, S. Yosunkaya², F. Gok², I. Erayman², A. Yosunkaya²

¹Konya Education and Research Hospital, Konya, Turkey, ²Necmettin Erbakan University, Konya, Turkey

INTRODUCTION. Ventilator-associated pneumonia (VAP) in a critically ill patient increases ventilator time, length of stay and risk of mortality.

OBJECTIVES. We aimed to assess the effect of continuous drainage of subglottic secretion in the prevention of VAP in patients requiring prolonged mechanical ventilation for more than 48 h in the intensive care unit as a prospective, randomized, controlled study.

METHODS. Our study was performed by a document from the ethics committee and written informed consent from the relatives of patients between April 2011 - February 2012 in our 14-bed intensive care unit. 54 patients whose mechanical ventilation requirement were expected to be longer than 72 h included in our study. Patients were randomly divided into 2 groups. These were formed as the group used conventional intubation tube group (Group C) and the group used intubation tube which allowing aspiration of subglottic secretions (Group S). In Group S continuous subglottic aspiration underwent under constant pressure with a special device. In both groups, the cuff pressure kept in a constant pressure of 20-30 14 cmH₂O by using of digital cuff pressure device (1).

RESULTS. In Group C VAP was developed in 10 (35.7 %) from 28 patients. In Group S VAP was developed in 5 (21.7 %) from 23 patients. Both groups when compared according to the development of VAP, there were no statistically significant differences were detected (p = 0.276). However, in the first 5 days the development of VAP were significantly higher in the Group C (respectively, 4.3 % vs 25 %, p = 0.046). The growth rate of VAP (VAP number/ventilator day × 1000) in Group C were 17.48, while in Group S were 11.62. Between the groups there were no statistically significant difference according to ICU mortality, length of ICU stay and length of hospital stay (p > 0.05).

CONCLUSION. This prospective randomized controlled study, demonstrated that the incidence of VAP (especially early development of the VAP) with continuous aspiration of subglottic secretions without creating any undesirable clinical damage in the airways was significantly reduced.

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0168

RESPIRATORY TRACT INFECTION CAUSED BY ASPERGILLUS SPP. IN CRITICALLY ILL PATIENTS

L. Dot Jordana¹, F. Alvarez-Lerma¹, P. Olaechea Astigarraga², M. Palomar Martínez³, M. Rodríguez Carvajal⁴, J. Machado Casas⁵, M.D. Jimenez Quintan⁶, F. Esteve Urbano⁷, J. Ballesteros Herraez⁸, E. Zabala Zegarra⁹, Grupo Estudio Envin-Helics

¹Hospital del Mar, Parc de Salut Mar, Barcelona, Spain, ²Hospital de Galdakao, Galdakao, Spain, ³Hospital Universitario Arnau de Vilanova, Lleida, Spain, ⁴Hospital Juan Ramon Jimenez, Huelva, Spain, ⁵Hospital Universitario Médico Quirúrgico Jaén, Jaén, Spain, ⁶Hospital Universitario Virgen de las Nieves, Granada, Spain, ⁷Hospital Universitario de Bellvitge, Hospitalet de Llobregat, Spain, ⁸Hospital Clínico de Salamanca, Salamanca, Spain, ⁹Hospital Clínic de Barcelona, Barcelona, Spain

INTRODUCTION. The presence of a respiratory tract infection by *Aspergillus* spp. in a critically ill patient admitted to a Service of Intensive Care Unit (ICU) is associated with high morbidity and mortality.

OBJECTIVES. Patients diagnosed of a respiratory tract infection by *aspergillus* spp. during their ICU stay, were analysed retrospectively to determine their characteristics, mortality and risk factors for poor evolution.

METHODS. Retrospective, observational, multicentre study, of patients with respiratory tract infection caused by *Aspergillus* spp. Who were admitted to Spanish ICUs and who were included in the National Register ENVIN-HELICS during April, May and June 2006–2012 (inclusive). Infections were classified as mechanical ventilation associated pneumonia (VAP), nosocomial pneumonia (NP) and tracheobronchitis (TB). Were analysed demographic data, risk factors, origin, type of infection and ICU evolution. Logistic regression analysis was applied to identify variables relate to mortality.

RESULTS. A total number of 267 patients of the 108,244 patients included in the registry, corresponding to 79 ICUs (39.9 %) of the 198 participants, were diagnosed with respiratory tract infection by *Aspergillus* spp. The respiratory rate of *Aspergillus* infection was 2.46 cases per 1000 patients admitted to the ICU and 3.23 episodes/10,000 days in ICU. Infections were classified as VAP in 93 cases (34.8 %), NP 120 (44.9 %) and TB in 54 (20.2 %). The mean age was 64.8 years (SD 17.1), with 173 men (64.8 %), APACHE of 22.03 (SD 7.7). 137 cases (51.3 %) cases presented severe sepsis or septic shock. The most frequent pathology was medical in 173 cases (64.8 %). 58.1 % (155 patients) were from hospitalization units (74.2 % diagnosed NN). In almost half of patients (57.6 %) exists prior comorbidity, antibiotic (44.2 %) and/or parenteral nutrition (41.6 %). The median ICU stay was 19 days (9–34), longer in VAP (29 days (16–44)) and TB 25 days (13–39). Median hospital stay prior to diagnosis, was 11 days (SD 2–21) and ICU 2 days (0–10). Intra UCI the mortality was 57.3 % (157 patients), of these, 79 % were NN and 57 % (53 patients) VAP. Hospital mortality was 59.6 % (159 patients). The independent risk factors of mortality in the logistic regression analysis were: prior admission to a hospital (OR 7.08, 95 % CI 3.18–15.76), history of immunosuppression (OR 2.52, 95 % CI 1.24 to 5.13) and the presence of sepsis or septic shock (OR 8.91, 95 % CI 4.24 to 18.76).

CONCLUSIONS. The national rate of respiratory infection by *Aspergillus* spp in admitted in ICU affects 2.5 patients/1000 hospitalized, affecting a selected group of patients. The majority of infections have been in immunosuppressed patients, diagnosed as previously to admission in ICU and presenting sepsis o septic shock, being all of them, independent risk factors.

0169:

16S PAN-BACTERIAL PCR CAN ACCURATELY IDENTIFY PATIENTS WITH VENTILATOR ASSOCIATED PNEUMONIA

N. Gadsby¹, T. Hellyer², R. McMullan³, J. McKenna³, T.S. Walsh⁴, K. Templeton¹, A.J. Simpson², A. Conway Morris^{4,5}

¹NHS Lothian, Virology, Edinburgh, United Kingdom, ²Newcastle University, Institute of Cellular Medicine, Newcastle upon Tyne, United Kingdom, ³Queen's University, Centre for Infection and Immunity, Belfast, United Kingdom, ⁴University of Edinburgh, Centre for Inflammation Research, Edinburgh, United Kingdom, ⁵University of Cambridge, Anaesthesia, Cambridge, United Kingdom

INTRODUCTION. Ventilator-associated pneumonia (VAP) remains a challenge to ICUs¹. Diagnosis relies on a combination of clinical and microbiological assessment. However the delay in microbiological culture techniques results in patients being started on broad-spectrum antibiotics even though many will not have VAP confirmed.

OBJECTIVES. To derive and validate a pan-bacterial molecular test for VAP.

METHODS. A planned secondary analysis was conducted on samples from two cohorts of patients with suspected VAP (Chest X-ray evidence of consolidation and two or more of white cells $>11 \times 10^9/L$ or $<4 \times 10^9/L$ temperature $>38^\circ C$ or $<35^\circ C$ and purulent tracheal secretions), were recruited, a single centre derivation cohort² and 10 centre validation cohort³. Broncho-alveolar lavage (BAL) was performed and VAP defined as growth of 10^4 CFU/ml on conventional culture. 16 s DNA was amplified using rTPCR and threshold cycle (C_t) recorded, with lower C_t indicating higher bacterial content.

RESULTS. 67 patient samples were available from the derivation cohort, 11 (16 %) of whom had bacterial VAP. Using 10^4 CFU/ml as the diagnostic standard the 16 s C_t value had an area under ROC curve (AUCROC) of 0.91, with a sensitivity of 100 % and specificity of 65 % at the optimal cut-off. 93 samples were available from the validation cohort, 25 (27 %) of whom had bacterial VAP. The AUCROC for C_t in this cohort was 0.90, with a sensitivity of 93 % and specificity of 77 % at the optimal cut-off. At maximum sensitivity of 100 %, specificity was 68 %. Specific PCR for *Mycoplasma* and *Ureaplasma* species, which do not show up on conventional cultures, revealed 45 % of derivation and 30 % of validation 'false positives' (i.e. C_t value below the cut-off but with growth $<10^4$ CFU/ml) were positive for these atypical organisms.

CONCLUSIONS. This study has derived and validated a novel test for bacterial VAP. The high sensitivity, moderate specificity and potential for rapid turn around relative to conventional microbial cultures suggest that 16 s PCR could be used as a rapid biomarker of VAP and allow better stewardship of antibiotics. Testing for atypical organisms may enhance the specificity of this test. Additionally 16 s PCR could be used as a screening test to select which samples should be tested with specific bacterial species PCR probes.

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A MULTICENTER SURVEILLANCE OF VENTILATOR-ASSOCIATED PNEUMONIA IN GREEK ADULT ICUS: RATES, MORTALITY AND TREATMENT CONSIDERATIONS

K. Arvaniti¹, E. Mouloudi¹, P. Papamichalis¹, E. Papadomichelakis¹, E. Aimoniotou¹, M. Daganou¹, E. Paramithiotou¹, T. Giasnetsova¹, F. Frageskaki¹, E. Antoniadou¹, P. Tasioudis¹, M. Stougianni¹, T. Aslanidis¹, P. Myrianthefs¹

¹Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine, Athens, Greece

INTRODUCTION. Ventilator-associated pneumonia (VAP) is a leading healthcare associated infection in the ICU setting with a considerable attributed mortality.

OBJECTIVES. The aim of the study was to explore the epidemiology and mortality of VAP in Greek ICUs of a large geographical region.

METHODS. Prospective, observational, 2-month period study conducted simultaneously in 12 Greek ICUs (107 ICU beds, 5007 hospital beds in total). We included 444 patients, 83 were excluded (LOS < 2d). Variables recorded were: age, gender, APACHE II score, isolates, reason for ICU admission (surgical, medical, trauma, other), LOS, duration of mechanical ventilation prior VAP onset and mortality. VAP was diagnosed with non-bronchoscopic quantitative cultures of pulmonary specimens (tracheal aspirates, protected distal telescopic specimen, BAL).

RESULTS. Thirty-five VAP cases were diagnosed in 361 patients (9.7 %, 8.8 cases/1000 mechanical ventilation-days), with 31.4 % overall mortality. Mean APACHE II score, 19.4 \pm 6.3, mean age, 57 yrs, LOS, 10.2 \pm 4.6 d, MV before VAP onset, 17.1 d. Isolated pathogens were *A. baumannii* (37.1 %), *P. aeruginosa* (25.7 %), *K. pneumoniae* (14.2 %), *polymicrobial* (8.5 %), *E. cloacae* (5.7 %), *P. mirabilis*, *E. aerogenes* and *S. marcescens* accounted for 2.8 % each. MRSA was isolated in one polymicrobial VAP case. Susceptibility rates for selected antibiotics were:

a) *A. baumannii*: tigecycline 100 %, colistin 95 %, gentamicin 21 %, meropenem/imipenem 0 %, b) *K. pneumoniae*: colistin 100 %, tigecycline 100 %, gentamicin 29 %, meropenem/imipenem 14 %, c) *P. aeruginosa*: colistin 100 %, cefepime 44 %, gentamicin 44 %, meropenem/imipenem 33 %, amikacin 22 %.

Antibiotic combination therapy was administered in 72 % of cases for a mean duration of 13d. 80 % of the patients received appropriate empirical antibiotic therapy, 94 % of them within 24 h of diagnosis. Antibiotic combination therapy was used in 72 % of cases for median duration of 15d. About 80 % of the patients received appropriate empirical antibiotic therapy and 94 % of them within 24 h from diagnosis.

CONCLUSIONS. VAP rates and overall mortality were high, while gram-negative bacteria predominated. The appropriateness of empirical antibiotic regimens could be attributed to familiarization with local epidemiological data, showing most probably a clonal propagation of these pathogens in Greek ICUs. Infection control efforts should be targeted

a) to the distribution of centrally collected epidemiological data to the ICU physicians, aiming prompt and appropriate empirical treatment
b) against this wide spread of multiresistant gram-negative bacteria.

0171

SECONDARY BACTEREMIA IN PATIENTS WITH VENTILATOR-ASSOCIATED PNEUMONIA: RESULTS OF A MULTICENTER STUDY IN GREEK ADULTS ICUS

A. Sakagianni¹, E. Papadomichelakis¹, K. Arvaniti¹, T. Aslanidis¹, E. Aimoniotou¹, C. Nikolou¹, A. Gavala¹, M. Karvouniaris¹, M. Daganou¹, G. Vlachogianni¹, E. Mouloudi¹, P. Myrianthefs¹

¹Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine, Athens, Greece

INTRODUCTION. Mortality of Ventilator-Associated Pneumonia (VAP) remains high. Secondary bacteraemia (SB) is often encountered in VAP cases.

OBJECTIVES. The purpose of the study was to compare epidemiology and outcomes between VAP-SB and VAP-only cases.

METHODS. 2-month, prospective study conducted in 13 adult ICUs in Greece (148 ICU beds, 7620 hospital beds in total). Variables recorded were: age, gender, APACHE II score, pathogens, CPIS score, mechanical ventilation-days before VAP onset, duration of antibiotic therapy, secondary bacteremia and mortality.

RESULTS. Among 496 patients admitted in the ICUs, 39 VAP cases (7.9 %, 8.4/1000 mechanical ventilation-days) and a 31 % mortality were recorded. SB was diagnosed in 33.3 % VAP cases. Average age of VAP-SB cases and VAP only cases was 58.3 years and 57.5 years, respectively. The characteristics of VAP-SB and VAP-only cases are shown in Tables 1 and 2.

	Total	VAP-SB group	VAP-only group
N	39	13	26
Male Sex (%)	71.8	84.6*	69.2
APACHE II score	20.5	19	21
Mortality (%)	31.4	33.3*	26.9
MV days before VAP	17.9	13.3	17.6
Antibiotic Therapy days	13.3	13.4	12.9
CPIS 48 h before VAP	4	4	4
CPIS first 24 h	8	8	8
CPIS 48 h after	6	7	6.5

[Characteristics of patients with VAP-SB and VAP-only]

Table 1. Patients characteristics: total population studied, VAP-SB and VAP-only cases. Comparison was performed between VAP-SB and VAP-only cases, * = p < 0.05 (statistically significant).

	Total VAP cases	VAP-SB cases	VAP-only cases
<i>A. baumannii</i> (%)	44.5	39.4	46.1
<i>P. aeruginosa</i> (%)	18.9	17.3	19.2
<i>K. pneumoniae</i> (%)	17.4	16.3	15.3
<i>E. cloacae</i> (%)	5.1	8.7	3.8
<i>E. aerogenes</i> (%)	2.5	8.7	0
<i>S. marcescens</i> (%)	2.5	0	3.8
Polymicrobial (%)	8.6	8,7	11.5

[distribution of pathogens]

Table 2. Distribution of pathogens in different groups

CONCLUSIONS. VAP-SB patients presented significantly higher mortality compared to VAP-only group. Regardless of severity of illness on ICU admission, type of pathogen, duration of MV before VAP or antibiotic treatment, bacteremia itself negatively influenced the ICU outcome, which merits further evaluation.

0172
ONE-YEAR OF SDD APPLICATION IN A TERTIARY-CARE UNIVERSITY HOSPITAL: IMPACT ON COLONIZATION AND NOSOCOMIAL INFECTIONS

C. Sánchez Ramírez¹, M. Cabrera Santana¹, A. Hernández Viera¹, L. Caípe Balcázar¹, S. Hipola Escalada², N. Sangil Monroy², A. Bordes Benitez³, P. Saavedra Santana⁴, S. Ruiz Santana¹

¹University Hospital of Gran Canaria Dr Negrín, Intensive Care Unit, Las Palmas de Gran Canaria, Spain, ²University Hospital of Gran Canaria Dr Negrín, Pharmacy Department, Las Palmas de Gran Canaria, Spain, ³University Hospital of Gran Canaria Dr Negrín, Microbiology Department, Las Palmas de Gran Canaria, Spain, ⁴Las Palmas de Gran Canaria University, Mathematics and Informatics Department, Las Palmas de Gran Canaria, Spain

OBJECTIVE. Effects of Selective Digestive Decontamination (SDD) on colonization and infection in ICU after 1 year.
METHOD. We applied SDD in all patients admitted whose received mechanical ventilation for more than 48 h, from 1 October 2011 to 30 September 2012. A 4 days of intravenous cefotaxime course on admission and enteral solution and oral paste with tobramycin, colistin and amphotericin B was applied. Rectal and oropharyngeal swabs were obtained on admission and once weekly. We compared results with patients without SDD admitted from October 2010 to September 2011, which had nosocomial infections. ENVIN infection diagnoses criteria were used. We also studied exogenous and endogenous primary and secondary infections, colonized isolates resistant to tobramycin and colistin, and infections etiology. Categorical variables were summarized as frequencies and percentages and the continuous ones as means and standard deviations (SD) when data followed normal distribution or medians and interquartile ranges (IQR) when they did not. Percentages were compared using the Chi square test or Fisher exact test, means with t-test and medians with Wilcoxon test for independent samples. For each one of acquired infections incidences per 1000 days of exposure in each cohort and corresponding relative risks were obtained using the Poisson regression. Statistical significance was $p \leq 0.05$.
RESULTS. 165 patients admitted from October 2010 to September 2012 were included. Demographic and clinical data are shown in Table.

	SDD*		P
	Yes N=55	No N=110	
Age, years	57.9 ± 18.5	59.6 ± 15.8	.539
Male /female, %	72.7 / 27.3	68.2 / 31.8	.548
Apache-II	22.5 ± 7.2	21.2 ± 7.6	.282
Glasgow Coma Score	14 (8 ; 15)	15 (8 ; 15)	.106
Trauma patients, n (%)	8 (14.5)	17 (15.5)	.878
Days in ICU	118 (47 ; 156)	62 (40 ; 111)	.241
Deaths, n (%)	15 (27.3)	35 (31.8)	.548
Coronary patients, n (%)	8 (14.5)	19 (17.3)	.655
Emergency surgery, n (%)	24 (43.6)	33 (30.0)	.082
Previous surgery, n (%)	10 (18.2)	22 (20.0)	.781
Immunosupresión, n (%)	5 (9.1)	7 (6.4)	.525
Neutropenia, n (%)	1 (1.8)	3 (2.7)	.1
Parenteral Nutrition, n (%)	17 (30.9)	26 (23.6)	.316
Prior 48 hours antibiotics use, n (%)	8 (14.5)	28 (25.5)	.110
Renal replacement therapy, n (%)	19 (34.5)	34 (30.9)	.637
Intraventricular catheter, n (%)	7 (12.7)	11 (10.0)	.596
ORSA, n (%)	1 (1.8)	3 (2.7)	.1
ESBLs, n (%)	8 (14.5)	39 (35.5)	.005
Pseudomonas, n (%)	7 (12.7)	10 (9.1)	.469
Gram negative ARB, n (%)	1 (1.8)	12 (10.9)	.062
Acinetobacter, n (%)	3 (5.5)	13 (11.8)	.193
Enterococcus vancomycin ARB, n	0	0	-
Shock, n (%)	37 (67.3)	51 (46.4)	.011
N° primary and catheter related bacteremias, n (%)	17 (30.9)	25 (22.7)	.422
N° other secondary bacteremias, n (%)	18 (32.6)	43 (39)	.752
N° pneumonias, n (%)	28 (49.1)	43 (39.1)	.736
N° urinary infections, n (%)	14 (25.5)	34 (30.9)	.464
N° ARB infections, n (%)	18 (32.7)	61 (55.5)	.017

[Table 1. Univariate analysis] (*) The cohorts of study are consecutive. ORSA: oxacillin resistant Staphylococcus Aureus; ESBL: Extended spectrum betalactamase; ARB: antibiotic resistant bacteria.

[Table 1. univariate analysis]

Number of patients with one or more Antibiotic Resistant Bacteria (ARBs) and with one or more Extended Spectrum Betalactamase (ESBL) infections were significantly lower in SDD group ($p \leq 0.01$). Total number of isolates was 250. Ninety-five came from nosocomial pneumonia (NP), 48 from urinary infections, 44 from primary and catheter-related bacteremia and 63 from secondary bacteremias. NP rates, secondary bacteremias and urinary infections, significantly decreased after SDD (Table).

	NO N=110	YES n=55	P	RR(95%CI)
Primary and catheter-related bacteremia / 1000 days of CVC	3.725	1.615	.122	0.620(0.338;1.137)
Other secondary bacteremia / 1000 days in ICU	4.686	1.951	.002	0.416(0.240;0.722)
Nosocomial pneumonia / 1000 days of MV	10.308	4.435	.001	0.430(0.276;0.672)
Urinary infection / 1000 days of urinary catheter	3.905	1.615	.005	0.414(0.222;0.771)

[Table 2. Infection rates]

Most common isolates were *Klebsiella pneumoniae* (18.1 %), *Pseudomonas aeruginosa* (12.9 %), *Enterobacter cloacae* (11.7 %), *Acinetobacter baumannii* (11.1 %). MRSA 1.8 % in non-SDD group and *Pseudomonas aeruginosa* (24.7 %), *Klebsiella pneumoniae* (12.3 %), *Escherichia coli* (8.6 %), *Acinetobacter baumannii* (4.9 %) in SDD group. ARBs isolates also significantly decreased ($p < 0.001$) and there was no *Clostridium difficile* infection isolates. The most frequent infections were exogenous (87.7 %). Twenty per cent of all SDD patients were colonized and 11.1 % of them were resistant to tobramycin and 3.1 % to colistin, respectively. NP data are shown in Table

Sample, n (%)	SDD		P
	No N=62	Yes N=32	
Quadruplicate BGS	56 (90.2)	20 (62.5)	
Quantitative BGS	3	1 (3.1)	
Prim-secular biopsy	1 (1.5)	1 (3.1)	
Enterococcal biopsy and telescoping	1 (1.5)	2 (6.2)	
Pleural fluid culture	2 (3.1)	0	
Negative culture	5 (7.7)	7 (21.9)	
No sample	3	1 (3.1)	
Bacterie (BGS vs rest)	56 (90.2)	20 (62.5)	.008
Inflammatory response, n (%)			<.001
No sepsis	10 (15.4)	2 (6.2)	
Sepsis	24 (36.3)	1 (3.1)	
Other sepsis	21 (47.7)	29 (90.6)	
Sepsis shock	11 (47.7)	29 (90.6)	
ARBs, n (%)	22 (48.2)	5 (15.5)	.001
Exogenous infections, n (%)	-	23 (90.6)	-
Secondary endogenous infections, n (%)	-	3 (9.4)	-
Streptococcus pneumoniae, n (%)	-	2 (6.2)	-
Tobramycin resistant colonization	-	3 (9.4)	-
Colistin resistant colonization	-	0	-
Microorganisms, n			
<i>Acinetobacter</i> spp	-	1	
<i>Klebsiella pneumoniae</i>	-	1	
<i>Pseudomonas aeruginosa</i>	-	3	
MRSA	-	1	

SDD: Selective Digestive Decontamination; BGS: bronchoaspirate; ARB: antibiotic Resistant Bacteria; MRSA: Methicillin Resistant Staphylococcus Aureus

[Table 3. NP isolates]

CONCLUSION. NP, secondary bacteremia, urinary tract and ARBs infections significantly decreased after a year of ICU SDD application. *Pseudomonas aeruginosa* was the commonest pathogen isolated after SDD. There was also a significant decrease in ESBL enterobacterias. There was no *Clostridium difficile* infections.

0173
DOES THE IMPACT OF VAP STAFF EDUCATION DIFFERS BETWEEN 2 ICUS IN ALEXANDRIA UNIVERSITY HOSPITALS?

A.M. Elmenshaw¹, T.H. Elbadawy², H.A.A. Abu Khabab³, S.F. Hafez⁴, E.E.M.H. Ibrahim⁵, A.M. Fayed¹

¹Alexandria University/Alexandria Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt, ²Alexandria University/Alexandria Faculty of Medicine, Cardiology and Angiology, Alexandria, Egypt, ³Alexandria University/Alexandria Faculty of Medicine, Anesthesia and Surgical Intensive Care, Alexandria, Egypt, ⁴Alexandria University/Alexandria Faculty of Medicine, Medical Microbiology and Immunology, Alexandria, Egypt, ⁵Alexandria University/Alexandria Faculty of Medicine, Chest Diseases, Alexandria, Egypt

INTRODUCTION. Successful implementation of any VAP bundle depend on several factors, including implementation strategies that need to be tailored to local situation.¹ However, do tailoring need to be done only between organizations or inside each organization?

OBJECTIVES. To explore the differences in the impact of VAP staff education in 2 different ICUs in the same department for purpose of tailoring the educational program inside the same organization.

METHODS. The same VAP staff educational program was held in ICU1 (operational mainly as extended ER) and ICU3 (operational mainly as tertiary ICU) whom worked with same policies, procedures, and rotational physicians within the same department during the period from July 2009 till August 2012. The percent of change of parameters of efficacy of VAP program were compared between both units.

RESULTS. The baseline characteristics for both patients were similar. The VAP rate decreased in the post-intervention phase in ICU1 and ICU3 by 34.8 and 33 % respectively in spite of significant increase of ventilator utilization ratio by 62.5 and 41.3 % respectively. Similarly, the clinical defined and laboratory confirmed VAP decreased insignificantly by 6.6 and 3.8 % in ICU1 and significantly by 24 and 31.9 % in ICU3 respectively. On the other hand, the incidence of early and late onset VAP decreased significantly by 59 and 28.5 % in ICU1 and insignificantly by 41.7 and 20.4 % in ICU3 respectively. The incidence of single and multiple VAP episodes decreased insignificantly in ICU1 (0.6 and 20.9 %) and ICU3 (24.3 and 22.4 %) respectively. The percent of increase of the compliance to VAP preventive practices were higher in ICU1 in head of bed elevation (184.8 vs 90.4 %) and cuff pressure monitoring (1516 vs 409 %) and in ICU3 in oral hygiene (287 vs 116.7 %), daily sedation vacation (108 vs 38 %), peptic ulcer prophylaxis (51.3 vs 6.5 %), deep vein thrombosis prophylaxis (22.6 vs 8 %) and hand hygiene (300 vs 180 %) respectively. The mortality rate decreased insignificantly in both units with attributable mortality for VAP increased by 37 % in ICU1 and decreased by 14.5 % in ICU3. The MV and ICU days changed insignificantly with excess MV and ICU days increased by 42 and 17 % in ICU1 and by 39.8 and 32.3 % in ICU3 respectively. The antibiotic days decreased insignificantly in ICU1 and ICU3 by 11 and 2 % respectively. There were a highly significant decrease in sensitivity of carbapenems and β-lactam/β-lactamase inhibitors and to gram negative organism in both units.

CONCLUSIONS. In spite of some exceptions, there was no major discrepancy in the impact of VAP staff education and it was effective in both units, there is no need for tailoring of educational programs in different units of the same department or organization.

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0174

INVASIVE MECHANICAL VENTILATION IN COMMUNITY ACQUIRED PNEUMONIA

M. Ferrer¹, C. Cilloniz¹, A. Gabarrus¹, E. Polverino¹, A. Liapikou², A. Torres¹

¹Hospital Clinic, Dept of Pneumology, Barcelona, Spain, ²Sotiria Chest Diseases Hospital, Respiratory Medicine, Athens, Greece

BACKGROUND. Invasive mechanical ventilation (IMV) is frequently used in patients with community-acquired pneumonia (CAP) and severe respiratory failure. However, there is little information on these patients.

Methods: We prospectively enrolled consecutive patients hospitalized with CAP for 12 yrs. We assessed the characteristics and outcomes of patients on IMV, those who needed non-invasive ventilation (NIV) and no ventilatory support, and determined predictors for the need of ventilation and mortality.

Results: Among 3,719 patients included, 154 (4.1 %) required IMV, 136 (3.7 %) NIV, and 3,429 (92.2 %) were not ventilated. *Streptococcus pneumoniae* was the main pathogen. Alcohol consumption, higher levels of C-reactive protein, worse baseline oxygenation, higher Pneumonia Severity Index, and bacteremia at admission independently predicted the need for IMV, while fever at admission was independently associated with no need for IMV. Likewise, higher levels of C-reactive protein and worse baseline oxygenation independently predicted the need for NIV, while fever at admission was independently associated with no need for NIV. The rate of ICU admission was highest and the hospital stay was longest in patients from the IMV group, followed by the NIV group and non-ventilated patients. Similarly, the 30-day mortality rate was highest in the IMV group, followed by the NIV and non-ventilation groups (51, 33 % vs. 22, 16 % and 192, 6 %, respectively, $p < 0.001$). Both the need for NIV (adjusted OR 2.44, 95 % CI 1.37-4.33, $p = 0.002$) and IMV (adjusted OR 4.69, 95 % CI 2.94-7.46, $p < 0.001$), together with chronic cardiovascular and neurologic disease, dyspnea, bacteremia, worse oxygenation, and higher PSI risk class at admission, independently predicted 30-day mortality in the multivariate analysis.

CONCLUSION. Even after adjustment for higher baseline severity, the need for NIV and IMV independently predicted mortality. Identification of these predictors may help in the initial management and hospital allocation of patients.

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0175

DO VENTILATOR ASSOCIATED EVENTS (VAE) PREDICT VENTILATOR ASSOCIATED PNEUMONIA (VAP)?

A.A. Havaladar¹, N. Rajagopalan¹, V. Gupta¹, P.H. Manjunath¹

¹Narayana Hrudayalaya Hospital, MICU, Bangalore, India

INTRODUCTION. At present diagnosis of VAP is made by using CPIS score which includes clinical characteristics such as fever, leukocytosis, PaO₂/FiO₂, secretions and new infiltrates on CXR¹. The new proposed diagnostic criteria for VAP include VAC, Infected ventilator associated condition (IVAC), possible and probable pneumonia. Till date diagnosis of VAP has been made by using Clinical pulmonary infection score (CPIS). It has been suggested that VAC and IVAC are reportable for public records but not possible or probable pneumonia².

OBJECTIVES. To evaluate the correlation between diagnosis of VAC, IVAC and VAP by using New CDC classification and CPIS score.

METHODS. Patients admitted to the MICU, Narayana Hrudayalaya from 1st January 2014 to 31st March 2014. Inclusion Criteria-Patients requiring invasive mechanical ventilation, >2 Calendar days on ventilator. Exclusion Criteria- Patients whose FiO₂ requirement was >80 % and PEEP > 10. Patients transferred from another hospital already intubated. Patients with DNR status.

METHODOLOGY. Basic epidemiological data and APACHE score were collected from all the Patients on day 1. CPIS and ventilator parameters such as FIO₂, PEEP, and PaO₂/FIO₂ were calculated from day 1 of ICU admission. VAC and IVAC were diagnosed based on the following criteria: Increase in FIO₂ of 20 % following 2 days of stability or Increase in PEEP of 3 cmH₂O after 2 days of stability. Diagnostic criteria for IVAC: Temperature >38 °C or <36 °C, or WBC count >12000 or <4000 AND A new antimicrobial agent(s) is started and is continued for >4 calendar days².

RESULTS. Consecutive 100 patients requiring mechanical ventilation for more than 48 h were included in the study. Out of these 13 patients were excluded (1 patient was discharged against medical advice, 6 patients expired, and 6 patients got extubated within 48 h). Out of 87 patients 7 patients developed VAP. 15 patients satisfied criteria for diagnosis of VAC and 13 for IVAC. Diagnosis of VAC preceded diagnosis of VAP by 2 days in one patient and by 5 days in another patient. In 4 patients no temporal difference was noted between VAC and VAP. In one patient with a diagnosis of VAC, CPIS remained normal while patient developed lung infiltrates consistent with pneumonia. Out of 13 patients with IVAC only 7 patients developed VAP. No temporal difference was noted between IVAC and VAP. Statistical analysis was done using kappa test.

CONCLUSIONS. This pilot study has shown a good correlation between VAC, IVAC and CPIS criteria for VAP. VAC may precede CPIS in diagnosis of VAP. However this needs further validation from the current ongoing study.

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Renal replacement therapy: 0176–0189

0176

PHARMACOKINETICS OF ANTIBIOTICS DURING CONTINUOUS VENOUS HEMODIALYSIS WITH REGIONAL CITRATE ANTICOAGULATION IN INTENSIVE CARE UNITS

J. Fessler¹, C. Woloch¹, R. Pirracchio¹, E. Billaud², D. Journois¹, C. Lebard¹

¹HEGP, Réanimation chirurgicale, Paris, France, ²HEGP, Pharmacology, Paris, France

INTRODUCTION. Severe sepsis in critical care patients is commonly associated with acute renal failure, which increases mortality rate (1). Renal Replacement Therapy highly modifies antibiotic pharmacokinetics (2). Continuous hemodialysis with citrate anticoagulation is a developing method in intensive care units (ICU) and allows greater stability of extra renal clearance (3). However no pharmacokinetic study about antibiotics is still available.

OBJECTIVES. The aim of this study is to assess antibiotics plasma concentration stability in critical patients under Continuous Venous Hemodialysis with regional citrate anticoagulation (CVVHD Ci-Ca).

METHODS. From May 2013 to March 2014, a monocentric observational prospective study, approved by the ethical committee of Société de Réanimation de Langue Française, was conducted in our ICU. Patients under CVVHD Ci-Ca (multiFiltrate - Kit Ci-Ca CVVHD AV 1000 S - FRESUBIN with a standard delivering dose: 100 ml/min blood flow and 2000 ml/h dialysate flow) with an antibiotic treatment initiated according to local protocol, with beta-lactams or vancomycin, were enrolled. Demographic and biologic parameters and weight variation were recorded. Antibiotic concentrations were measured after the loading dose and daily during at least 72 h. Patient antibiotic plasma concentration, using a developed LC/MS-MS quantification method for betalactams and an immunoenzymatic assay for vancomycin, was monitored. Data are presented as mean ± SD.

RESULTS. A total of 36 patients (24 men and 12 women), mean age 60.6 ± 17.3 years, were enrolled in the study. Mortality rate was 53 %. 66 % of the patients received more than two antibiotics. However, due to missing data, only 40 kinetic profiles were recorded from 321 plasma samples (6.5 samples per patient). Target antibiotic steady state concentration available in Table 1, were reached during the first 24 h and maintained over the 72 h period in 94 % of the patients. Mean concentration (C_{ss}) for all other drugs remained unchanged from baseline to 72 h.

	C _{ss} (mg/L)						Target (mg/L)
	24h	48h	72h	96h	120h	>120h	
Amoxicillin	43 ± 26	44 ± 19	36 ± 12	42 ± 18	49 ± 23	52 ± 24	10-50
Meropenem	23 ± 1	19 ± 5	26 ± 5	24 ± 8			10-20
Ceftazoxim	50 ± 11	48 ± 16	40 ± 9	49 ± 11	50 ± 9	39 ± 4	20-50
Ticarcillin	142 ± 44	150 ± 27	147 ± 23				> 80
Piperacillin	117 ± 12	102 ± 5	97 ± 4				> 80
Vancomycin	24 ± 7	31 ± 7	46 ± 16	44 ± 25	48 ± 11	46 ± 10	> 20

[Table 1]

CONCLUSIONS. Early optimal antibiotic therapy is fundamental in severe sepsis in critical care patients. These preliminary results suggest that extra renal clearance, by CVVHD Ci-Ca, remain stable and predictable, during antimicrobial treatment.

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0177

PREVALENCE OF PRELOAD-DEPENDENCE RELATED HYPOTENSION DURING INTERMITTENT HEMODIALYSIS IN ICU

J.-C. Richard^{1,2,3}, L. Bitker¹, F. Bayle¹, G. Bourdin¹, V. Leray¹, S. Debord¹, A. Stoian Cividjian¹, H. Yonis¹, C. Guerin^{1,2,3}

¹Hospices Civils de Lyon, Hôpital de la Croix-Rousse, Service de réanimation médicale, Lyon, France, ²Université de Lyon, Lyon, France, ³CREATIS INSERM 1044 CNRS 5220, Villeurbanne, France

INTRODUCTION. Hypotension is a frequent complication of intermittent hemodialysis in ICU, and the clinician response is usually an interruption of fluid removal by the dialyzer and intravascular fluid administration. However, this management relies on the assumption that the underlying cause of hypotension during hemodialysis is hypovolemia, a statement that has never been formally challenged. Several monitoring devices have now the potential to reliably classify cardiovascular instability episodes as dependent or non-dependent of the cardiac preload, and should provide new insight relating to this phenomenon.

OBJECTIVES. The aim of the present study was to evaluate the prevalence of preload-dependence related hypotension episodes during intermittent hemodialysis sessions in ICU, using the PICCO device.

METHODS. The study is a single-center retrospective observational study performed from March 2012 to April 2014. Patients selected were ICU patients monitored with the Picco device, undergoing an intermittent hemodialysis session for acute kidney injury. The main judgment criterion was the prevalence of hypotension episodes (defined as mean arterial pressure below 65 mmHg) related to preload dependency, occurring during the hemodialysis session. Preload-dependence was assessed with the passive leg raising test, and considered present if the systolic ejection volume increased by at least 10 % during the test. In case of multiple hypotension episodes occurring during the same hemodialysis session, only the first episode was evaluated. Data are presented as median [interquartile range].

RESULTS. 40 patients were included, with a median age of 69 [63-78], and IGS II 46 [38-60]. 90 hemodialysis sessions were analyzed. The median SOFA score at time of hemodialysis was 7 [5-10]. 40 % of the sessions were performed under mechanical ventilation. At dialysis initiation, mean arterial pressure was below 65 mm Hg in 6 % of the sessions; norepinephrine and inotropes were administered in 47 % and 11 %, respectively. Total fluid removal during the session amounted to 2610 [1770-3200] mL. 55 % of the sessions were associated with at least one episode of hypotension, but only 24 % of hypotensive episodes were associated with preload-dependence. Univariate analysis identified SOFA score ($p < 0.01$) and mean arterial pressure ($p < 0.001$) at hemodialysis initiation as being associated with hypotension, and both mechanical ventilation ($p = 0.02$) and pulmonary vascular permeability index ($p = 0.04$) at hemodialysis initiation as being associated with preload dependence-related hypotension episodes.

CONCLUSIONS. In the context of our ICU, the majority of first hypotension episodes occurring during hemodialysis is not related to preload dependence, and hence should not lead to fluid removal interruption or intravascular fluid administration. Whether this finding is valid in other settings warrants further investigations.

0178
FILTER LIFE AND ANTICOAGULATION USE IN A MIXED MEDICAL/ SURGICAL/TRAUMA ICU: A BASELINE ASSESSMENT

K. Poply¹, S. Schwartz¹, S. Lucena-Amaro¹, S. Ramsey¹, M. Robinson¹, C.J. Kirwan¹, J.R. Prowle¹

¹Barts Health NHS Trust, Adult Critical Care Unit, London, United Kingdom

INTRODUCTION. Filter lifespan is an important quality indicator in provision of renal replacement therapy (RRT), however many patients may have contraindications to anticoagulation with heparin. Regional citrate anticoagulation can improve filter lifespan, particularly when systemic anticoagulation cannot be used, however citrate metabolism may be impaired in the presence of significant liver dysfunction or severe shock [1].

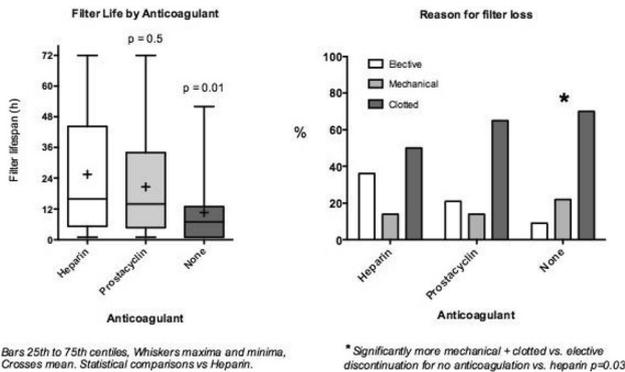
OBJECTIVES. To determine current filter lifespan with anticoagulation methods employed in our ICU and investigate the feasibility of adopting regional citrate anticoagulation in our patients.

METHODS. We audited clinical and haemofiltration data in consecutive patients requiring RRT over 6 weeks in a 44 bed mixed ICU servicing a Level-1 trauma centre. We considered only the first 72 h of filtration to avoid over-representation of stable patients.

RESULTS. 26 patients underwent RRT during the study period. 57 % were men with median age 63 years. Diagnosis was medical in 54 % and surgical or trauma in 46 %. Primary cause of AKI was sepsis in 65 %. Median time on RRT in the first 72 h was 55 h, 73 filters were used during this period. Median effluent flow rate was 39 ml/kg ideal body weight. Anticoagulant was heparin in 36 cases (49 %), prostacyclin in 14 (19 %) and none in 23 (32 %). Filters receiving no anticoagulation had significantly shorter median filter duration that those receiving heparin or prostacyclin (7 h vs 16 h and 14 h, p = 0.01) and significantly more filters were discontinued for non-elective reasons (91 % vs 64 % and 79 %) - Figs 1 and 2, Table 1. Pre-dilution was more frequently employed when no anticoagulation or prostacyclin was used (78 % and 64 % vs. 33 %, p = 0.002). Surgical bleeding risk or coagulopathy were more frequent when no anticoagulation or prostacyclin was chosen, as were signs of liver injury or chronic liver disease - Table 1. No patients had fulminant hepatic failure in the first 72 h of filtration and only 2 of 26 patients received high dose vasopressors for refractory shock (noradrenaline > 0.5 µg/kg/min).

Anticoagulant	Any	Heparin	Prostacyclin	None	p
No. Filters	73	36	14	23	–
Median Duration (h)	12 (4-33)	16 (5-44)	14 (5-34)	7 (1-13)	0.03
Non-Elective discontinuation	75 %	64 %	79 %	91 %	<0.001
Pre-dilution	53 %	33 %	64 %	78 %	0.002
Abnormal Liver enzymes	33 %	6 %	21 %	83 %	<0.001
Chronic Liver Disease	12 %	3 %	29 %	17 %	0.03
Abnormal Coagulation	62 %	31 %	93 %	91 %	<0.001
Platelets < 80	23 %	6 %	14 %	57 %	<0.001
Recent Trauma/ Surgery	40 %	6 %	79 %	70 %	<0.001

[Table 1]



[Figures 1&2]

CONCLUSIONS. Overall filter lifespan was poor, particularly so in the absence of anticoagulation, despite increased use of pre-dilution. Surgical and haematological risks for bleeding were very frequent when heparin was not used. Improving filter lifespan could improve patient care and provide cost savings. Adoption of citrate anticoagulation has the potential to achieve this goal, particularly in patients with a contra-indication to heparin. Major contraindications to citrate (fulminant hepatic failure or refractory shock) were uncommon, however as patients with contra-indication to heparin frequently had enzymatic evidence of liver injury or history of chronic liver disease careful patient evaluation and monitoring for citrate accumulation would be of particular importance in our patient population.

REFERENCE. 1. Oudemans-van Straaten and Ostermann Crit Care. 2012; 16(6): 249.

0179
LOWER MORTALITY IN ICU PATIENTS ON CHRONIC DIALYSIS THAN IN THOSE REQUIRING DIALYSIS FOR ACUTE KIDNEY INJURY

R. Lohse¹, M. Ibsen¹, J. Wiis¹, A. Perner¹, M.B. Damholt²

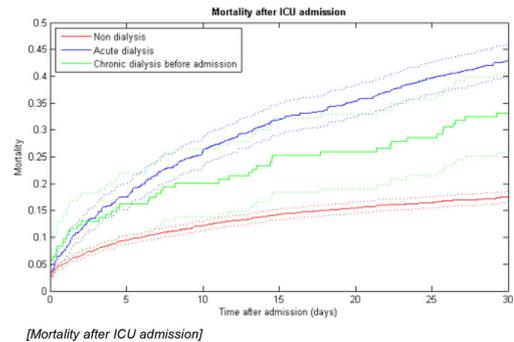
¹Copenhagen University Hospital, Rigshospitalet, Department of Intensive Care 4131, Copenhagen, Denmark, ²Copenhagen University Hospital, Rigshospitalet, Department of Nephrology 2132, Copenhagen, Denmark

INTRODUCTION. The mortality of patients requiring acute renal replacement therapy (RRT) (continuous or intermittent) in the intensive care unit (ICU) is high. In this study we aim to investigate to what extent this may rely upon the lack of renal function. Thus we compared the mortality of ICU patients requiring acute RRT with that of patients who were on chronic dialysis before ICU admission.

METHODS. All adult patients admitted to the multidisciplinary ICU, Rigshospitalet, from Jan 1st 2005 to Dec 31st 2012 were identified through the ICU database, excluding repeat admissions. Chronic dialysis patients were identified from the Danish Society of Nephrology database. Kaplan–Meier plots were calculated for the mortality of the first 30-days after ICU admission.

RESULTS. We included 6076 patients of whom 1030 (17.0 %) received acute RRT and 154 (2.5 %) were on chronic dialysis before admission. The mean age was 61 years (±14) for acute RRT patients vs. 60 years (±15) for chronic dialysis patients (p = 0.576). The mean SAPS II score was 59 (±17) for acute RRT patients vs. 56 (±17) for chronic dialysis patients (p = 0.126). The mean of the highest SOFA score during admission was 14 (±4) for acute RRT patients vs. 12 (±4) for chronic dialysis patients (p < 0.001). Thirty-day mortality (95 % CI) was 42.7 % (39.7 % - 45.7 %) for acute RRT patients and 33.1 % (25.7 % - 40.6 %) for chronic dialysis patients (p = 0.036). For non-dialysis patients 30-day mortality was 17.5 % (16.4 % - 18.5 %).

CONCLUSIONS. Patients with acute RRT in the ICU had a significantly higher mortality compared to patients on chronic dialysis. This may have reflected acute RRT patients being more severely ill, particularly during the course of their ICU stay. It may be speculated that lack of renal function in itself does not explain the high mortality in ICU patients requiring acute RRT.



[Mortality after ICU admission]

0180
THE IMPACT OF CONNECTION TO SUSTAINED LOW EFFICIENCY DIALYSIS (SLED) ON TRANSPULMONARY THERMODILUTION (TPTD) AND PULSE CONTOUR ANALYSIS (PC) IN PATIENTS WITH ACUTE KIDNEY INJURY (AKI)

W. Huber¹, S. Fuchs¹, A. Minning¹, B. Saugel¹, T. Lahmer¹, M. Messer¹, A. Beitz¹, B. Henschel¹, C. Schwerdtfeger¹, S. Rasch¹, C. Schnappauf¹, R.M. Schmid¹

¹Technical University of Munich, Klinikum rechts der Isar, II. Medizinische Klinik, Munich, Germany

INTRODUCTION. AKI is frequent in ICU patients and significantly increases mortality. Several strategies including advanced hemodynamic monitoring and prolonged periods of renal replacement therapy (RRT) have been suggested to limit cardiovascular side effects of RRT which can result from (dis)connection to RRT and from fluid withdrawal. However, particularly for SLED it is not completely understood to which degree changes in TPTD parameters are “real”, or if they result from confounding of the TPTD procedure by SLED (e.g. loss of TPTD indicator (injection of 15 ml iced saline 0.9 %) due to partial removal by SLED).

OBJECTIVES. We prospectively investigated the course of Cardiac index (CI), global end-diastolic volume index GEDVI and extravascular lung water index (EVLWI) before and 5 min after connection (T1 and T2) to SLED as well as before and 5 min after disconnection from SLED (T3; T4; GENIUS, Fresenius, Germany) in 51 SLEDs in 32 patients with AKI and PiCCO-monitoring.

METHODS. To investigate the effect SLED itself on TPTD, TPTD-derived CItD and its changes were compared to PC-derived CIpc and its changes at T1 and T2: Regarding the different techniques to assess CI, determination of CIpc immediately before T2 can be assumed to be independent of indicator loss during TPTD at T2.

Patients were connected to SLED in an iso-volaemic manner (prefilling of the tubing with saline 0.9 %). Disconnection was performed using re-transfusion of the blood within the tubing. Dialysis catheters were inserted to the femoral vein and central venous catheters via the jugular vein, respectively.

Statistics: Spearman correlation; Mann–Whitney-U-test; SPSS 21.
RESULTS. APACHE-II 26 ± 8; blood flow 147 ± 14 ml/min; filtration 229 ± 207 ml/h. Connection to SLED (T2 vs. T1) did not result in significant changes of CItD (4.36 ± 1.55 vs. 4.46 ± 1.48; p = 0.064) and CIpc (4.32 ± 1.47 vs. 4.46 ± 1.48L/min*m²; p = 0.077). Changes in CIpc and in CItD significantly correlated (r = 0.622; p < 0.001) and were not different (p = 0.896). Comparable results for TPTD and PCA suggest that TPTD was not significantly confounded by SLED itself.

Furthermore, GEDVI, EVLWI, MAP, CVP, heart rate (HR) and SVRI did not significantly change before and after connection to SLED (T2 vs. T1).

By contrast, disconnection from SLED and re-infusion of the blood within the tubing and the dialyzer (T4 vs. T3) resulted in significant increases in GEDVI (p < 0.001), CVP (p = 0.012), CItD (4.19 ± 1.41 vs. 3.92 ± 1.32; p < 0.001) and CIpc (4.10 ± 1.47 vs. 3.94 ± 1.32L/min*m²; p = 0.01). SVRI decreased (p = 0.01) whereas EVLWI, heart rate and MAP remained unchanged.

CONCLUSIONS.
 1.) SLED itself does not substantially confound TPTD.
 2.) Initiation of SLED with prefilled tubing does not deteriorate hemodynamics.
 3.) Significant increases in CI, GEDVI and CVP after disconnection of SLED suggests hemodynamic relevance of re-infusion of blood contained within the tubing.

0181
LONG TERM MORTALITY AND RISK OF END-STAGE RENAL DISEASE IN ACUTE RRT PATIENTS COMPARED TO NON-DIALYSIS PATIENTS

R. Lohse¹, M.B. Damholt², J. Wiis¹, A. Perner¹, M. Ibsen¹

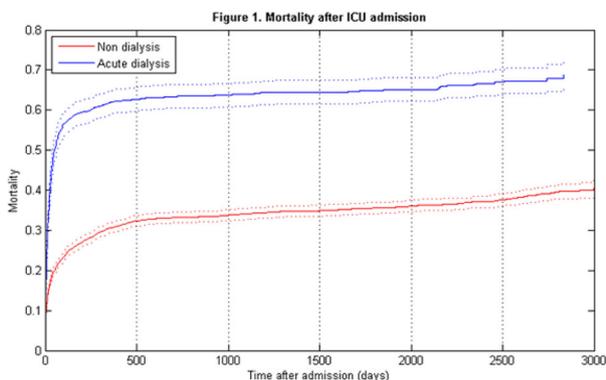
¹Copenhagen University Hospital, Rigshospitalet, Department of Intensive Care 4131, Copenhagen, Denmark, ²Copenhagen University Hospital, Rigshospitalet, Department of Nephrology 2132, Copenhagen, Denmark

INTRODUCTION. In the intensive care unit (ICU), the need for acute renal replacement therapy (RRT) (continuous RRT or intermittent hemodialysis) is associated with higher patient mortality and increased risk of end-stage renal disease (ESRD). There are few large long term single center studies comparing mortality and risk of ESRD between acute RRT patients and non-dialysis patients.

OBJECTIVES. To investigate the long term (up to 7 years) difference in mortality and progression to ESRD in ICU patients requiring acute RRT and non-dialysis ICU patients. **METHODS.** Retrospective analysis of all adult patients admitted to the multidisciplinary ICU, Rigshospitalet, from Jan 1st 2005 to Dec 31st 2012 were identified through the ICU database, excluding repeat admissions and chronic dialysis patients. ESRD was defined as the long term (>90 days) need of dialysis or kidney transplant. Kaplan-Meier plots were calculated for death and ESRD up to 7 years after ICU admission.

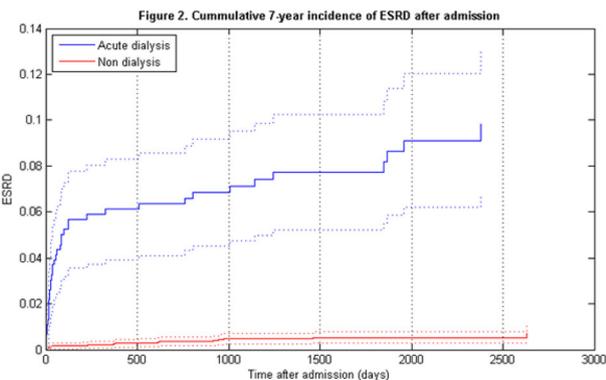
RESULTS. In the study 5922 patients were included. Of these, 1030 (17.4 %) received acute RRT and 4892 (82.6 %) did not receive any dialysis. The number (percentage) of male patients was 688 (66.8 %) for acute RRT patients and 3066 (62.7 %) for non-dialysis patients (p = 0.044). The mean age (SD) was 60.7 years (±14.2) for acute RRT patients and 56.3 years (±17.8) for non-dialysis patients (p < 0.001). The mean SAPS II score was 58.6 (±17.2) for acute RRT patients and 39.2 (±15.2) for non-dialysis patients (p < 0.001). The mean of the highest SOFA score during admission was 14.4 (±3.8) for acute RRT patients and 7.5 (±3.6) for non-dialysis patients (p < 0.001). The 30-day mortality (95 % CI) was 42.7 % (39.7 % - 45.7 %) for acute RRT patients and 17.5 % (16.4 % - 18.5 %) for non-dialysis patients (p < 0.001). The 90-day mortality was 55.4 % (52.4 % - 58.5 %) for acute RRT patients and 22.7 % (21.5 % - 23.9 %) for non-dialysis patients (p < 0.001). The 1-year mortality was 62.0 % (59.0 % - 65.0 %) for acute RRT patients and 30.6 % (29.3 % - 31.9 %) for non-dialysis patients (p < 0.001). The 7-year Kaplan-Meier plot appears in figure 1. The 6.5 year risk of ESRD for patients surviving 90 days after admission was 0.53 % (0.27 % - 0.78 %) for non-dialysis patients and 9.82 % (6.61 % - 13.03 %) for acute dialysis patients (p < 0.001).

CONCLUSIONS. Patients requiring acute RRT in the ICU had a significantly higher mortality and a significantly higher risk of ESRD compared to non-dialysis patients. Acute RRT patients were older, more often male and more severely ill at admission and during the course of their ICU stay.



No. at risk					
Non dialysis	3309	3240	3185	3127	3050
Acute dialysis	385	374	366	259	340

[Figure 1.]



No. at risk					
Non dialysis	3772	3764	3762	3762	3762
Acute dialysis	431	428	424	417	414

[Figure 2.]

0182
COMPARISON OF RENAL REPLACEMENT THERAPIES IN AN INTENSIVE CARE UNIT. AN INDIAN PROSPECTIVE OBSERVATIONAL STUDY

M. Shan¹, S. Jakkinaaboina¹, T. Satish², S. Mudigonda³, T. Mohan Shankarji Maharaj²

¹Apollo Health City, Critical Care Medicine, Hyderabad, India, ²Apollo Hospitals, Critical Care Medicine, Secunderabad, India, ³Apollo Health City, Nephrology and Transplantation, Hyderabad, India

INTRODUCTION. Acute Kidney Injury (AKI) is an independent predictor of mortality and associated with End Stage Renal Disease. Evidence suggests no survival benefit with different modalities of Renal Replacement therapies (RRT).

OBJECTIVES. To Evaluate the Renal Replacement therapies and outcomes in the Intensive care unit (ICU).

METHODS. A Prospective observational study done for a period of 6 months from October 2013 to March 2014 at 6 Intensive care units associated with Apollo Health City. Data was collected after ethics committee approval. All patients admitted to the ICU with AKI requiring RRT were eligible to enrol. Exclusion Criteria were post cardiac arrest, age <18 years, chronic kidney disease and DNR status. The Primary end point is In-hospital mortality. The following were the parameters monitored Age, Sex, mode of RRT, indication of RRT, Comorbidities, source of sepsis, vasopressors, cumulative balance, ICU and hospital length of stay, mechanical ventilation duration, APACHE II and SOFA score at admission.

RESULTS. The total number of patients were 75 which were grouped into Intermittent hemodialysis 14 patients (IHD), Sustained low efficiency dialysis 34 patients (SLED), Continuous renal replacement therapy 27 patients (CRRT) and total group 75 patients (IHD + SLED + CRRT). The baseline characters comparison shown in the table no 1. In baseline characters the Serum lactate at RRT, APACHE II at Admission, SOFA at admission, total cumulative balance at ICU discharge were statistically significant. Within the 4 groups the pH at dialysis, HCO₃ at RRT, type of cases (medical and surgical) were statistically not significant. The in-hospital mortality in IHD, SLED, CRRT and total groups were 0, 52.94, 37.03 and 37.33 % respectively. The Primary outcomes In-hospital mortality is increased by increased age, increased ICU and hospital length of stay, Comorbidities more than 2, increased mechanical ventilation duration, vasopressors >1, APACHE II at Admission, APACHE II at RRT, Blood urea and serum creatinine at RRT. The Clinical Outcomes of the study patients were shown in table 2. Factors influencing the In-hospital mortality is shown in table 3. In-hospital and 30 day mortality in the SLED group is more than the IHD and CRRT, possibly because of less patients in the CRRT group. The Mechanical ventilator days, ICU and hospital length of stay is more in the SLED group compared with IHD and CRRT group. The ICU free days is more in CRRT group than SLED and IHD group. The Kaplan-meier survival graph is attached.

	Total Group	IHD	SLED	CRRT	p Value
Number of Patients n (%)	75 (100)	14 (18.66)	34 (45.33)	27 (36)	<0.05
Age in years	55.5	57.7	61.7	45.7	0.001
Sepsis n (%)	62 (82.66)	13 (92.8)	31 (91.2)	17 (62.96)	0.001
APACHE II at Renal replacement therapy (RRT)	19.65	15	18	24	0.001
SOFA at RRT	9.9	9	9	11.5	0.02
Serum Bicarbonate at RRT(mmol/dl)	13.5	12.7	13.9	13.5	0.8
Blood Urea at RRT(mg/dl)	130	186	127	105	0.001
Serum Creatinine at RRT (mg/dl)	4.1	5.7	4	3.6	0.001
Cumulative Balance (ml)at RRT	3430	725	3414	4851	0.001

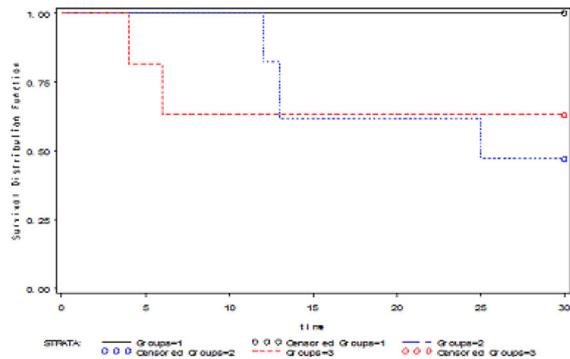
[Baseline characteristics of the patients]

	Total Group	IHD	SLED	CRRT	p Value
In-hospital mortality n (%)	28(37.33)	0(0)	18(52.94)	10(37.03)	0.01
28 day mortality n(%)	28(37.33)	0(0)	18(52.94)	10(37.03)	0.01
ICU length of stay (days)	11.7	4.6	17	8.7	0.002
Hospital length of stay (days)	19	9.5	22.5	19.8	0.17
Mechanical Ventilation (days)	10.6	4	13.2	7.7	0.001

[Clinical Outcomes of the study patients.]

Variable	p Value	Odds Ratio	95 % CI
Age > 56 years	0.01	1.01	0.98 - 1.05
ICU length of stay > 11 days	0.02	0.978	0.93 - 1.02
Hospital Length of stay > 19 days	0.02	0.95	0.91-0.99
Co-morbidities > 2	0.01	1.36	1.06 - 1.74
Mechanical ventilation duration > 10 days	0.02	0.97	0.92 - 1.02
Vasopressors > 1	0.007	2.58	1.4 - 4.47
SOFA > 10 at RRT	0.07	1.21	1 - 1.4
Blood urea > 130 mg/dl at RRT	0.05	0.99	0.9 - 1
Serum Creatinine < 4 mg/dl at RRT	0.004	0.46	0.3 - 0.7

[Factors influencing the In-hospital mortality]



[Kaplan-Meier survival estimates for the RRT group]

CONCLUSIONS. The In-hospital mortality is increased by increased age, increased ICU and hospital length of stay, Comorbidities more than 2, increased mechanical ventilation duration, vasopressors >1. The mortality in the CRRT group is less than SLED group. Further study is required with more number and randomisation of patients.

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0183

EVALUATING COAGULATION USING ROTATION THROMBOELASTOMETRY (ROTEM) DURING CONTINUOUS RENAL REPLACEMENT THERAPY

T. Tsubo¹, E. Hashiba², H. Okawa², K. Hirota²

¹University of Hirosaki, School of Medicine, Intensive Care Unit, Department of Anesthesiology, Hirosaki, Japan, ²Hirosaki University Hospital, Intensive Care Unit, Hirosaki, Japan

INTRODUCTION. During continuous renal replacement therapy (CRRT), coagulation is affected by anti-coagulant administration and systemic abnormalities. Activated partial thromboplastin time (aPTT) and activated coagulation time (ACT) have been used to monitor coagulation during CRRT, however, they have limitations.

OBJECTIVES. The present study determined the association between the standard laboratory test and rotation thromboelastometry (ROTEM) in patients undergoing CRRT. Additionally, we determined which ROTEM can potentially replace aPTT and ACT during CRRT.

METHODS. Fifty blood samples in 40 patients who underwent CRRT were evaluated. Continuous hemodiafiltration was performed at a 500 ml/h dialysate flow and filtrate flow. The anticoagulant nafamostat mesilate was administered at 30 mg/h. Polysulfone and polymethyl methacrylate 1.0 m² membranes formed the filter. ROTEM parameters including clotting time (CT), clot formation time (CFT), maximum clot firmness (MCF), and the α -angle of EXTEM, INTEM, and FIBTEM were compared with the ACT, aPTT, PT, platelet count, and fibrinogen concentration. Non-parametric Spearman rank correlation and multiple linear regression were performed.

A P-value < 0.003 was considered significant.

RESULTS. The correlation coefficient in ACT and aPTT, and the CT of INTEM was $r = 0.66$ ($P < 0.001$) and $r = 0.71$ ($P < 0.001$), respectively. The ACT and aPTT were greater than 100 s and 40 s in CRRT patients, but CT of INTEM remained normal in most patients. The correlation coefficients for PT and CT of EXTEM, fibrinogen concentration and MCF of FIBTEM, and platelet concentration and MCF of INTEM were $r = 0.71$ ($P < 0.001$), $r = 0.86$ ($P < 0.001$), and $r = 0.64$ ($P < 0.01$), respectively. The α -angle was normal even in patients with frequent thrombosis in the circuit.

CONCLUSION. These results confirm that CT of INTEM and EXTEM, as well as MCF of INTEM and FIBTEM correlated well to the aPTT, PT, platelet count, and fibrinogen concentration. Theusinger et al.¹ similarly reported an association between standard laboratory tests and ROTEM parameters in patients hemorrhaging intraoperatively. The aPTT is a plasma based parameter and does not fully reflect whole blood coagulation, while ACT is affected by hemodilution and hypothermia. Unfortunately, the CT of INTEM did not detect the anti-coagulant effect of nafamostat mesilate during CRRT. Nafamostat mesilate is a serine protease inhibitor and used to treat pancreatitis, disseminated intravascular coagulopathy, and as an anti-coagulant during CRRT. Zhang et al.² reported that the serum pH and ionized calcium concentrations were associated with circuit lifespan. In patients with a short circuit lifespan, we did not observe any hypercoagulation as detected by the α -angle.

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0184

LONG-TERM OUTCOME IN SEPTIC SHOCK RELATED ACUTE KIDNEY INJURY REQUIRING CONTINUOUS RENAL REPLACEMENT THERAPIES (CRRT)

G. Moreno-Gonzalez¹, J. Sabater-Riera¹, P. Cardenas Campos¹, J. Ballus Noguera¹, V. Corral Velez¹, J.M. Vazquez Reyeron¹, V. Gumucio¹, N. Betancur Zambrano¹, J.P. Pinseau¹, X.L. Perez Fernandez¹

¹Hospital Universitari de Bellvitge, Critical Care, Barcelona, Spain

INTRODUCTION. Factors related to long-term renal recovery or progression to chronic kidney disease (CKD) and dependence of long-term renal replacement therapies (LTRRT), as well as long-term mortality related factors after an episode of septic AKI that requires CRRT are not well established.

OBJECTIVE. To know the long-term outcome (mortality, dependence of LTRRT and renal function) at 5 years follow-up after CRRT in septic shock patients with AKI.

METHODOLOGY. We performed from 2006 to 2009 a prospective observational study in 139 septic shock adult patients that survived to an AKI episode requiring CRRT in an ICU of a tertiary hospital. Patients with severe CKD (CKD4-5), those who received RRT previous to ICU or RRT for less than 24 h were all excluded. Demographic, clinical and laboratory data were recorded at CRRT initiation. Mortality, renal function and dependence of LTRRT were evaluated at hospital discharge, after 6 months, 2 and 5 years from CRRT initiation. To analyze 5-year mortality predictors after CRRT, we performed a Cox

regression model. To analyze both factors related to renal function at hospital discharge and prognostic factors for LTRRT dependence we performed multivariate binary regression models. $P < 0.05$ was considered statistically significant.

RESULTS. Mean age was 58 ± 15 years, with mean SOFA score and APACHE II score at ICU admission 11 ± 4 and 22 ± 8 , respectively. Global in-hospital mortality was 65.8%. Mortality at 5-years is 74.2% (24.5% among hospital discharge survivors). Statistically significant identified mortality factors at 5-years after CRRT were age (HR 1.096), prescribed renal dose (HR 1.076), female gender (HR 1.130), diabetes mellitus (HR 34.8) and heart failure (HR 1.73). Accumulate dependence for LTRRT was 9.4% among hospital discharge survivors. LTRRT dependence among 5 years follow up survivors was 6.7%. Levels of creatinine (Cr) were: baseline 128 ± 123 $\mu\text{mol/L}$; 239 ± 220 $\mu\text{mol/L}$ at hospital admission; 356 ± 196 $\mu\text{mol/L}$ at CRRT initiation; 109 ± 87 $\mu\text{mol/L}$ at hospital discharge; 131 ± 112 $\mu\text{mol/L}$ at 6 months; 142 ± 168 $\mu\text{mol/L}$ at 2 years, and 134 ± 110 $\mu\text{mol/L}$ 5 years after CRRT. Baseline Cr and hospital days (OR 1.023 and 1.024) are independent prognostic factors for LTRRT dependence. Male gender seems to prevent severe CKD at hospital discharge (OR 0.79).

CONCLUSIONS. Septic shock related AKI that requires CRRT has a high mortality (5 year mortality 74.2%, and 24.5% among hospital discharge survivors). An increased age, a higher prescribed renal dose, female gender, and presence of diabetes mellitus or heart failure are mortality predictors at 5 years follow-up. Accumulate dependence for LTRRT is 9.4% and 6.7% among 5 year survivors. Only baseline Cr and hospital days seem to be associated with LTRRT dependence. Male gender prevents severe CKD at hospital discharge.

0185

TIMING OF RENAL REPLACEMENT THERAPY IN CRITICALLY ILL PATIENTS WITH ACUTE KIDNEY INJURY

R. Avila¹, N. Carrizo¹, C. Zuchella¹, P. Cursio¹, I. Ponzó¹, A. Fernandez¹

¹Hospital Cullen, Santa Fe, Argentina

INTRODUCTION. The decision of starting Renal Replacement therapy (RRT) and the optimal time of initiation are issues without resolution when agreeing on a dialysis procedure. In the absence of traditional indications there is no consensus on when dialysis should be offered and started. The lack of parameters to guide the decision has resulted in considerable variation among physicians and centers.

OBJECTIVE. The aim of this study is to evaluate the relationship between timing of RRT in severe acute kidney injury and clinical outcomes.

METHODS. We retrospectively reviewed the records of 3636 patients admitted to intensive care unit during a period of 6 years, searching for patients who developed AKI and needed renal replacement therapy.

Timing of RRT was stratified into "early" and "late" by median urea and creatinine at the time RRT was started. Timing was also categorized temporally from ICU admission into early (≤ 3 days), and late (> 3 days).

RESULTS. We found 153 patients who underwent RRT.

Timing by serum urea, early RRT showed no significant difference in crude (77% for urea ≥ 1.51 g/L vs 68% for urea < 1.51 g/L; odds ratio [OR], 1.66; 95% confidence interval [CI], 0.81-3.42; $P = 0.16$) or covariate-adjusted mortality (OR, 1.24; 95% CI, 0.56-2.75; $P = 0.59$). When stratified by creatinine, no significant difference in crude (71% for creatinine ≥ 4.03 mg/dl vs 74% for creatinine < 4.03 mg/dl; OR, 0.86; 95% CI, 0.42-1.75; $P = 0.68$) and covariate-adjusted mortality (OR, 0.84; 95% CI, 0.37-1.87; $P = 0.67$).

However, for timing relative to ICU admission, late RRT was associated with greater crude (81% vs 64%, OR, 2.35 95% CI, 1.12-4.94 $P = 0.02$) and covariate-adjusted mortality (OR, 2.57; 95% CI, 1.12-5.90; $P = 0.02$).

CONCLUSIONS. We concluded that late initiation of RRT (days from admission) was generally associated with a higher mortality rate and a longer stay in intensive care unit.

The decision to start RRT should be based on trend in the patient's severity of illness, presence of oliguria and fluid overload and associated non-renal organ failure.

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0186

TIMING OF CONTINUOUS RENAL REPLACEMENT THERAPIES IN ACUTE KIDNEY INJURY AFTER CARDIAC SURGERY

C. Hernandez-Caballero¹, A.I. Hurtado-Doce¹, T.C. Barnes¹, D. Hall¹

¹Royal Brompton and Harefield Hospital NHS Foundation Trust, London, United Kingdom

INTRODUCTION. Postoperative kidney function deterioration has been shown to be an important predictor of morbidity and mortality after cardiac surgery. In previous studies, early initiation of haemofiltration (< 3 days post cardiac surgery) has been shown to reduce mortality and hospital length of stay.

OBJECTIVES. To determine whether early vs. late start of continuous renal replacement therapies (CRRT) results in improved clinical outcomes (e.g. length of stay in ITU, and mortality) of patients with cardiac surgery-associated acute kidney injury.

METHODS. Retrospective observational study including every patient admitted to Harefield Hospital Intensive Therapy Unit (ITU) after elective or emergency cardiac surgery during 2013, excluding heart transplants and patients requiring mechanical circulatory support (other than intra-aortic balloon pump). The cohort was divided into 3 groups based on the AKI staging (AKIN classification) at the time of initiation of CRRT.

RESULTS. Of the 512 patients admitted to Harefield Hospital ITU after cardiac surgery, 60 required CRRT (11.7%) during their admission to ITU. The mean time from surgery to initiation of CRRT was 40 h (median of 28 h). The group that received CRRT was divided into early CRRT (< 12 h since surgery) and late CRRT (after 12 h). 24 patients were in the early group and 46 in the late group. The mortality in the early CRRT group was 29.16% (7 patients) and in the group with late CRRT was 26.16% (12 patients). 12 patients (20%) were initiated on CRRT while in stage 1 of the AKIN classification, 10 patients (16.6%) were in stage 2, and 38 patients (63.3%) were in stage 3. The mean length of ITU stay for each of these groups was 8.6 days, 6.2 days and 14 days respectively. Of the 512 patients the mean length of stay was 2.7 days. Only 7 patients had an ongoing CRRT requirement after discharge from ITU. ITU mortality was 31.6% (19 patients) in the CRRT group. The general mortality was 4.5% (23 patients).

CONCLUSIONS. AKI is a common and serious postoperative complication of cardiac surgery. Most of the patients were initiated on CRRT after 12 h of surgery. There is a significant increase in mortality in the CRRT group, but there are no significant differences in mortality between early and late initiation of CRRT. Additionally, patients that require CRRT have a prolonged length of stay in ITU. These results are consistent with previous reviews and the optimum time to commence RRT in our patients remains unclear.

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0187

LONGER CIRCUIT LIFESPAN ON PEDIATRIC CONTINUOUS RENAL REPLACEMENT THERAPY IN HIGH RISK BLEEDING PATIENTS, ONLY CITRATE?

S. González¹, Y. Peña-López¹, L. Gil¹, L. Seidler¹, J. Izquierdo¹, M. Pujol¹, J. Balcells¹

¹University Hospital Vall d'Hebron, Pediatric Critical Care Unit, Barcelona, Spain

INTRODUCTION. The use of regional citrate anticoagulation (RCA) is increasingly used for continuous renal replacement therapy (CRRT) because it provides filter patency with minimal risk of bleeding. However, in the setting of significant hepatic compromise, RCA may not be safe, due to the risk of citrate accumulation and toxicity. We propose an alternative protocol for these and other high risk bleeding patients.

OBJECTIVE. To evaluate circuit lifespan (CL) after the implementation of a new high-blood flow (HBF) protocol for use with PrismaFlex CRRT in critically ill children with acute kidney injury at high risk of bleeding and/or hepatic dysfunction.

METHODS. A prospective observational evaluation study from January 1st, 2013 until April 11th, 2014 in a 16-bed mixed pediatric intensive care unit. We designed a new CRRT protocol based on data from the literature and our own clinical experience. It consists of: the use of larger catheter size and filter size. HBF based on filter's size and not on the patient's weight, filtration fraction <12% and continuous post-filter replacement fluid to avoid blood-air contact in the drip chamber. Heparin was not routinely prescribed on the circuit and if it was, we used low-doses to maintain patient's aPTT <40 s. We excluded patients undergoing CRRT while on other extracorporeal techniques and one patient with multiple thrombosis and sub-optimal vascular access.

RESULTS. 13 patients receiving CRRT were included (n = 109 filters and 5,944 h of therapy). Heparin was used in 48 filters (44%). Circuit clotting occurred in 39.5% of all filters. The overall mean \pm SD CL was 54.5 h (h) \pm 46.5 (median 44 h, range 4-232), and the overall filter survival at 48 h and 72 h was 45.9% and 26.6% respectively. When the new protocol was strictly followed (n = 78, 71.6%), the mean CL was longer (63.8 hours 31.3 h; p = 0.001) with 56.4% versus 19.3% filter survival at 48 h (p = 0.001) and 33.3% versus 9.7% filter survival at 72 h (p = 0.008). No significant differences in CL were found according to the use of low-doses of heparin (mean 57.4 versus 52.3 h; p = 0.574) with 52% versus 40.9% filter survival at 48 h (p = 0.168) and 25% versus 27.8% filter survival at 72 h (p = 0.455).

CONCLUSIONS. Our high-blood flow protocol for PrismaFlex CRRT is a feasible and a safer alternative to citrate for children at high bleeding risk and/or hepatic dysfunction; it provides an acceptable CL, independently of the use of low-dose of heparin.

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0188

MYOGLOBIN REMOVAL RATE OF SUPER HIGH FLUX MEMBRANE (EMIC2) IN PATIENTS IN ICU. A CASE SERIES

M. Migliari¹, P. Fabbrini^{2,3}, R. Rona⁴, M.R. Viganò^{2,3}, A. Stella^{2,3}, A. Pesenti^{1,3,4}

¹San Gerardo Hospital, Terapia Intensiva Cardiocirurgica, Monza, Italy, ²San Gerardo Hospital, Clinica Nefrologica, Monza, Italy, ³University of Milan Bicocca, Department of Health Science, Milan, Italy, ⁴San Gerardo Hospital, Terapia Intensiva Generale, Monza, Italy

INTRODUCTION. Rhabdomyolysis is a disease often complicated by acute kidney injury related to intra-tubular myoglobin (Mb) deposition. Renal complication influence negatively both ICU in-stay and overall patients survival. Therefore renal protection or fast renal recovery is advisable. Beside classic infusion protocols there is an hypothetical role for mechanical removal of circulating excess of Mb. Due to Mb molecular weight (17 kDa), intermittent or high volume CVVHF cannot achieve the sufficient removal rate, but new more permeable membranes with cut-off value above 30 kDa seems to be promising for this purpose.

OBJECTIVES. Aim of our study was then to measure efficacy in Mb removal of a new high cut off membrane (EMIC2- Fresenius, cut off 40 kDa) for continuous renal replacement therapies (CRRT) in the ICU setting.

METHODS. Eleven patients affected by rhabdomyolysis were treated with EMIC2 in CVVHD in 4% trisodium citrate anticoagulation regimen. Five out of eleven patients had classic indications for hemodialysis according to RIFLE criteria (Failure (F), Loss of Function (L), ESRD (E)) while the remaining were precociously treated in state Risk (R) or Injury (I). The CVVHD were delivered with blood and dialysate flow of 100 - 150 ml/min and 2L/h respectively. Plasma Mb levels were measured each 12 h and removal rates were estimated by kinetic modeling (1) and measured dialyzer clearances. Clinical data regarding renal and overall survival were also collected.

RESULTS. Mean pre-treatment Mb was 23676.5 (4679 - 42911 ng/mL). Treatments lasted on average 52.1 h (14 - 72 h) with a reduction rate of 77% (44% - 94%). The main reduction rate was achieved in the first 24 h with an average of 43.8% (17.4% - 80.5%). Four out of five patients with renal failure at presentation recovered normal kidney function, the same was registered for three out of the six patients treated in the risk/injury state. Four patients died therefore no renal outcome was registered.

CONCLUSIONS. These are preliminary data indicating a very good performance of a new high permeable membrane in Mb removal. The results seems to be promising in term of overall removal, especially within the first 24 h of treatment. Larger clinical trials are advocated to see any potential clinical effect of Mb removal and to clarify timing of intervention.

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0189

EFFECTS OF DIFFERENT DOSES IN CONTINUOUS VENO-VENOUS HEMOFILTRATION ON PLASMA LACTATE IN CRITICALLY ILL PATIENTS

L. Yong-Jun¹, O. Bin², C. Juan², M. Jie², H. Shun-Wei², G. Xiang-Dong²

¹The First Affiliated Hospital of Sun Yat-sen University, Department of SICU, Guangzhou, China, ²The First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China

INTRODUCTION. Many studies have shown that CRRT could clean lactate and treat the hyper-lactatemia. On the contrary, some other studies found that filter lactate clearance only accounted for a very small part of total lactate clearance and the hemofilter's contribution to the overall lactate clearance was negligible. The objective of this study was to evaluate the effects of various doses of continuous veno-venous hemofiltration (CVVH) on plasma lactate elimination in critically ill patients.

OBJECTIVES. To evaluate the effects of different doses in continuous veno-venous hemofiltration on plasma lactate elimination in critically ill patients.

METHODS. Patients were divided into three groups according to their incipient plasma lactate concentration. Group A: lactate \leq 2 mmol/L, Group B: lactate 2-5 mmol/L, Group C: lactate \geq 5 mmol/L. Three different doses (20 ml/kg/h, 35 ml/kg/h and 45 ml/kg/h) of Continuous Veno-Venous Hemofiltration (CVVH) were applied to critically ill patients who experiencing CVVH. The concentrations of plasma lactate in pre-(A), post-dialyzer (V) sites and ultrafiltrate were measured after each dosage of CVVH was carried out for 30 min. Rate of lactate clearance by the filter (RLC) and filter lactate clearance (FLC) and Lactate-Sieving Coefficient (LSC) were calculated under different circumstances, including different doses of CVVH and different incipient lactate levels.

RESULTS. 15 patients were enrolled and 104 blood samples were drawn and lactate concentrations were measured in this study. RLC was found increased (9.36 ± 9.73 , 13.92 ± 12.56 and 16.52 ± 12.71 mmol/h, $p < 0.05$ respectively) with the dose of CVVH increased. RLC was also increased (3.46 ± 1.46 , 10.38 ± 5.50 and 24.53 ± 14.69 mmol/h, $p < 0.05$ respectively) with the incipient lactate increased. FLC was increased (1.95 ± 0.63 , 2.95 ± 0.74 and 3.45 ± 0.54 l/h, $p < 0.05$ respectively) with the dose of CVVH increased. There was no significant difference of LSC in different doses of CVVH and different incipient lactate levels.

CONCLUSIONS. Plasma lactate can be eliminated by CVVH and different doses of CVVH affect the rate of lactate clearance in critically ill patients.

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0190

POSITIVE EFFECT OF DEXMEDETOMIDINE ON HEMODYNAMICS DURING MAJOR BURN SURGERY UNDER GENERAL ANESTHESIA

T. Lim¹, M.-G. Son¹, Y.-K. Lee², I.-S. Kwak², W. Chun³, K.-M. Kim²

¹Hallym University Dongtan Sacred Heart Hospital, Department of Anesthesiology and Pain Medicine, Hwaseong-si, Korea, Republic of, ²Hallym University Hangang Sacred Heart Hospital, Department of Anesthesiology and Pain Medicine, Seoul, Korea, Republic of, ³Hallym University Hangang Sacred Heart Hospital, Department of Burn Surgery, Seoul, Republic of Korea

INTRODUCTION. Major burn injuries show unstable hemodynamic parameters including tachycardia during surgery under general anesthesia and practitioners have difficulties in maintaining hemodynamic stability, regardless of medications. Although dexmedetomidine can lead to hypotension or bradycardia [1] as an adverse effect and practitioners might hesitate to use it during surgery associated with hemodynamic instability, meticulous use of dexmedetomidine can be considered to attenuate hemodynamic instabilities during major burn surgery under general anesthesia.

OBJECTIVES. The aim of this study is to evaluate the effect of dexmedetomidine on hemodynamic parameters during major burn surgery under general anesthesia.

METHODS. Forty-six ASA class II and III patients scheduled for major burn surgery (escharotomy and skin graft surgery with first or second-degree burn covering $\geq 25\%$ of body surface area and third-degree burn covering $\geq 10\%$ of body surface area) were enrolled. Patients were randomly assigned to group D (Initiation of dexmedetomidine infusion of 0.4 mcg/kg/h just after catheterization, n = 23) or group C (without dexmedetomidine infusion, n = 23). After induction of general anesthesia, intra-arterial catheter and central venous catheter were placed. When heart rate was ≥ 100 beats/min and systolic blood pressure ≥ 100 mmHg after completion of catheterization, the experiment was initiated. Heart rate, systolic, diastolic, and mean blood pressure, and central venous pressure were collected at 15-min intervals for 2 h from the initiation of the experiment. When systolic blood pressure < 90 mmHg occurred, phenylephrine 1 mcg/kg was intravenously administered and the number of phenylephrine administration was recorded. Independent t-test was performed to compare %measures relative to baseline measures (measures at the initiation of the experiment) at each interval between the two groups.

RESULTS. Heart rate was significantly lower in group D at 15, 30, 45, and 60 min ($p = 0.010$, 0.011 , 0.006 , and 0.003 , respectively). Systolic, diastolic, and mean blood pressure showed significant changes at 60 min between the two groups ($p = 0.031$, 0.008 , and 0.004 , respectively). Central venous pressure did not show a significant change between the two groups. There is no phenylephrine administration in both groups. Two cases of serious sinus bradycardia and one case of refractory hypotension occurred in group D and the patients were excluded from the experiment.

CONCLUSIONS. Dexmedetomidine might be expected to become an alternative for heart rate control during major burn surgery, without significant hemodynamic changes.

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0191

COMPARISON THE HAEMODYNAMICS EFFECTS OF DEXMEDETOMIDINE AND PROPOFOL IN PATIENTS AFTER MAJOR ABDOMINAL SURGERY

M. Chen¹, Z. Lin¹, Z. Jiang¹, J. Chen¹, X. Guan¹, B. Ouyang¹¹Sun Yat-Sen University, Surgical Intensive Care Unit (SICU), Guangzhou, China

BACKGROUND. The alpha2 agonist dexmedetomidine (DEX) is a new sedative agent. Patients sedated with DEX could be easily roused to facilitate the co-ordination with doctors and nurses, and to assess the patients' function of tissue and organs. But some studies had showed some adverse effects of DEX on haemodynamics. Now the effects and mechanisms on hemodynamics of DEX in patients after major abdominal surgery is still unclear.

OBJECTIVES. To compare the haemodynamics effects of DEX with propofol in patients after major abdominal surgery, Expect to further research the mechanism of haemodynamics and Explore the security and safety of DEX.

METHODS. 74 patients enrolled were randomly divided into DEX group (group D) or Propofol group (group P), 37 cases in each group. Depth of sedation was monitored using the bispectral index (BIS) and Ramsay sedation score (RSS), haemodynamics data were recorded through "Vigileo" and cardiogram monitor. When the patients could be roused, a loading dose of fentanyl was injected at 0.0007 mg/kg, followed by continuous infusion at 0.3 µg/kg/h. Group D received 1 µg/kg loading dose followed by continuous infusion of 0.3 µg/kg/h. Group P received 0.5 mg/kg loading dose followed by continuous infusion at 0.5 mg/kg/h. Then adjusted the dose to maintain the BIS 70-80. The BIS and Hemodynamic parameters such as heart rate(HR), blood pressure(BP), central venous pressure(CVP), stroke volume (SV), cardiac output index (CI), systemic vascular resistance index (SVRI) were recorded at 0 min, 5 min, 10 min, 30 min, 1 h, 2 h, 4 h, 6 h.

RESULTS. There weren't differences between group D and group P in BIS during sedation (61.23 ± 12.73 vs 62.55 ± 13.67 , $P = 0.127$), but the RSS values was higher in group D than group P (4.5 ± 0.8 vs 4.2 ± 0.8 , $P < 0.001$); HR was significantly lower in group D [$P = 0.006$], but we didn't give any intervention to bradycardia. SBP, DBP, SV, SVRI elevated briefly in group D during the loading period, but these indicators decreased quickly at the end of the loading time. SV were significant differences between the two groups ($P = 0.009$), but SBP, DBP, and SVRI didn't show significant difference ($P = 0.165, 0.067, 0.614$). CI were declined in both groups, and didn't have difference between these two groups ($P = 0.545$). 6-hour lactate clearance rate in group D was more quickly than group P ($50.9 \pm 22.2\%$ VS $18.6 \pm 36.0\%$ $P = 0.005$). No adverse events related to the sedative in either group.

CONCLUSIONS. Dexmedetomidine is a safe, effective sedative drugs but it can cause complex impact on hemodynamic of the patients after major abdominal surgery, especially during the loading time. So monitoring the hemodynamic changes carefully during sedation are required.

0192

THE USEFULNESS OF THE LIMON METHOD OF INDOCYANINE GREEN ELIMINATION MEASUREMENT DURING PERIOPERATIVE PERIOD FOR PREDICTION AND EARLY DETECTION OF LIVER FAILURE

V. Baladrón¹, F.J. Redondo², D. Padilla³, P. Villarejo³, R. Villazala², N. Bejarano⁴¹Hospital Santa Barbara, Anesthesiology and Critical Care Medicine, Puertollano, Spain,²Hospital General Universitario de Ciudad Real, Anesthesiology and Critical Care Medicine, Ciudad Real, Spain, ³Hospital General Universitario de Ciudad Real, General Surgery, Hepatobiliary Unit, Ciudad Real, Spain, ⁴Hospital General Universitario de Ciudad Real, Pediatrics, Ciudad Real, Spain

INTRODUCTION. A non-invasive liver function monitoring system, the LIMON[®], has been developed to measure indocyanine green (ICG) elimination by pulse spectrophotometry. The aim is to assess the relationship between pre and post-operative ICG plasma disappearance rate (ICG PDR %/min) values and the onset of post-hepatectomy liver dysfunction. Postoperative liver failure after hepatectomy has been identified by the association of prothrombin time <50 µ and serum bilirubin >50 µmol/L (the "50-50" criteria).

METHODS. 23 patients scheduled for major liver resections were selected. Nine had chronic liver disease. ICG PDR was measured preoperatively and 24 h postoperative. The prothrombin time and serum bilirubin was determined on day 3 and day 5 in critical care unit after hepatectomy.

RESULTS. We submit the values obtained for the variables of the ICG PDR pre and post operative to an analysis of ROC curves, we found a very good predictive capacity for both variables showing an area under the curve of 0.72 (p.16) and 1 (p.002), respectively for determined early diagnosis of postoperative liver failure. Bilirubin and prothrombin time show an area under the curve of 0.99 (p.001) and 1 (p.001). Significant correlation was found between ICG PDR measurement taken on postoperative day 1 and bilirubin level on day 5 ($p < 0.001$) and prothrombin time on day 5 (p.006).

CONCLUSIONS. LIMON ICG PDR measured by pulse spectrophotometry is a quick, non-invasive and reliable liver function test in patients undergoing liver resection that aids in the prediction and early detection of post-hepatectomy liver dysfunction.

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0193

CENTRAL VENOUS OXYGEN SATURATION IN PATIENTS UNDERGOING MAJOR SURGERY WITH TOTAL INTRAVENOUS ANESTHESIA

F.I.R.M. da Fonseca¹, A.H. Rezende¹, L.F. Falcão¹, T.D. Corrêa², J.L.G. do Amaral¹, M.S.C. Assunção²¹Escola Paulista de Medicina (UNIFESP), Department of anesthesiology, pain and critical care, São Paulo, Brazil, ²Hospital Israelita Albert Einstein, Intensive Care Unit, São Paulo, Brazil

INTRODUCTION. Central venous oxygen saturation (ScvO₂) can be used as a therapeutic guide to improve tissue perfusion and outcomes in critically ill patients (1,2). ScvO₂ levels higher than 70 % during general anesthesia have been associated with fewer perioperative complications and, therefore, could be used as a target during hemodynamic optimization.

OBJECTIVES. To evaluate the ScvO₂ in high-risk surgical patients submitted to general anesthesia without a hemodynamic optimization protocol.

METHODS. Prospective observational study. Twenty adult patients were submitted to a high-risk surgical procedure after an ultrasound-guided central venous catheterization and arterial line insertion. General anesthesia was induced with fentanyl, propofol and atracurium and was maintained with propofol and remifentanyl. Central venous oxygen saturation, mean arterial blood pressure (MAP), central venous pressure (CVP), cardiac index (CI), stroke volume variation (SVV), arterial lactate and hemoglobin were measured before anesthesia induction and every 1.5 h afterwards.

RESULTS. The mean (SD) age was 61 ± 14 years. Physical status distribution P1, P2 and P3 were 15, 40 and 45 %, respectively. The median (IQR) time under general anesthesia was 6.0 h (4.0 to 7.0). The median administered fluids and the net fluid balance were 3.0 liters (2.5 to 6.2) and 0.4 liters (-0.9 to 1.8), respectively. While ScvO₂ increased after anesthesia induction and remained higher than 70 % during the entire surgical procedure ($p = 0.001$), arterial lactate increased ($p = 0.008$) and cardiac index and hemoglobin remained unchanged (Table 1).

CONCLUSIONS. Hemodynamic optimization aiming ScvO₂ goals during major surgery and general anesthesia does not seem appropriate. Cardiac index should be chosen as a guide in this population of patients.

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Time (h)	0	1.5	3.0	4.5	6.0	7.5	p value
ScvO ₂ (%)	75 ± 8	81 ± 8	83 ± 7	83 ± 8	75 ± 7	86 ± 8	0.001
MAP (mmHg)	93 ± 18	76 ± 13	75 ± 14	79 ± 21	89 ± 13	83 ± 21	0.008
CVP (mmHg)	5 ± 4	8 ± 5	9 ± 7	9 ± 3	9 ± 4	6 ± 5	0.13
CI (l/s/m ²)	3.4 ± 1.2	2.9 ± 0.9	2.9 ± 0.8	3.1 ± 1.2	3.1 ± 0.5	3.3 ± 1.1	0.35
SVV (%)	11 ± 7	14 ± 10	15 ± 9	16 ± 8	14 ± 7	11 ± 7	0.54
Lactate (mg/dl)	15 ± 8	16 ± 8	16 ± 9	18 ± 12	33 ± 25	46 ± 47	0.008
Hemoglobin (g/dl)	12 ± 2	11 ± 2	11 ± 3	11 ± 3	9 ± 3	11 ± 1	0.16

[Table 1: Hemodynamics and hemoglobin levels]

0194

INTRAOPERATIVE FLUID OPTIMIZATION USING STROKE VOLUME VARIATION IN GERIATRIC PATIENTS UNDERGOING MAJOR ABDOMINAL SURGERY

J.H. Woo¹, H.J. Baik¹, J.H. Kim¹, J.I. Han¹, Y.J. Kim¹¹School of Medicine, Ewha Womans University, Department of Anesthesiology and Pain Medicine, Seoul, Republic of Korea

INTRODUCTION. Stroke volume variation (SVV) is used to predict and guide fluid therapy during controlled ventilation. It has been shown to predict fluid responsiveness in different clinical and experimental settings. However, there is no study to investigate the actual clinical usefulness and perioperative outcome in the geriatric patients.

OBJECTIVES. This study aims to evaluate the intraoperative hemodynamic stability and perioperative outcomes in the geriatric patients undergoing major abdominal surgery.

METHODS. Thirty six patients, aged over 65, scheduled for major abdominal surgery including gastrectomy, Whipple's operation, colorectal surgery were enrolled and randomly assigned to Group I (n = 18) or Group II (n = 18). Fluid management was guided by SVV (Vigileo/Flotrac system) in all patients. Using colloid boluses of 2 ml/kg or crystalloid 6 ml/kg, the SVV was maintained below 10 % in group I or 13 % in group II. The number and duration of intraoperative hypotension, intraoperative ephedrine use, total input, perioperative arterial blood gas analysis, postoperative complication including cardiovascular, respiratory, renal, thrombotic and gastrointestinal problem on day 30 after the operation were evaluated.

RESULTS. The patients' characteristics and clinical details were similar between groups. The number and duration of intraoperative hypotension and intraoperative ephedrine use were not different between groups. The arterial pH and base excess significantly decreased at the end of surgery compared with preoperative value in group II only, but were not different between groups. Serum lactate was also similar between groups. The hospital stay and postoperative complication were not different between groups.

CONCLUSIONS. The SVV threshold with 13 % showed decreased arterial pH and base excess at the end of surgery, however, the both threshold provided similar intraoperative hemodynamic stability and postoperative complication profile. Further larger study is warranted to determine the significance of these findings in high risk geriatric patients.

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0195

IMPROVING NEUROLOGIC OUTCOME IN CARDIAC SURGERY PATIENTS WITH A GOAL-ORIENTED THERAPY PROTOCOL BASED ON CEREBRAL REGIONAL OXYGEN SATURATION

F. Franchi¹, B. Biagioli¹, A. Tabucchi¹, S. Scolletta¹¹University of Siena, Siena, Italy

INTRODUCTION. NIRS (near infrared spectroscopy) is a neuro-monitoring tool that provides cerebral regional oxygen saturation (rSO₂).

OBJECTIVES. We hypothesized that a goal-directed therapy (GDT) protocol based on rSO₂ values would be associated with reduced incidence of postoperative neurologic complications (PNC) in high-risk cardiac surgery (CS) patients.

METHODS. 85 high-risk CS patients (mean age 71 ± 9) were monitored during CS with NIRS (cNIRS group). Intraoperative interventions were based on a GDT protocol aimed at improving cerebral rSO₂ and blood flow (i.e., increasing arterial oxygen content with red

blood cell transfusions and FIO₂; increasing systemic blood flow and cerebral perfusion pressure with fluids, inotropic, and vasoactive drugs and increasing pump-flow during cardiopulmonary bypass). cNIRS group was compared with 100 patients (mean age 73 ± 6) (not monitored with cerebral NIRS, N-cNIRS group) who were selected from a historical database using a propensity-matching analysis. Neuron-specific enolase (NSE) and S-100B protein were collected at different times in the cNIRS group.

RESULTS. PNC resulted 21 % in the cNIRS group and 35 % in N-cNIRS group ($p < 0.05$). N-cNIRS group showed longer times of mechanical ventilation (MV) (150.3 ± 274.9 vs 29.9 ± 65 h, $p = 0.02$) and ICU stay (13.3 ± 14.7 vs 3.4 ± 3.9 days, $p = 0.01$) than cNIRS group. In the cNIRS group, preoperative rSO₂ values were significantly lower in the patients who exhibited PNC than those who had good neurologic outcome (59.6 ± 7.6 vs 63.4 ± 7.8 %, $p = 0.04$). An inverse correlation was found between the lowest values of intraoperative cerebral rSO₂ and the length of MV ($r = -0.31$, $p = 0.04$) and ICU stay ($r = -0.43$, $p = 0.003$). Only the peak of NSE, measured 6 h after CS, showed significant difference between patients who developed PNC and those who did not ($p = 0.02$).

CONCLUSIONS. In our cohort of CS patients, NSE and S-100B protein were poor predictors of PNC. Conversely, the lower the preoperative cerebral rSO₂, the poorer the neurologic outcome. A GDT protocol based on NIRS values, aimed at improving cerebral rSO₂ and blood flow, might reduce PNC in high-risk CS patients.

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0196

THE CUMULATIVE FLUID BALANCE DOES NOT REFLECT THE FLUID STATUS OF INTENSIVE CARE PATIENTS - A SINGLE CENTER PROSPECTIVE ONE-YEAR STUDY

M. Köster¹, S. Drenthardt¹, H.B. Hopf¹

¹Asklepios Klinik Langen, Academic Teaching Hospital of the University Frankfurt am Main, Anaesthesia and Perioperative Medicine, Langen, Germany

INTRODUCTION. The cumulative fluid balance of critically ill patients seems to be an outcome relevant variable (1,2). In fact, mortality of postoperative ICU-patients rises up to 100 %, if the cumulative fluid balance - measured as rise of body weight - exceeds 20 % (1). Although there are no validated data for their reliability, calculated 24 h fluid balances are generally used as variable of patients' fluid status.

OBJECTIVES. Accordingly in a prospective one-year study we evaluated in our ICU-patients, whether and to what extent the cumulative calculated 24 h balances (with and without a correction for insensible perspiration of 10 ml/kg bw/d) would match with the simultaneously measured changes in body weight.

METHODS. With permission of the local ethical committee all ICU-patients aged ≥18 years and with a stay ≥5 days were examined from 2013-01-01 to 2013-12-31. Daily standardised weighing was performed by using bed-integrated scales (Multicare®, LINET Group SE) simultaneously with the daily 24 h balance at 06:00 AM. A balance including insensible perspiration (10 ml/kg bw/d) was calculated for each 24 h balance. Further variables: biometry, SAPS II, SOFA-score, dialysis intensity (number of dialysis/treatment days). Statistics: ANOVA, Students T-test, $p \leq 0.05$. Null hypothesis: No difference between changes in body weight (kg) and cumulative fluid balance (l) or cumulative fluid balance including insensible perspiration (l). Study endpoint was the day of transfer to the normal ward or of death, respectively.

RESULTS. 106 critically ill patients with an ICU-stay of 23 ± 45 d (mean ± SD) were included. Following results were obtained after 5, 10, 21 and 30 days: Change in body weight: -0.9 ± 4.1 (n = 106), -3.0 ± 6.6 (n = 60), -0.8 ± 8.5 (n = 25) - 1.5 ± 7.4 (n = 17) kg; cumulative fluid balance: $+2.2 \pm 5.1$, $+3.5 \pm 7.3$, $+12.1 \pm 9.2$, $+14.4 \pm 10.4$ l; cumulative fluid balance including insensible perspiration: -2.3 ± 6.1 , -5.5 ± 8.4 , -6.1 ± 10.0 , -11.2 ± 11.2 l each time point $p < 0.05$ for change in body weight vs. cumulative balance vs. insensible perspiration including fluid balance respectively. At the specified endpoint survivors (n = 82) showed a higher loss in body weight than non-survivors (n = 24) (-3.1 ± 6.0 vs. -2.2 ± 7.5 kg), despite a significant higher intensity of dialysis in the nonsurvivors (0.26 ± 0.27 vs 0.52 ± 0.26).

CONCLUSIONS. Cumulative 24 h balances overestimate and cumulative 24 h fluid balances including insensible perspiration underestimate the volume status of critically ill patients. The daily routine measurement of body weight seems to be a more reliable variable for the estimation of the volume status of critically ill patients.

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GRANT ACKNOWLEDGMENT. Only departmental resources have been used.

0197

PERIOPERATIVE HAEMODYNAMIC OPTIMIZATION BY OESOPHAGEAL DOPPLER MONITORING IN ABDOMINAL EMERGENCIES - PRELIMINARY RESULTS

M. Ben Romdhane¹, A. Ben Souissi¹, I. Nefzi¹, S. Kamoun¹, A. Riahi¹, W. Laaribi¹, M.S. Mebazaa¹

¹Mongi Slim Hospital, La Marsa, Anesthesiology and ICU, Sidi Daoued, Tunisia

INTRODUCTION. The haemodynamic optimization is a strategy for management of patients, including the perioperative period. The oesophageal Doppler (OD) is a noninvasive monitoring technique that allows instantaneous and continuous measurement of blood velocity. It is proposed to investigate the effect of perioperative fluid resuscitation (PFR) monitored by OD on the incidence of postoperative (PO) complications and the length of stay in abdominal emergencies.

METHODS. A Prospective randomized comparative study was conducted between a control group (CG) (PFR guided by clinical parameters) and a study group (SG) with PFR monitored by the parameters provided by OD. We have included all abdominal emergencies with or without haemodynamic instability and excluded patients with arrhythmia and those with contraindication to OD probe. The fluid therapy protocol was based on a decisional algorithm developed from the SFAR expert committee recommendations (1). For both groups, the PFR was conducted by 200 ml bolus of colloids in addition to compensation for insensible losses estimated at 8 ml/kg/h crystalloids. The primary endpoint was the hospital length of stay. Secondary endpoints were recovery of bowel motility delay, PO complications, PO nausea and vomiting (PONV) and markers of inflammation (CRP). Statistical analyses included the Student and Mann-Whitney's tests for quantitative variables and Chi

Square with Fisher correction for qualitative variables, where $p < 0.05$ was considered significant.

PRELIMINARY RESULTS. The sample consisted of thirty patients equally distributed in both groups. The two groups were comparable for demographic characteristics and duration of anesthesia and surgery. The length of stay was shortened in the SG (6.4 vs 4.6 days; $p = 0.035$). The quantity of crystalloids was comparable in both groups. However, there were more patients who received colloids in the SG (10 vs 4; $p < 0.05$). Recovery bowel motility and PO complications are alike; the incidence of PONV was lower in the OD ($p = 0.04$). CRP value was lower in SG: CRP: 233.36 vs. 185.77 mg/l ($p = 0.048$).

DISCUSSION. These results in urgent abdominal surgery were similar to those found in studies of haemodynamic optimization monitored by the OD during the elective colorectal surgery (2,3). PFR monitored by OD is correlated with shorter length of stay and lower PO morbidity (PONV, CRP). Cardiac output of patients in the SG who received intraoperative colloids was optimized in order to maintain balance between consumption and transport of O₂ and thus, organ perfusion. The perioperative optimization based on noninvasive haemodynamic monitoring values showed an advantage in reducing PO morbidity in the abdominal emergency surgery.

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0198

IS THERE A NEED FOR PROLONGED ADMITTANCE TO A HIGH DEPENDENCY UNIT AFTER SURGERY FOR RECTAL CANCER?

J. Betten¹, A.K. Ronness¹, B.H. Endreseth², S. Tyvold³, P. Klepstad⁴, T. Nordseth⁵

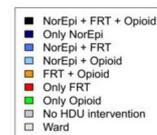
¹Norwegian University of Science and Technology, Faculty of Medicine, Trondheim, Norway, ²Norwegian University of Science and Technology, Department of Cancer Research and Molecular Medicine, Faculty of Medicine, Trondheim, Norway, ³St. Olav University Hospital HF, Trondheim, Norway, ⁴Norwegian University of Science and Technology, Department of Circulation and Medical Imaging, Faculty of Medicine, Trondheim, Norway, ⁵St. Olav University Hospital, Department of Anesthesia and Intensive Care, Trondheim, Norway

INTRODUCTION. Patients with rectal cancer who are treated with low anterior resection of the rectum (LAR) or abdominal perineal resection of the rectum (APR), are routinely treated in a high dependency unit (HDU) during the first 16 to 24 h after surgery at our hospital. This use of an HDU has not been properly validated. Inappropriate use of an HDU is expensive, and may reduce the capacity for other surgical procedures.

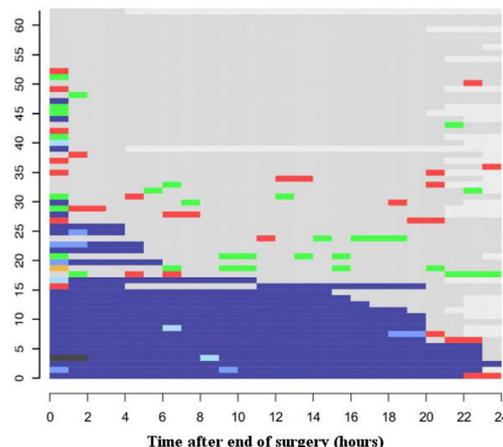
OBJECTIVES. The aim of this study was to describe the physiological course and the HDU-specific interventions given during the first 24 h of the postoperative (PO) period, in patients with rectal cancer who received surgical treatment with LAR or APR.

METHODS. Sixty-two patients treated with LAR or APR at the St. Olav's University Hospital (Trondheim, Norway) were included. A thoracic epidural was placed before the induction of anesthesia and kept through the HDU stay. Physiological data and HDU-interventions recorded during the first 24 h of the PO-period were obtained from the anesthesia information system applied (Critical Care Manager, Wakefield, MA, USA). HDU-specific interventions were defined as the need for respiratory support, fluid replacement therapy (FRT) above 500 ml/h, the use of vasoactive medications or a need for intravenous (i.v.) opioids exceeding 7.5 mg/h.

RESULTS. The individual needs for HDU-specific interventions during the first 24 h of the PO-period are demonstrated in Figure 1 (one bar = one patient, intervention-specific colours). Fifty-two patients (84 %) were at some point in time in need of one or more of the predefined HDU interventions. No patients were in need of respiratory support during the defined PO-period. The need for an HDU-intervention was mainly evident during the first 4-6 h for most patients. Approximately 1/3 of the patients experienced a need for FRT or opioid therapy after this time period, usually for less than 2-3 consecutive hours (middle 1/3 of Figure 1). Seventeen patients (27 %) had the need for HDU-specific therapy for more than 10 h continuously (lower 1/3 of Figure 1), mainly due to the need for an infusion of nor-epinephrine.



HDU-demanding interventions given (n=62)



[Figure 1]

CONCLUSIONS. Most patients treated with LAR or APR was in need of an HDU-specific intervention during the first 4-6 h of the PO-period, with a marked decline after this time period. A continuous need for nor-epinephrine was evident in approximately 1/3 of the patients. The use of an HDU for 24 h after LAR or APR seemed reasonable for most patients, especially among those who continued to demonstrate the need for HDU-specific interventions past 6-8 h of the PO-period.

0199

IMPLICATION OF PREOPERATIVE HYPOALBUMINEMIA AND ANEMIA: PREDICTORS OF TRANSFUSION IN RADICAL NEPHRECTOMY FOR RENAL CELL CARCINOMA

J.Y. Kim¹, K.M. Kim¹, Y.G. Kim¹

¹University of Ulsan College of Medicine, Asan Medical Center, Department of Anesthesiology, Seoul, Republic of Korea

INTRODUCTION. Renal cell carcinoma (RCC) accounts for 2- 3 % of all malignant diseases in adults, representing the third most frequent and most lethal genitourinary cancer. The only curative therapeutic strategy for this kind of tumor is complete removal of malignant renal tissues. Hemorrhage, therefore, occurs in patients who undergo radical nephrectomy (RN) for RCC. Blood transfusion is the mainstay in the management of hemorrhage. Transfusion, however, carries significant risks and is associated with postoperative morbidity and mortality.

OBJECTIVES. Our aim is to find out factors which can be used to predict requirements for transfusion in RN. We also analyzed the effects of transfusion in the occurrence of postoperative complications.

METHODS. We retrospectively reviewed data from 526 patients who underwent RN for RCC at Asan Medical Center (Seoul, Republic of Korea) between January 2010 and December 2012. Univariate logistic regression analysis was conducted to identify any associations among demographic variables, preoperative laboratory findings, and postoperative values in relation to packed red blood cell (PRBC) transfusion requirement in RN. Variables with a P value < 0.05 in univariate analysis were included in the multivariate logistic regression analysis to determine independent factors for PRBC that predict transfusion in RN for RCC.

RESULTS. Preoperative hypoalbuminemia (serum albumin level <3.5 g/dL) was found in 75 (14.3 %) patients. The mean preoperative hemoglobin level was 13.2 ± 2.1 g/dL. Preoperative anemia (hemoglobin <12.0 g/dL) was found in 121 (23.0 %) patients. PRBC was transfused in 93 (17.7 %) patients. Mean transfused PRBC was 5.5 points. Between the PRBC transfusion group and the non-PRBC transfusion group, no significant differences were found in terms of demographic variables. However, significant differences were found in the preoperative hemoglobin level, prothrombin time, platelet count, and serum albumin levels between the groups. Multivariate logistic regression analysis showed that independent factors which were significantly associated with PRBC transfusions were preoperative hypoalbuminemia (odds ratio = 0.377; P = 0.037) and anemia (odds ratio = 0.324; p = 0.006). The PRBC transfusion group had a higher incidence rate of pulmonary complications (32.3 %; P = 0.000) and tended to stay longer in hospital (16.9 ± 15.5 days; P = 0.000) than the non-PRBC transfusion group ($16.3 \pm 8.42 \pm 3$ days, respectively).

CONCLUSIONS. Preoperative hypoalbuminemia and anemia were found to be the crucial predictors of PRBC transfusion in RN for RCC. Furthermore, these predictors appear to be associated with increased perioperative morbidity and mortality.

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0200

ON- VS OFF-PUMP CABG: EFFECTS ON POSTOPERATIVE LACTATE, BASE EXCESS AND PH OVER THE FIRST 24 HOURS IN INTENSIVE CARE

F. Chiarenza¹, C. Cassisi¹, F. Sanfilippo², C. Santonocito², M. Astuto¹, S. George², M. Trivella³, D. Altman⁴, D. Taggart⁴

¹School of Anaesthesia and Critical Care, Anaesthesia and Critical Care, Catania, Italy,

²John Radcliffe Hospital, Cardiothoracic Critical Care Unit, Oxford Heart Centre, Oxford, United Kingdom. ³Centre for Statistics in Medicine, University of Oxford, Botnar Research Centre, Oxford, United Kingdom. ⁴John Radcliffe Hospital, Cardiothoracic Surgery, Oxford Heart Centre, Oxford, United Kingdom

INTRODUCTION. Blood lactate levels during the first 10 h in intensive Care Unit (ICU) post cardiac surgery correlate with prolonged ventilation time, longer ICU stay and mortality.¹ Arterial lactate levels at 6 h are predictive of major postoperative complications.² This has not been studied yet in a selected population undergoing coronary artery bypass grafting (CABG).

METHODS. We aimed at comparing values of postoperative metabolic outcomes (lactates, base excess and pH) in two groups of patients undergoing CABG with on-pump (ON) or off-pump (OFF) technique. Single centre (Oxford) retrospective study over 1 year period (Aug 2012 - Aug 13), retrieving data (from electronic medical records) at 8 time points; pre-operatively, at ICU admission and at 1, 3, 6, 12, 18 and 24 h post-operatively. We also studied the length of stay (LOS) in ICU. Patients with preoperative haemodynamic support and/or dialysis were excluded.

Normal distribution of data was assessed (Kolmogorov-Smirnov test). Continuous variables are presented as mean \pm standard deviation and compared with t-student test for independent samples. Categorical variables are presented as percentage (%) and analysed with Chi square test with Yates's correction. All tests are two-sided, and a value of p < 0.05 was considered statistically significant. A time series analysis using multilevel mixed-effects linear regression was performed to study the effects of ON- vs OFF techniques on postoperative metabolic outcomes. Demographics, co-morbidities, number of grafts performed and LOS in ICU were included as covariates in the model.

RESULTS. We included 339 patients, 124 of them in the group OFF (37 %). Among demographics and comorbidities, only hypercholesterolemia was significantly different (OFF 86 % vs ON 74 %, p = 0.02). The OFF group had significantly lower number of grafts performed (2.4 ± 0.8 vs 3.0 ± 0.7 ; p < 0.001). We found no differences in the levels of lactate and pH, either overall or at any time-point (Fig. 1 and 2). Base excess were not different *per-se*. However the regression analysis showed significantly worse BE values in the ON group from ICU admission until the 18th hour. Peaks of differences occurred at 1st and 12th postoperative hour (Fig. 3). The LOS in ICU was not different (OFF 2.1 ± 1.5 vs ON 2.3 ± 2.5 ; p = 0.10).

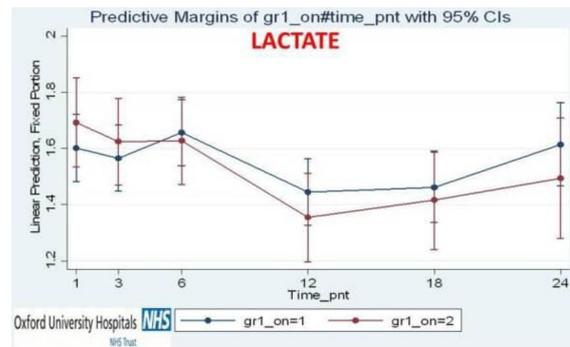


Fig. 1 Lactate values after performing multilevel mixed-effects linear regression. Two groups of patients undergoing coronary artery bypass grafting: ON-pump technique (blue, group 1) and OFF-pump technique (red, group 2).

[Fig. 1 - Lactate levels in two populations]

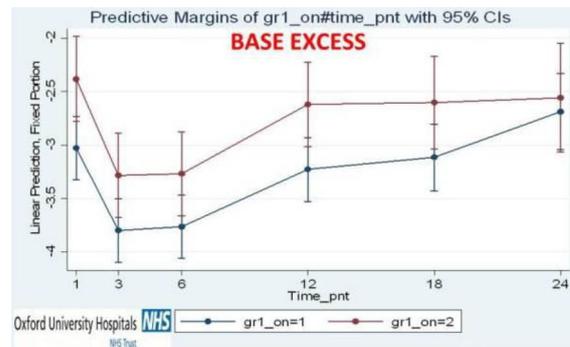


Fig. 2 Base Excess values after performing multilevel mixed-effects linear regression. Two groups of patients undergoing coronary artery bypass grafting: ON-pump technique (blue, group 1) and OFF-pump technique (red, group 2).

[Fig. 2 - Base Excess levels in two populations]

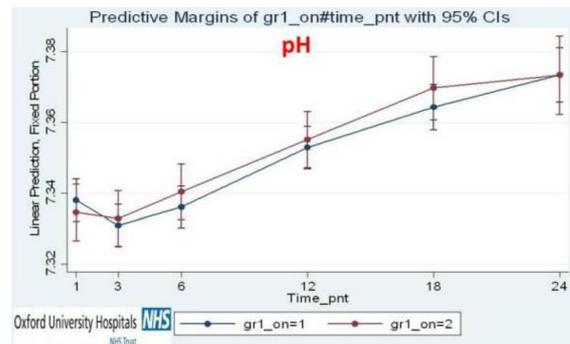


Fig. 3 pH values after performing multilevel mixed-effects linear regression. Two groups of patients undergoing coronary artery bypass grafting: ON-pump technique (blue, group 1) and OFF-pump technique (red, group 2).

[Fig. 3 - pH levels in two populations]

CONCLUSIONS. Metabolic variables are not profoundly affected by the technique of CABG, on- or off-pump. After multi-regression analysis only BE are worse in the on-pump group, while lactate (major predictor of outcome) was not different. The LOS in ICU between the two groups was comparable as well.

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0201

THE ACCURACY OF CARDIAC OUTPUT MEASUREMENT OBTAINED WITH THE FOURTH GENERATION FLOTRAC-VIGILEO AND LIDCORAPID AT THE TIME OF SYSTEMIC VASCULAR RESISTANCE VARIATION

T. Imabayashi¹, A. Matsunaga¹, S. Hagihara¹, T. Yoshinaga-Shiramomo¹, M. Nagaoka¹, M. Hasegawa-Moriyama¹, Y. Kanamura¹

¹Graduate School of Medical and Dental Sciences, Kagoshima University, Dept of Anaesthesiology, Kagoshima, Japan

INTRODUCTION. Cardiac output (CO) measurement obtained with arterial pressure waveform analysis is increasingly used in high risk patient. The measurement affected by systemic vascular resistance (SVR) variation is well known. Recently, the fourth generation

FloTrac-Vigileo (Edwards Lifesciences, Irvine, CA, USA) and LiDCOrapid (LiDCO, Ltd, Cambridge, UK) respond to SVR variation are used in clinical settings.

OBJECTIVES. The aim of this study was to compare the accuracy of the CO obtained from the fourth generation FloTrac-Vigileo and LiDCOrapid at the time of SVR variation in cardiac surgery patients.

METHODS. Thirty five adult patients undergoing coronary artery bypass grafting or valve replacement were enrolled. Stroke volume (SV) measured by continuous CO (CCO) with pulmonary artery thermodilution catheter (PAC) at stat mode is a gold standard method of measuring SV. At the decrease in blood pressure, SV were measured by PAC, FloTrac-Vigileo and LiDCOrapid, before administration of phenylephrine (0.05 ~ 0.2 mg) and 1,2,3,4 and 5 min after administration. In addition, the changes of mean blood pressure (MBP) and SV from baseline were examined. Linear regression analysis and Pearson's correlation coefficient were calculated. A *P* value less than 0.05 was considered to be statistically significant.

RESULTS. After administration of phenylephrine, the increase of SV were not significantly correlated with the increase of MBP in PAC ($y = -0.16x + 2.6671$, $R^2 = 0.0442$) and FloTrac-Vigileo ($y = 0.087x + 1.2948$, $R^2 = 0.0126$). After administration of phenylephrine, the increase of SV was significantly correlated with the increase of MBP in LiDCOrapid ($y = 0.4413x + 4.0152$, $R^2 = 0.4319$) (Figure 1).

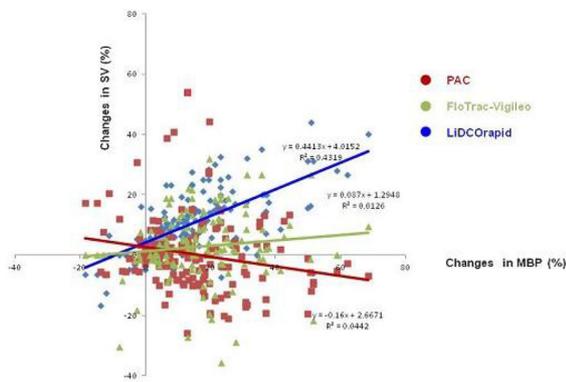


Figure 1. Relationship between Changes in SV and MBP after administration of phenylephrine.

After administration of phenylephrine, the increase of SV was not correlated with the increase of MBP in PAC ($R^2 = 0.0442$) and FloTrac-Vigileo ($R^2 = 0.0126$), but significantly correlated in LiDCOrapid ($R^2 = 0.4319$). SV stroke volume, MBP mean blood pressure

[Figure 1.]

CONCLUSIONS. The accuracy of cardiac output measurement at the time of systemic vascular resistance variation was high obtained with the fourth generation FloTrac-Vigileo than with LiDCOrapid.

0202

PROGNOSTIC VALUE OF PREOPERATIVE BIOELECTRICAL IMPEDANCE PHASE ANGLE ON HEMOTRANSFUSION AFTER CARDIAC SURGERY

D. Ringaitienė¹, D. Gineitytė², V. Vicka², M. Balčiūnas², I. Norkienė¹, J. Sipylaitė¹, J. Ivaskėvičius

¹Vilnius University, Faculty of Medicine, Clinic of Anesthesiology and Intensive Care, Vilnius, Lithuania, ²Vilnius University, Faculty of Medicine, Vilnius, Lithuania

INTRODUCTION. Considerable evidence suggests that hemotransfusion increases the risk of serious complications after cardiac surgery. Phase angle (PhA), determined by bioelectrical impedance analysis (BIA), detects changes in tissue electrical properties and has been hypothesized to be a marker of malnutrition¹.

OBJECTIVES. The aim of this study was to investigate the prognostic role of phase angle, determined by bioelectrical impedance analysis, on hemotransfusion in patients undergoing cardiac surgery.

METHODS. A prospective randomised study was conducted between April and September 2013. The phase angle of 276 cardiosurgical patients was evaluated using bioelectrical impedance analysis one day before surgery. After applying randomisation criteria 151 patients were selected for further evaluation. Patients were classified into two groups in accordance to postoperative hemotransfusion factor. The low phase angle cutoff value was set 5.44. Associations between low phase angle (PhA < 5.44) and postoperative hemotransfusion were analysed.

RESULTS. Low PhA was detected in 59 (39 %) randomized patients group. Preoperative anemia rate (16 (64.0 %) vs. 33 (34.4 % $p = 0.011$) and postoperative hemotransfusion rate was two times higher in low PhA group (29 (64.4 %) vs. 30 (28.3 %) $p = 0.000$). Low PhA (OR = 2.9 CI95 % 1.04-8.15 $p = 0.042$) and preoperative anemia (OR = 20.05 CI95 % 4.42-90.97 $p = 0.000$) persisted as predictors of higher hemotransfusion rates according to multivariate regression analysis model adjusted for preoperative and operative hemotransfusion risk factors.

CONCLUSIONS. The phase angle, determined by bioelectrical impedance analysis, used for evaluation of malnutrition could select the patients at higher risk for postoperative hemotransfusion. Nutrition interventions target at improving phase angle could reduce consumption of blood products.

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0203

DISTRIBUTION OF INTRAVENOUS FLUIDS OVER THE EXTRACELLULAR AND INTRACELLULAR COMPARTMENTS IN POSTOPERATIVE CARDIOTHORACIC PATIENTS TREATED AT THE ICU. TESTING THE STANDARD MODEL ON WATER AND ELECTROLYTE DISTRIBUTION WITH POTASSIUM BALANCE ANALYSIS

L. Hessels¹, M. Hoekstra^{1,2}, A. Oude Lansink¹, M.W. Nijsten¹

¹UMC Groningen, ICU, Groningen, Netherlands, ²UMC Groningen, Anesthesiology, Groningen, Netherlands

INTRODUCTION. The accepted model on the distribution i.v. administered water, Na⁺ and K⁺ can be found in many textbooks, including Rose¹. This model claims that water distributes proportionally over the intracellular volume (ICV) and extracellular volume (ECV). K⁺ homes to the ICV and Na⁺ homes to the ECV. An important consequence of this 'standard' model is the use of Na⁺-based fluids when the circulating volume (being part of the ECV) needs to be increased.

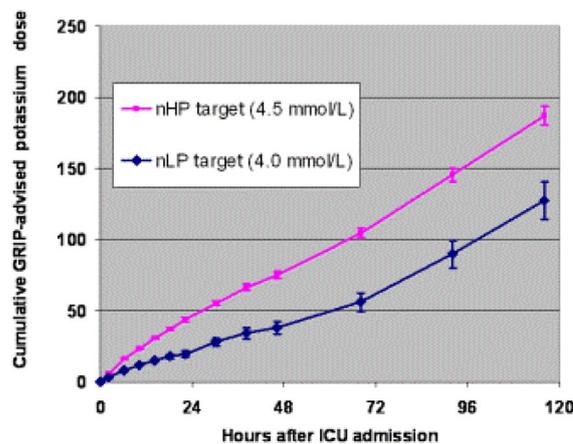
However, the concept that the ECV and ICV expand proportionally after a water load is neither compatible with many observations from cell biology, nor has it been verified in critically ill patients.

As ECV and ICV cannot be measured directly in ICU patients we used potassium balance studies in ICU patients to test the standard model.

OBJECTIVES. In the context of the GRIP-COMPASS trial that compared a normal low potassium (nLP) target with a normal high potassium (nHP) target, we measured potassium balances after cardiothoracic surgery. During the immediate post-operative phase such patients have a positive fluid balance. The standard model predicts that in patients receiving more potassium, more potassium and water will home to the ICV.

METHODS. In a retrospective cohort study patients admitted to our thoracic ICU of a tertiary university teaching hospital between 2010 and 2013, were evaluated for availability of sufficient urinary data. The reference range of K⁺ is 3.5-5.0 mmol/L and patients were assigned to either a target of 4.0 (nLP) or 4.5 mmol/L (nHP). For both groups K⁺-levels were regulated with a validated computerized decision support system (GRIP-II)². K⁺-administration data was obtained from GRIP-II and fluid balances and urinary 24 h K⁺-excretion were determined up to ICU day 5. All laboratory measurements were performed as a part of standard care.

RESULTS. We included 244 and 1276 patients in the nLP and nHP groups respectively. A significant but small difference of the mean K⁺ was achieved: 4.2 (nLP) vs 4.3 mmol/L (nHP; $p < 0.001$) despite far higher cumulative K⁺ doses in the nHP-group (Figure 1; $p < 0.001$).



[Cumulative K-administration in nLP and nHP groups]

The whole difference in K⁺ dose between the nLP and nHP groups (as shown in Fig. 1) was excreted in the urine, underscoring that additional K⁺ was not retained.

CONCLUSIONS. K⁺ levels in the ECV were nearly constant under different doses. During a phase of pronounced fluid retention no additional K⁺ moved into the ICV, indicating that no water moved into the ICV as well.

Thus, in contrast to the standard model, whilst the ECV expands, the ICV apparently remains constant. If the ICV is much more constant than assumed, i.v. fluids with lower or no Na⁺ deserve wider consideration.

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From rapid response teams to ICU triage: 0204–0217

0204

THE FEATURES OF RAPID RESPONSE SYSTEM IN UNIVERSITY HOSPITALS AND MUNICIPAL HOSPITALS

J. Tsukuda¹, S. Fujitani², T. Naito¹, A. Sasaki³, Y. Kudo¹, H. Sakuma¹, M. Konno⁴, R. Uchimido³

¹Tokyo Bay Uraysu-Ichikawa Medical Center, Intensive Care Unit, Uraysu, Japan, ²Tokyo Bay Uraysu-Ichikawa Medical Center, Uraysu, Japan, ³Tokyo Bay Uraysu-Ichikawa Medical Center, Department of Emergency Medicine, Uraysu, Japan, ⁴Tokyo Bay Uraysu-Ichikawa Medical Center, Medical Risk Management Office, Uraysu, Japan

INTRODUCTION. We introduced the Rapid Response System (RRS) online registry in Japan on January 2014 supported by the Japanese Society for Emergency Medicine and currently 13 facilities have been registered. To our best knowledge, few publications have reported the difference of RRS between university hospitals and municipal hospitals.

OBJECTIVES. We intended to find out the features of RRS in university hospitals and municipal hospitals.

METHODS. We conducted this observational study in the registered facilities (3 university hospitals and 10 municipal hospitals) from January 2014 to March 2014. We reviewed RRS cases registered in online registry system and collected data about sex, age, Glasgow Coma Scale (GCS), number of medical staffs and change in code status after RRS intervention.

RESULTS. 231 cases met the RRS activation criteria during this period. Number of beds in university hospitals ranged from 808 to 1156, and municipal hospitals from 183 to 715. 103 cases were of university hospitals and 128 cases of municipal hospitals. 54 cases (52.4 %) of university hospitals and 64 cases (50.0 %) of municipal hospitals were males ($p = 0.57$). The cases of university hospitals were younger compared to those of municipal hospitals

(57.4 ± 14.9 years vs. 83.7 ± 5.28 years; $p < 0.0001$). As to GCS, the cases of university hospitals were more critical than municipal hospitals (9.0 ± 5.1 vs. 10.6 ± 4.4 ; $p = 0.0018$). More medical staffs in university hospitals were involved in each RRS interaction compared to municipal hospitals (3.09 ± 1.28 vs 2.59 ± 1.15 ; $p = 0.03$). Code status was changed less frequently after each RRS interaction in university hospitals than municipal hospitals (17.2% vs 7.8% ; $p = 0.03$). No significant difference was observed in 1 month mortality rate.

CONCLUSIONS. RRS cases of university hospitals were younger and more critical. Code status was less frequently changed. Considering age, severity, code status changes, RRS cases might be more aggressively managed by RRS interventions.

GRANT ACKNOWLEDGMENT. We received a grant from Japanese Ministry of Education (#24592755).

0205

CLINICAL DIFFERENCES OF THE RAPID RESPONSE SYSTEM BETWEEN PATIENTS ADMITTED TO THE SURGICAL AND MEDICAL SERVICES

Y.J. Lee¹, H.J. Min², D.S. Lee², Y.Y. Choi², E.Y. Lee², I. Song³, Y.-J. Cho¹, K. Kim⁴, S. Park⁵

¹Seoul National University Bundang Hospital, Department of Internal Medicine, Seongnam, Korea, Republic of, ²Seoul National University Bundang Hospital, Interdepartment of Critical Care Medicine, Seongnam, Korea, Republic of, ³Seoul National University Bundang Hospital, Department of Anesthesiology, Seongnam, Korea, Republic of, ⁴Seoul National University Bundang Hospital, Department of Emergency Medicine, Seongnam, Republic of Korea

INTRODUCTION. Clinical characteristics of the patients admitted to the medical and surgical services are different. Therefore, patients on specific services may derive differential benefit from the rapid response system (RRS).

OBJECTIVES. To compare the differences in the triggers for RRS, interventions performed, and outcomes between patients admitted to the medical and surgical services.

METHODS. We retrospectively reviewed patients who admitted to 1300-bed tertiary care academic hospital and detected by the RRS from October 2012 to February 2014. We compared the triggers, interventions, and the outcomes between patients admitted to the medical and surgical services.

RESULTS. In total, 21,415 alert lists were generated from 11,271 patients. The RRS was activated in 460 patients, with the instances of activation being almost three times higher in the surgical service (74.3 %) than in the medical service (25.7 %). The triggers for RRS activation significantly differed between the surgical and medical groups ($p = 0.001$), and included low blood pressure (30.1 %), low oxygen saturation (19.6 %), and abnormal heart rate (16.7 %) in the surgical group as well as abnormal respiratory rate (27.1 %), abnormal results on blood gas analysis (23.7 %), and low blood pressure (22 %) in the medical group. We evaluated the interventions performed following RRS activation. Overall, patients were more likely to be classified as do not resuscitate (DNR) or require intensive care unit admission in the medical group than the surgical group (65.3 % vs. 54.7 %; $p = 0.045$). Moreover, the time from RRS activation to DNR conversion was longer in the surgical group than the medical group (median, 14 days vs. 4 days; $p = 0.035$). Analysis of individual interventions also yielded significant differences. Although the majority of patients were alive at discharge from the hospital in both groups, a significantly greater number of patients were alive at discharge in the surgical group than the medical group (86.8 % vs. 60.2 %; $p < 0.001$).

CONCLUSIONS. We found that the triggers, outcomes, and clinical requirements and interventions associated with the RRS greatly differed between the medical and surgical services. Therefore, further research is needed to evaluate the efficacy of a tailored approach to specific groups in the RRS.

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GRANT ACKNOWLEDGMENT. We thank members of SAFER(our rapid response team).

0206

EMERGENCY SURGICAL ADMISSIONS ADMITTED TO CRITICAL CARE: ARE WE ADHERING TO GUIDELINES?

K. Cooke¹, J. Sonksen¹

¹Russells Hall Hospital, Intensive Care, Birmingham, United Kingdom

INTRODUCTION. General surgical emergency admissions are the largest group of all surgical admissions, representing the largest percentage of all surgical deaths. It is well recognised that peri-operative care of higher risk general surgical patients in the UK has deficiencies, with variable outcomes and large health care costs (including length of stay and ICU costs).

OBJECTIVES. Our aim was to look at the journey through hospital for all surgical patients taken to theatre for an emergency laparotomy and admitted directly to ICU post-operatively.

METHODS. We retrospectively collected data for all emergency laparotomies admitted to the ICU post-operatively from Jan 2011 to Aug 2013. Twenty-two sets of patient notes were reviewed for the following: recognition of SIRS/sepsis/severe sepsis, lactate level, blood cultures, administration of - 1 litre of fluid, 3 litre of fluid, first antibiotic dose, surgical registrar and consultant review, CT request, CT report, anaesthetic start, admission to ICU.

RESULTS. Mean age: 70 years, 9 male, 13 female. Median length of stay was 15 days. The mortality rate was 32 %. Forty-one percent had SIRS, 32 % sepsis and 27 % severe sepsis at time of recognition. From this point, the time taken for each of the following was: blood cultures 0 h, lactate 2 h, 1 litre of fluid 6.7 h, 3 litres of fluid 16.7 h, 1st antibiotic 5 h, registrar review 4.7 h, consultant review 14.1 h, CT request 11.1 h, CT report 35.3 h, anaesthetic start time 52.2 h, ICU admission 55 h.

CONCLUSIONS. Only 23 % and 68 % had blood cultures and lactate taken, respectively. Fluid resuscitation was inadequate, the median time for 1 litre of fluid to be infused was 6.7 h; these patients are often being under-resuscitated. The median time for antibiotic administration fell short of the recommended 3 h stated by the Surviving Sepsis Campaign (1). None of the patients admitted via A&E had been discussed with the surgical registrar, which caused likely delay to the recognition of illness and timeliness of intervention. These patients were considered high risk and by surgical guidelines (2) should be reviewed by a

consultant within 4 h, but our median time was 14.1 h. If the delay between CT request and report was reduced, an earlier decision could have been made on the patient going to theatre. These patients should be fast-tracked to theatre, yet there was a median time of 52.2 h from recognition to anaesthetic start time. Following the discovery of our non-adherence to the surviving sepsis protocol for these patients, we formulated and implemented a high-risk surgical patient pathway with a laparotomy card to highlight the key investigations and interventions required to ensure timely management.

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0207

WHAT IS THE BENEFIT OF THE EARLY WARNING SYSTEM?

S. Nair¹, C. O'Connor¹, S. MacColgain¹, M. Donnelly¹, N. Hayes¹, L. McGovern¹

¹AMNCH, Department of Anaesthesia and Intensive Care, Dublin, Ireland

INTRODUCTION. Delays in admission to ICU increases mortality.¹⁻² Earlier detection of a deteriorating patient can improve outcome and ERT (emergency response teams) have been shown to reduce cardiac arrest and hospital mortality.³⁻⁴ The Tallaght Hospital Emergency Response System (ERS) was introduced in January 2012.

OBJECTIVES. Compare the standardized mortality rates of patients admitted to ICU from inpatient wards through ERT versus the conventional referral route.

METHODS. We compared two types of ICU admissions

1) those admitted from inpatient ward areas by direct team referral; 2) those admitted via ERS activation from inpatient ward areas.

Study period - January to December 2013. The calling criteria for ERT was ViEWS score 7 or above. Inclusion criteria: adult patients from all inpatient areas of the hospital. Exclusion criteria: adult patients referred from ED or other hospitals/patients with incomplete datasets. All patient information was recorded on the ICU intensive clinical information portfolio (ICIP). Data were analysed using Fisher's exact test.

RESULTS. There were total 427 admissions to the unit in 2013 comprising 383 patients. A total of 180(46.9 %) patients were referred from inpatient wards. 102(56.6 %) patients came from direct referrals. 3 patients were excluded from analysis as apache data was incomplete, 4 were excluded due to no apache data as LOS < 8 h, 1 patient had no hospital outcome. Of the 78 (43.3 %) from ERT calls 6 were excluded as 5 had incomplete apache data and 1 had no hospital outcome. The other 203 patients were admitted from theatre, Emergency department and transfers from other hospitals.

	ERT Calls - 78 calls/ 68 patients	Non-ERT calls - 102 patients
Critical care outcomes	10 died (62)	14 Died (94)
Critical care unit mortality	16 %	15 %
Critical care unit SMR	0.5	0.4
Hospital outcome	21 died (62)	24 died (94)
Hospital mortality	34 %	26 %
Hospital SMR	1.0	0.7
Average apache II prognosis 2012	33 (33.16)	35 (34.96)

[2013 ERT calls versus Non ERT calls patients]

Table 1 shows the comparison of the critical care unit SMR and hospital SMR .

CONCLUSIONS. In this study there is no significant difference in ICU mortality (p 0.51) mortality or Hospital mortality (p 0.19) between ERS referrals and direct referrals. Our results question the benefit of the EWS in this patient group.

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0208

COMPARISON OF THE NATIONAL EARLY WARNING SCORE SYSTEM AGAINST A SINGLE PARAMETER WARNING SYSTEM FOR IDENTIFICATION OF THE DETERIORATING PATIENT

T.J.O. Atkinson¹, D. King¹

¹Southend University Teaching Hospital, Department of Anaesthetics & Critical Care, Southend-on-Sea, United Kingdom

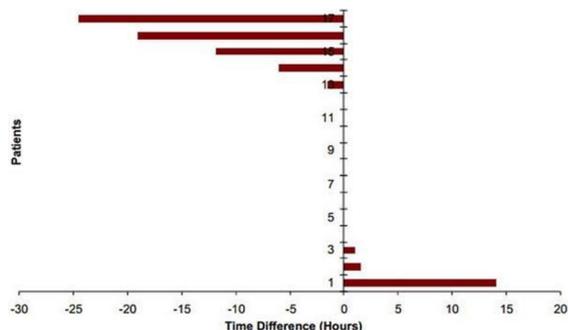
INTRODUCTION. The National Early Warning Score (NEWS), Royal College of Physicians UK (July 2012), aims to standardise the recognition and management of deteriorating patients in UK hospitals. Utilising a multi-parameter observation chart, where additional points are given the further a parameter deviates from "normal". A suggested graded response is also provided, to instruct the level of clinical response required.

Southend University Hospital employs a "Track & Trigger" Early Warning system (STT) where a standard notification to the parent clinical team is made by the nursing staff when any single parameter falls outside the accepted range. An audit was carried out to compare this system with the proposed NEWS.

OBJECTIVES. Compare the sensitivities of the STT system and NEWS in patients who had been admitted to the Intensive Care Unit, to quantify utility of introducing the NEWS and assess potential impact on ICU referrals and admissions.

METHODS. A pilot point-prevalence survey was carried out by reviewing all observation charts on one surgical ward, and one medical ward on a given day. Observations were transcribed onto a NEWS chart to see whether patients "triggered" one or other or both systems. A retrospective clinical notes review then looked at all ICU admissions over a 3 month period (January to March 2013). Patients included were admissions from medical and surgical wards only, excluding patients admitted directly from the Emergency Department, or from operating theatres. The observed parameters on the chart were transcribed on to a NEWS chart, and the times at which patients observations triggered a medical response were compared with the time they would trigger a NEWS score ≥ 5 .

RESULTS. The pilot survey found that of the 32 patients reviewed, 9 triggered the current system, and 8 scored ≥ 5 with NEWS. Two patients scored 7 and 9 respectively putting them in highest risk NEWS group, mandating “urgent Critical Care review” without triggering the STT. The audit of ICU admissions identified 17 patients, and in 9 of those cases the patients would have triggered both systems simultaneously. In 5 cases the patients would have triggered NEWS sooner, and later in 3 cases, as shown in graph below.



[“Trigger” time difference when using NEWS]

CONCLUSIONS. This study appears to show that the STT system compares favourably in terms of detecting deteriorating patients and facilitating admission to Critical Care. However, the NEWS was shown to be excessively sensitive in certain scenarios.

A standardised National Early Warning System has definite merit, in terms of continuity for staff and especially medical trainees rotating between hospitals. However, implementation must be carefully weighed against the impact on workload for Intensive Care Units and personnel.

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0209

UNSCHEDULED ADMISSIONS TO THE INTENSIVE CARE UNIT - IDENTIFYING INADEQUACIES THROUGHOUT THE PATIENT JOURNEY

P. Parulekar¹, E. Bodenham², V. Brown², V. Halai², P. Anderson²

¹Royal Sussex County Hospital, Intensive Care Unit, Brighton, United Kingdom, ²Royal Sussex County Hospital, Brighton, United Kingdom

INTRODUCTION. Improving patient safety and quality of care is a core component of good clinical governance. Early review by a senior grade of doctor and early clear focused decision making are of paramount importance in improving patient safety. The role of outreach nurses and regular NEWS monitoring are increasingly important in recognising and identifying ward patients early for potential high dependency and intensive care admission. Guidelines from the Royal College of Physicians (RCP) state that a patient with a NEWS score of 7 or more should be reviewed by a doctor of at least middle grade (registrars level).¹

OBJECTIVES. To assess the seniority of doctor reviewing patients prior to intensive care unit (ICU) admission.

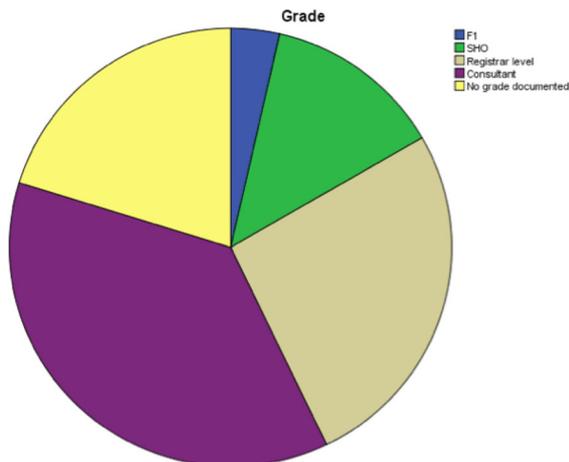
To assess the impact of outreach nurse review on ICU admissions.

To assess whether the NEWS score at time of deterioration correlates with ICU admission.

METHODS. A complete patient list of unscheduled surgical and medical ICU admissions to the Royal Sussex County Hospital, Brighton, UK between 04/01/2014 to 28/02/2014 was obtained via the electronic database system Metavision. 84 patient notes were extracted from the medical records library and results were collected and retrospectively analysed. Data was tabulated via Excel spreadsheet form and statistics were applied using Statistical Package for the Social Sciences (SPSS) Version 20.

RESULTS. 41 patients (48.8 %) of patients were reviewed by a consultant within the preceding 24 h prior to ICU admission, with 22 patients (26.2 %) being reviewed by middle grade doctors with no documentation of grade being noted in 17 patients (20.2 %).

13 patients (15 %) were reviewed by outreach nurses prior to ICU admission. Of these admissions 3 (3.6 %) patients were reviewed by outreach team more than once prior to admission. 27 patients (32.1 %) with a NEWS score of 7 or more were admitted to the ICU with only 15 (55.6 %) of these patients being reviewed by a doctor of middle grade level or above. 13 patients had no documentation of NEWS scores recorded.



[Pie chart: Grade of Doctor Reviewing Patient]

CONCLUSIONS. Only 48.8 % of patients were reviewed by a consultant within the preceding 24 h of ICU admission with only 26.2 % being seen by middle grade doctors. Only 55.6 % of patients with NEWS scores of at least 7 were reviewed by middle grades which suggests non compliance with the RCP national guidelines.

We aim to implement a trust wide policy to ensure all identified critically ill patients on the wards and in the acute care areas are reviewed by at least a middle grade doctor on a daily basis. We aim to highlight the importance of early senior decision making and significance of NEWS score assessment by formal education of junior doctors and nursing staff. We will present our findings to the trust board and to the hospital grand round meeting and will subsequently re-audit this and compare our results.

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0210

AN EVALUATION OF THE TIME DELAY FROM THE CLINICIANS DECISION TO ADMIT TO CRITICAL CARE TO THE ACTUAL CRITICAL CARE ADMISSION TIME IN THE UK

A.J. Parker¹, C.L. Johnstone¹, J.H. Littler¹, J.M. Eddleston¹

¹Manchester Royal Infirmary, Manchester, United Kingdom

INTRODUCTION. In the critically ill, treatment is best delivered within a critical care unit. Minimising delay to treatment is associated with better outcomes¹. The UK has a lower ratio of adult critical care beds per head of population than many Western countries² (3830 beds available in September 2013³). There are many reasons for delayed access; the National Adult Critical Care Clinical Reference Group report that approximately 10 % of all critical care discharges have delays greater than 24 h⁴.

OBJECTIVE. Assess compliance with recording time of decision to admit to critical care. Evaluate the subsequent time to admission and any reasons for delay.

METHODS. A prospective 28 day audit of consecutive unplanned admissions to 9 closed critical care units (107 beds) in Manchester beginning 9th September 2013. Each unit submits data to the Intensive Care National Audit and Research Centre Case Mix Programme (CMP). Admission time and unplanned admissions were recorded as outlined by CMP dataset definitions. Patient demographics were extracted from the dataset. Time of decision to admit and reasons for delay in admission were recorded separately.

RESULTS. 255 admissions were audited representing capture rate of 80 % of all unplanned admissions (164 male, 87 female, 4 unclassified, median age 60). Sources of admissions were Emergency Department (35 %), wards (24 %), theatres (24 %), HDU (11 %) and remainder from inter-hospital transfer and obstetric units.

204 patients were admitted to ICU (mean APACHE II score 16.2, SD 7.6) and 51 to HDU (mean APACHE II score 12.7, SD 5.0).

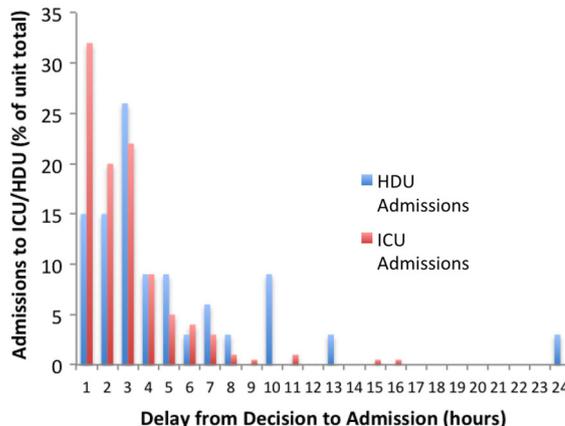
Data for time of decision to admission was available in 189 cases (74 % of audit population). 33 % of patients were admitted within 1 h of decision to admit and 52 % within 2 h. Median delay was 120 min (IQR 60 - 195 min); ICU median 110 min (IQR 50-182.5 min), HDU median 140 min (IQR 96-315 min).

Reasons for delay were given in 50 % of 189 admissions. Most common were clinical interventions e.g. radiology/theatres (n = 44), awaiting critical care bed (n = 27) and stabilisation prior to transfer (n = 11).

DISCUSSION. One third of admissions occurred within an hour of the decision to admit, rising to 81 % within the National 4 h Core Standard¹. However, time of decision to admit was only recorded in 74 % of admissions.

Currently, time of decision to admit is not included within the CMP dataset. Inclusion of this data field should address reliability of data capture and help drive a reduction in this time. This will require concerted efforts including elimination of delayed discharges to enhance flow. This should be undertaken before consideration of commissioning additional critical care capacity.

Length of time taken to admit to ICU and HDU



[Time to Admission]

REFERENCE(S). 1. Core Standards for Intensive Care Units, FICM, 2013. 2. Clinical Review: International Comparisons in critical care, Murthy et Wunsch Crit. Care 2012, 16:218. 3. Monthly SitReps Critical Care September 2013, NHS England. 4. National Adult Critical Care Clinical Reference Group, UK

0211 EARLY PREDICTIVE FACTORS OF SEVERITY FOR MULTIPLE TRAUMA PATIENTS

C. Allary¹, A. Follin¹, J. Reuter¹, R. Pirracchio¹, D. Journois¹

¹Hôpital Européen Georges Pompidou, Reanimation Chirurgicale et Traumatologique, Paris, France

INTRODUCTION. There is no consensus definition of multiple trauma patients [1]. The most commonly used, as the Injury Severity Score (ISS), take into account a precise description of anatomical injuries, so they can be calculated only after taking care of the patient. However, a few patients, who don't have any serious appearing organ failure, can quickly and deeply deteriorate.

OBJECTIVES. The aim of our study is to identify early risk factors associated to a poor prognosis, or the need for specialized treatments, as neurosurgery or interventional radiology, in order to improve the pre-hospital emergency care of the polytrauma.

METHODS. This is an observational study. The data of all patients admitted between January 2012 and December 2013 in an university hospital in Paris were collected prospectively on a register. We collected demographic data, injury mechanism, organ failures during pre-hospital care, treatments provided in the first 24 h in hospital (blood transfusion, surgery, arterial embolization), length of stay in ICU and hospital, ISS and IGS2 scores, and mortality rate. The primary endpoint is the relation between prehospital data and a poor prognosis or the need for specialized treatment. It was evaluated by a non parametric random forest approach [2]. A «poor prognosis» corresponds to the death in ICU, and/or transfusion of more than 3 packed red blood cells, and/or an ISS score higher than 15. The «specialized treatments» are the need for interventional radiology, and/or monitoring the intracranial pressure, and/or spine injury with neurological deficit. Data are presented as median and interquartile ranges for the continuous variable, and percentage for the categorical variable.

RESULTS. We admitted 949 patients for polytrauma during these 2 years. 73 % of them are men, and the median age is 36 [25-49] years old. The median IGSII is 19 [11-33] and ISS 10 [4-19]. The hospital mortality rate is 4.4 %. The length of stay in ICU and in hospital are respectively 2 [2-3] and 8 [3-16] days. Chest, skull and abdomen injuries, knife wounds and age appear as the most predictive factors of a poor prognosis. The most predictive factors for the need for specialized treatments were the use of norepinephrine, knife wound, accidental fall, pedestrian road accident, abdomen and chest injuries.

CONCLUSIONS. Some early obtained characteristics of multiple trauma patients could help to identify patients at risk of poor prognosis or needing specialized treatments. Taking this parameters into account could help guiding the patient to the appropriate hospital, and optimizing emergency treatments given.

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0212 DO PANDEMIC INFLUENZA SPECIFIC TRIAGING TOOLS PERFORM BETTER THAN CONVENTIONAL SEVERITY SCORES? A RETROSPECTIVE COHORT STUDY

B. Morton^{1,2}, L. Tang³, R. Gale², M. Kelly², H. Robertson⁴, K. Williams², M. Mogk⁵, N. Robin¹, I. Welters²

¹Liverpool School of Tropical Medicine, Department of Clinical Sciences, Liverpool, United Kingdom, ²Royal Liverpool and Broadgreen University Hospital, Critical Care Department, Liverpool, United Kingdom, ³University of Liverpool, Medical School, Liverpool, United Kingdom, ⁴Countess of Chester Hospital, Critical Care Department, Chester, United Kingdom, ⁵MoReData GmbH, Giessen, Germany

INTRODUCTION. Pandemic influenza presents a major threat to global health and socioeconomic wellbeing. Demand for critical care resources during a future pandemic may force clinicians to triage patients for admission. Two influenza specific triage tools have been developed: the Ontario Health Plan for an Influenza Epidemic (OHPIP)¹ and the Simple Triage Scoring System (STSS)². Neither tool has been validated in patients with influenza during a pandemic stretching capacity.

OBJECTIVES. To apply OHPIP and STSS to a cohort of patients admitted to hospital and validate scores against actual patient outcomes. We will use the Mortality in Emergency Department Sepsis (MEDS) score³ to determine if new scores outperform existing tools.

METHODS. We performed a retrospective review of patients with confirmed H1N1 influenza during the UK pandemic 2010-11. Demand for critical care during this period forced Merseyside hospitals to implement escalation policies, cancelling elective surgery to increase capacity. Two sites were included: Royal Liverpool University Hospital and Countess of Chester. Inclusion: PCR confirmed H1N1 influenza, age > 18. Exclusion: No evidence of treatment, patient not admitted to hospital or absent case notes. 101 patients met criteria for inclusion. Two independent reviewers examined patient records; data cross-checked and disparities adjudicated by the senior author. UK ethical approval was obtained (13/LO/0609). Statistical analysis was performed using R (version 3.0.3).

RESULTS. Patient demographic details: table 1. The STSS score predicted intensive care admission with a ROC AUC of 81.6 % (CI 0.727-0.904). The OHPIP tool was more complicated to apply and predicted admission with a sensitivity and specificity of 75.9 % and 91.0 %. The MEDS score predicted intensive care admission with a ROC AUC of 76.8 % (CI 0.681-0.855). Need for intensive care admission was associated with increased respiratory rate (p < 0.001), lactate (p < 0.001), urea (p = 0.003) and creatinine (p = 0.043) and decreased PaO₂/FiO₂ ratio (p < 0.001) and pH (p = 0.025).

	Critical care admission (29)	No critical care admission (72)	p value
Age (median, IQR)	47 (37-54)	38 (26-51)	0.044
Males (n, %)	14 (48.3 %)	29 (40.3 %)	0.826
Hospital LOS (median, IQR)	23 (12-32)	3 (2-6)	0.0001
Mortality (median, IQR)	9 (34.4 %)	2 (2.8 %)	0.0002
SOFA (median, IQR)	4 (3-6)	2 (1-4)	0.0001
APACHE II (median, IQR)	16 (11-22)		
Critical care LOS (median, IQR)	7 (10-17)		
Ventilated (n, %)	22 (75.8 %)		
Ventilator dependent days (median, IQR)	9 (1-15)		

[Table 1]

CONCLUSIONS. The STSS score was a better predictor of critical care admission than both the OHPIP and MEDS tools. However, no tool was an 'excellent' (AUC > 0.9) predictor of admission. Future implementation of triage tools will be challenged by need for increased training, hospital governance procedures, and likely limited clinical and possibly public acceptance of what may be regarded as "blunt" tools. We recommend that the STSS tool be used in the initial assessment of patients admitted to hospital during a future pandemic. This could facilitate early identification of at risk patients and trigger timely critical care review.

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0213 AUDIT OF CRITICAL CARE REFERRALS IN ONE DISTRICT GENERAL HOSPITAL (DGH)

A. Myers¹, S. Vidgeon¹

¹Croydon University Hospital, London, United Kingdom

INTRODUCTION. Critically ill patients benefit from assessment and management by experienced clinicians prior to and following ICU referral. NCEPOD [1], NHS London [2], and the Department of Health [3] highlight the importance of Consultant input into the referral process.

OBJECTIVES. To assess senior involvement in referrals made to one DGH ICU.

METHODS. ICU doctors receiving referrals filled out an online questionnaire following all calls received in 3 month period (Nov 2013 to Jan 2014). They recorded details including the grade of referring clinician, outcome, and whether the referral seemed appropriate or not. Results were collected anonymously and analysed at the end of the data collection period.

RESULTS. 96 referrals were made (61.5 % general medicine; 27.1 % A&E; 4.1 % general surgery; 7.3 % from cardiology, obstetrics, orthopaedics and vascular). 57 % of referrals were judged to have been inappropriate.

39 % were admitted to critical care, 50 % remained on a ward. The rest were palliated or transferred to another hospital.

In the 24 h prior to referral, a Consultant had reviewed the patient in 45 % of cases. A further 44 % had been seen by a registrar.

Referrals were made by registrars (42.7 %), junior doctors (28.1 %), Consultants (18.8 %), Outreach nurses (9.4 %) and ward nurses (1 %). 57.3 % were referred out of hours. 86 % were discussed by the receiving registrar with the ICU consultant.

Of the 41 registrar referrals, 26 were appropriate, 14 inappropriate, and 1 too late.

10 referrals were made by nursing staff (8 out of hours, 6 of which were inappropriate). 47 % of out of hours referrals were deemed inappropriate, compared with 34 % made during working hours.

CONCLUSIONS. Most cases had been reviewed by a registrar or consultant prior to referral. However, the aim should be that critically ill patients are reviewed by the most senior member of the admitting team and fully optimised prior to referral. In certain urgent cases, this may not be possible.

A large proportion of referrals were assessed to have been inappropriate. The main reasons given for this judgement included failure to optimise the patient on the ward (37 %); no requirement for invasive monitoring or organ support (19 %); irreversible or end-stage disease (39 %).

These results suggest that Consultants need to be more involved in making ICU referrals and that ward based doctors would benefit from education regarding the purpose and limitations of critical care. Such education may improve optimisation of patients on the wards and reduce the time critical care doctors need to spend away from the ICU.

REFERENCE(S). [1] *An Acute Problem? Report of the National Confidential Enquiry into Patient Outcome and Death.* London: National Confidential Enquiry into Patient Outcome and Death; 2005. [2] *Quality and Safety Programme Critical Care.* London Health Programmes; 2013. [3] *Guidelines on Admission to and Discharge from Intensive Care and High Dependency Units.* London: Department of Health; 1996

0214 EVALUATION OF SEVERITY IN ELDERLY CRITICALLY ILL PATIENTS (ECIPs)

J. Ruiz Moreno¹, E. González Marín¹, R. Corcuera Romero de la Devesa¹, M.J. Esteve Paños¹, N. Suárez Álvarez¹, M. Julia Mill¹, M. Moral Guiteras¹, N. Conesa Folch¹, M.J. Riba Ribalta¹, S. Godayol Arias¹

¹IDC Salud Hospital Universitari Sagrat Cor, Critical Care Department, Barcelona, Spain

INTRODUCTION. It is considered that the severity of ECIPs is higher than the overall CIPs requiring ICU admission. It is also considered that ECIPs have poorer outcomes from intensive care than younger CIPs. In any case and in parallel with the ageing of the general population throughout the world, more ECIPs are admitted to the ICU. However, the identification of specific clinical variables which determine the severity of the ECIPs has not been researched sufficiently.

OBJECTIVES. To assess the severity of the ECIPs compared to overall CIPs. Likewise, to evaluate and compare the mortality between two populations.

METHODS.

- Prospective, analytical, longitudinal, and observational study
- Period: Between January 1-2012 and August 31-2013 (20 months)
- **SETTING.** Medical/Surgical ICU belonging to a 290 acute care teaching hospital
- Population and sample: All the CIPs admitted consecutively to the ICU. Sample: 1090 CIPs.
- Exclusion criteria: CIPs < 16 years, major burn patients, incomplete clinical documentation, and voluntary discharge
- ECIP: patience 84 years old or more.
- Clinical variables: a) demographic: age, origin (medical CIPs, urgent surgical CIPs, elective surgical CIPs); b) hospital mortality; c) clinical variables: metabolic acidosis, oncological pathology; d) ICU procedures: total parenteral nutrition, intra-abdominal pressure, blood products, cultures, cardiac output, advanced life support, fibrogastroscopy, fibrobronchoscopy; e) limitation of life support (LLS).
- Statistical analysis: χ squared and contrast of means (Student's t - distribution)

RESULTS. Global CIPs: 1090. See Tables I and II.

Age: 83 years or <	Variables - 'p' value	Age: 84 years or >
63,0	Average age	86,9
58 (5,3 %)	Mortality (0,003)	15 (9,5 %)
180 (16,2 %)	Sepsis (0,001)	43 (27,2 %)
398 (36,5 %)	Met. acidosis (0,56)	54 (34,1 %)
421 (38,6 %)	Oncolog. path. (0,002)	41 (25,85 %)
202 (18, 6 %)	TPN (0,2)	36 (22,78 %)
202 (18, 6 %)	Blood Products (0,14)	37 (23, 4 %)

[Results 1]

Age: 83 years or <	Variables - p value	Age: 83 years or >
63 (5,8 %)	IAP (0,71)	5 (5,1 %)
281 (25,8 %)	Cultures (0,002)	59 (37,3 %)
28 (2,6 %)	F.Gastro.C (0,31)	2 (1,3 %)
28 (2,6 %)	F.Broncho.C (0,13)	1 (0,6 %)
34 (3,1 %)	ALS (0,38)	7 (4,4 %)
81 (7,4 %)	LLS (0,001)	32 (20,2 %)

[Results 1]

CONCLUSIONS.

- The severity in regard ECIPs is higher considering only the following variables: 'sepsis', 'oncological pathology', and 'cultures'.
- Mortality is higher in ECIPs
- The LLS applies more in ECIPs.
- Old age alone is probably not a contraindication for ICU admission

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0215**OUTCOME OF ELDERLY PEOPLE RECEIVING MECHANICAL VENTILATION IN ICU**

A. Ortín¹, R. Jimenez², S. Rebollo², M. Galindo², A. Fernandez², L. Herrera², A. Ojados², L. Tarraga², Y. Bonilla², M. Contreras²

¹Hospital General Universitario Santa Lucía, Intensive Care, Cartagena, Spain, ²Hospital General Universitario Santa Lucía, Intensive Care Unit, Cartagena, Spain

INTRODUCTION. Older people compromise a big deal in Critical Care. Several reports warn of a rapid growth in demand for intensive care services by older patients, particularly the very old (80 years or older), arising from the combined effect of ageing demographics, expansion of intensive care services, advances in therapeutics and technology, and the evolution of community expectations. Providing intensive care services for any age group involves outcome, resource and ethical considerations. Intensive care may not benefit those with irreversible disease or extreme fragility. Thus, clinicians, patients, families and the community face complex management and end-of-life decision about the appropriate use of life support therapies like mechanical ventilation.

OBJECTIVE. To assess trends in service use and outcome of critically ill very old people (80 years or older) receiving unplanned mechanical ventilation in intensive care unit (ICU). **METHODS.** We undertook a retrospective cohort study of ICU admissions of patients receiving unplanned mechanical ventilation between May 2011 and 31 December 2013. We performed analysis of mortality in patients attending on the following subgroups: the very old (>80 years) and younger patients. Statistical: Comparisons using t-test, Mann-Whitney or Chi Square as appropriate.

RESULTS. Population data We analyzed 531 patients: 75 patients >80 years old and 456 patients <80 years old. Table 1 shows data regarding to differences in age, APACHE II and death. There were no differences in patient origin, immunosuppression, urgent surgery neither type of admission (medical, trauma, coronary or surgical patients). Table 2 shows mortality of both groups according to a categorized APACHE II

	Age	APACHE II	Death
<80 years	59.21 (57.81-60.6)	21.92 (21.16-22.68)	34.7 %
>80 years	83.6 (82.85-84.35)	24.41 (22.49-26.33)	62.5 %
	p < 0.001	p 0.014	p < 0.001

[Table 1]

	Group 1 APACHE 0-9	Group 2 APACHE 10-19	Group 3 APACHE 20-29	Group 4 APACHE > 30
<80 years	10 %	19.5 %	41.9 %	54.3 %
>80 years	100 %	64.7 %	66.7 %	50 %
	p 0.026	p < 0.001	p 0.009	p NS

[Table 2]

CONCLUSION. Our study found that very old patients represented 14.12 % of all patients admitted to the ICU receiving unplanned mechanical ventilation. Interestingly, we showed

evidence that very old patients were more likely to have a greater acuity of illness. Very old patients, when compared with younger age strata, showed consistently lower survival. There were divergent age-related trends in ICU ventilated patients mortality according to a categorized APACHE II groups, except in group 4 (the group with higher score) where there were no differences. End of life planning and access to palliative care are crucial for those with severe illness or irreversible disease.

0216**CHARACTERISTICS AND OUTCOMES OF ELDERLY PATIENTS ADMITTED TO A MULTIDISCIPLINARY INTENSIVE CARE UNIT**

H. Aguirre-Bermeo¹, P. Cueto¹, C. Rovira¹, E. García¹, P. Garrido¹, J. Bergada¹, F. Roche-Campo¹, I. Vallverdú¹

¹Hospital Sant Joan de Reus, Reus, Spain

INTRODUCTION. The number of elderly patients (65 ≥ years old) admitted to the intensive care unit (ICU) increased during the last years.

OBJECTIVES.

- 1) To analyze the outcomes of elderly patients admitted to our ICU and
- 2) to identify risk factors for mortality.

METHODS. In this retrospective study, we included all patients admitted to the ICU from July 2008 to September 2012. We excluded patients with acute coronary syndromes and <18 years old. Patients were classified into 3 groups, by age: group A: <65 years; group B: 65-79 years; and group C: ≥80 years. The main variables collected were as follows: demographic variables; severity of disease without age factor (APACHE II, SAPS II); requirement and duration of mechanical ventilation (MV) and renal replacement therapy; length of stay (ICU and hospital); and mortality (ICU, hospital and 1 year after admission). The Chi square test was used to compare categorical variables and ANOVA for quantitative variables. COX regression was used to assess independent risk factors for ICU and hospital mortality.

RESULTS. A total of 1095 patients were included: 565 (52 %) in group A, 430 (39 %) in group B, and 100 (9 %) in group C. Mortality for each group is shown in the table. Independent factors related to ICU mortality were: APACHE II 1.05 (1.02-1.08); group C, 2.18 (1.34-3.55); and MV 2.57 (1.38-4.32). Independent factors related to hospital mortality were: SAPS II 1.02 (1.01-1.03); APACHE II 1.04 (1.01-1.07); group B, 1.57 (1.16-2.12); group C, 2.25 (1.49-3.41); and MV 2.85 (1.93-4.23).

VARIABLE	Group A (n = 565)	Group B (n = 430)	Group C (n = 100)	p=
ICU ^{a,b}	77 (14 %)	102 (24 %)	32 (32 %)	<0.05
Hospital ^{a,b,c}	22 (4 %)	35 (8 %)	14 (14 %)	<0.05
One year after admission ^{a,b,c}	28 (5 %)	37 (9 %)	12 (12 %)	<0.05
Cumulative at one year post-admission ^{a,b,c}	127 (23 %)	174 (41 %)	58 (58 %)	<0.05

Data are presented as number (percentage). ICU, Intensive care unit. ^aSignificant between group A and B. ^bSignificant between group A and C. ^cSignificant between group B and C.

[Table: Patient mortality by group classification.]

CONCLUSIONS. Elderly patients account for nearly 50 % of admissions in our ICU. Disease severity, age and MV are independent factors associated with mortality. Mortality at 1 year post-admission is high.

0217**ADOLESCENTS IN A PICU: CURRENT TRENDS AND PERSPECTIVES ON RESOURCE UTILIZATION**

E. Vasilaki¹, E. Geromarkaki², S. Ilia¹, D.M. Fitrolaki¹, T. Tavladaki¹, E. Blevrakis¹, A.M. Spanaki¹, G. Briassoulis¹

¹University Hospital of Heraklion, PICU, Heraklion, Greece, ²University Hospital of Heraklion, Pediatric Intensive Care, Heraklion, Greece

INTRODUCTION. Adolescents use pediatric hospitals for their inpatient needs. The prevalence and characteristics of adolescent pediatric intensive care unit patients have not been reported.

OBJECTIVES. To estimate the proportion of adolescents admitted to a single pediatric intensive care unit (PICU), characterize them, and compare them with younger aged patient groups.

METHODS. We evaluated four different age groups (<6, 6-14, 14-18, >18 years-old) consecutive admissions (n = 1099) to a 7-bed PICU over a 10-year period.

RESULTS. Among 1099 admissions, age groups < 6 (58 %) and 6-14 years (49.4 %) had higher percentage of acute illnesses, ages 14-18 the highest frequency of malignancies (16.7 %), and those >18 complex chronic conditions (46.6 %, p < 0.0001). The last group had the highest prevalence of admission positive blood cultures (7.1 % vs. 1.8 % (<6), p < 0.0001), non-invasive ventilation (7.4 % vs. 3.8 % (10-14), p < 0.05) and tracheostomy (14.8 % vs. 6.9 % (<6), 11.8 % (6-14), 7.7 % (14-18), p < 0.05). Diagnostic categories differed significantly between age groups (p < 0.0001). More often patients were covered by antibiotics in the <6 (70 %) and >18 (81 %) than the 6-14 (60 %) or 14-18 (64 %) age groups (p < 0.05). The highest percentage of immigrants was in the <6 (20 %) and tourists in the 6-14 (5.4 %) compared to 89 % natives in the >14 (p < 0.001). Mortality (4 %) did not differ among groups and varied between 2.2 % (6-14) and 7.4 % (>18). LOS, LOMV, severity of illness, surgery, and mechanical ventilation (52 % in the >18 years), did not differ among the 4 age groups. Longitudinally (2004-2014), co-morbidity, diagnostic categories and age groups distribution differed (p < 0.0001), showing increasing trends for older patients with metabolic diseases and organ failures.

CONCLUSIONS. In this single-institutional study, adolescents constituted a small but high-risk proportion of patients in some PICUs, suggesting that these PICUs should have plans and protocols specifically focused on this group.

Stroke: 0218–0231

**0218
EXTERNAL VALIDATION OF THE ISCORE AND DRAGON SCORE IN
INTRAVENOUS THROMBOLYSIS-TREATED ACUTE ISCHEMIC STROKE
PATIENTS**

J.S. Lee¹, H.S. Choi¹, H.P. Hong¹, Y.G. Ko¹, D.S. Lim¹, H.C. Chung¹, H.S. Sim¹, J.S. Choi¹

¹Kyung Hee University Hospital, Department of Emergency Medicine, Seoul, Republic of Korea
INTRODUCTION. Ischemic stroke is a leading cause of death and disability worldwide. Despite many efforts to improve treatments, less than 50 % of intravenous (IV) alteplase-treated patients have favorable outcomes. Recent research regarding stroke outcome prediction models demonstrated that the iScore and DRAGON score could be used to predict clinical responses after IV thrombolytic therapy in acute ischemic stroke patients.

OBJECTIVES. This study aimed to compare the prediction efficacies of 2 acute ischemic stroke outcome prediction models and to determine the prognostic factors in patients with discordant outcome predictions using the iScore and DRAGON score.

METHODS. Two hundred and eight consecutive IV thrombolysis-treated patients were included in this analysis. To calculate the iScore and DRAGON score, we reviewed the demographic characteristics, laboratory data, radiologic findings, stroke severity, and subtype data. The scores were categorized into 3 risk groups (low, moderate, and high). Functional outcomes were measured using the modified Rankin scale at discharge. The proportion of good outcomes was assessed in each risk group using the iScore and DRAGON score. For the patients whose risk categories with the 2 prediction models were not concordant, we performed univariable and multivariable analyses to identify the independent predictors of a good outcome.

RESULTS. Among 208 patients, 71 (34.1 %) had good functional outcomes at discharge. The proportions of good outcome in each risk group were 48.1, 20.0, and 20.5 %, respectively, with the iScore and 44.3, 17.1, and 0 %, respectively, with the DRAGON score. Seventy-three (35.1 %) patients had discordant risk categorization with the 2 prediction models. In these patients, the iScore and DRAGON score-based outcome prediction was not reliable; however, a glucose level <150 mg/dL correlated independently with a good functional outcome regardless of the baseline National Institutes of Health Stroke Scale score and hemoglobin A1c level (adjusted odds ratio, 6.386; 95 % confidence interval, 1.055-38.653).

CONCLUSIONS. The DRAGON score may be more useful than the iScore for predicting clinical responses after IV thrombolytic therapy for acute ischemic stroke. The concordance between the 2 prediction models is unacceptable. Further validation studies are needed.

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GRANT ACKNOWLEDGMENT. No study sponsors were involved.

**0219
CLEVIDIPINE IS SAFE AND EFFECTIVE FOR RAPID BLOOD PRESSURE
CONTROL IN PATIENTS WITH ACUTE NEUROLOGICAL INJURIES**

K.H. Polderman¹, D. Bajus¹, J. Varon²

¹University of Pittsburgh Medical Center, Pittsburgh, United States, ²The University of Texas Health Science Center, Houston, United States

INTRODUCTION. Rapid and precise control of blood pressure (BP) is critical in many patients with acute neurovascular emergencies including acute intracerebral hemorrhage (AIH), subarachnoid hemorrhage (SAH), acute ischemic stroke (AIS), posterior reversible encephalopathy syndrome (PRES) and other types of hypertensive encephalopathy. Further, tight BP control is critical after neurovascular interventions to prevent reperfusion injury. However, prevention of ischemic injury due to hypotension is equally or more important. Hypotension resulting from “overshoot” in BP reduction can cause or worsen AIS and has been linked to adverse outcome in patients with acute brain injury.¹ Clevidipine is a low-volume IV Ca channel blocker with rapid onset (90 s) and offset (5-10 min), making it easy to titrate for predictable BP control. It has so far been tested mainly in cardiac surgery patients; experience in neurocritical patients is very limited. We performed a prospective intervention study to test clevidipine to control BP in the acute phase of neurologic emergencies.

METHODS. Patients meeting inclusion criteria were started on clevidipine at the discretion of the attending physician, with BP targets (highest acceptable = cap, lowest acceptable = floor) set by the treatment team. BP was measured with an arterial line. Patients were started on 4-8 mg/h, increased stepwise every 90 s (maximum 32 mg/h) until target range was achieved. Primary outcome measures were median time to target range and % of patients achieving target range. Secondary parameters included time within target range divided by total time on the drug. Safety parameters included % of patients with “overshoot” below BP floor and time to recovery above floor.

RESULTS. The study is ongoing, with 74 patients enrolled to date (ICH: n = 31, SAH: n = 23, AIS: n = 12, presumed PRES: n = 3, endovascular treatment of AVM: n = 5). Initial BP control was achieved in 74/74 patients (100 %). Median time to target was 6 (average 4.3 ± 6.2) minutes. Average dose required to achieve target was 16.8 mg/h. Required dose varied by indication, with higher doses being required in patients with ICH. Subsequent time within target range until discontinuation of the drug was 98 %. 3 patients (4 %) had an overshoot to below set BP floor (mean 9 mmHg, range 5-14 mmHg). The average duration of the overshoot was 4.3 min.

CONCLUSIONS. Clevidipine was highly effective in controlling BP in patients with acute neurological disorders. Doses required to achieve targets were significantly higher than have previously been reported, likely reflecting the hyperadrenergic state often associated with acute brain injury. In patients experiencing hypotension the effects of clevidipine were rapidly reversed when the drug was temporarily discontinued, demonstrating safety. Clevidipine should be considered for treating hypertension in patients with acute neurological injuries.

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**0220
BRAIN INJURY BIOMARKERS' UTILITY AS A MORTALITY PREDICTOR IN
PATIENTS WITH SPONTANEOUS INTRACEREBRAL HEMORRHAGE**

A. Serrano¹, R. Huerta¹, A. Mesejo¹, D. Aguillón¹, L. Palacios¹, C. Sanchis¹, M.L. Blasco¹, J.M. Segura¹, M. Juan², A. Vargas¹

¹Hospital Clínico Universitario de Valencia, Valencia, Spain, ²Hospital General Universitario de Ciudad Real, Ciudad Real, Spain

OBJECTIVES. To evaluate the utility of brain injury biomarkers (BIM) to predict mortality in patients with spontaneous intracerebral hemorrhage (SIH).

METHODS. We included patients admitted in our ICU with SIH. We determined BIM (D Dimer (DD), Brain Natriuretic Peptide (BNP) and C reactive protein (CRP)), clinical parameters and complications at admission, and 24 h, 48 h and 72 h of ICU stay. We determine ROC curves and the best cutoff point of the BIM related to mortality. Results in % and mean (±SD) or median (min-max). We used the T-student and Chi square test to correlate quantitative and qualitative variables respectively with significant p < 0.05.

RESULTS. We included 81 patients with SIH. 70 % were men, with a median of age of 63 years (28-80), with a 41 % mortality, the median length of ICU stay was 7 (1-55) days and 4 (0-51) days of mechanical ventilation (DMV). APACHE II 13 (0-30) and Glasgow coma scale at admission (GCS) 11 (3-15). The BIM and results of the ROC curve in relation to mortality, the cutoff points with the best area under the curve (AUC) and the greater sensitivity and specificity are shown at Table 1. The patients were separated into two groups according to these cutoff points (Group 1 DD > cutoff point and Group 2 DD < cutoff point). Group 1 (DD₁ > 680, DD₂ > 845 and DD₃ > 1060) had higher APACHE II (p 0,000) and SOFA score (p 0,000), more days of ICU stay (p 0,001), and DMV (p 0,000), lower GCS at admission (p 0,000), greater hematoma volume (p 0,000) and more complications shown in Table 2 than the Group 2 (DD < cutoff point).

Brian Injury Markers	AUC	p	CI 95 %	Cutoff Point	Sensitivity	Specificity
BNP Day 0	0,7	0,003	0,61-0,82	37,9	73 %	60 %
D Dimer Day 0	0,7	0,006	0,62-0,81	400	67 %	65 %
D Dimer Day 1	0,75	0,000	0,63-0,88	680	72 %	65 %
D Dimer Day 2	0,79	0,000	0,68-0,88	845	75 %	70 %
D Dimer Day 3	0,76	0,000	0,64-0,87	1061	72 %	60 %

[Table 1]

Complications	Group 1 (DD > Cutoff Point)	Group 2 (DD < Cutoff Point)	p
EXITUS	28 %	11 %	0,003
Thraqueostomy	28 %	9 %	0,000
Ventricular Drainage	25 %	4 %	0,000
Surgery	14 %	4 %	0,03
Intracranial Hypertension	37 %	11 %	0,000
Rebleeding	28 %	6 %	0,000
Hydrocephalus	23 %	5 %	0,000
Edema	35 %	12 %	0,000

[Table 2]

CONCLUSIONS. D Dimer at 24, 48 and 72 h above the cutoff points defined correlates to greater mortality, severity and complications in patients with SIH. BNP at admission, was also related to mortality but with less sensitivity and specificity.

**0221
INDUCED MILD HYPOTHERMIA FOR ISCHEMIC STROKE PATIENTS**

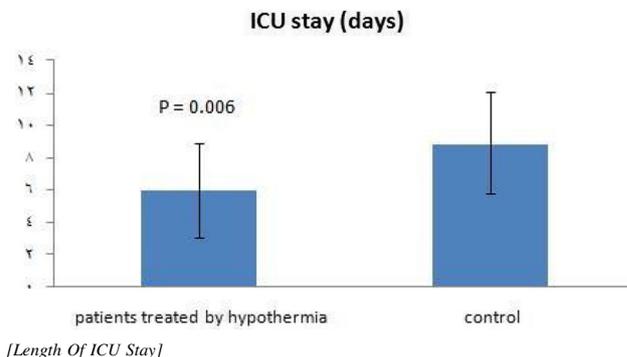
A.E. Elnahrawy^{1,2}, A.Y. Alsisi³, M.M. Khalaf³, H.S. Effat³

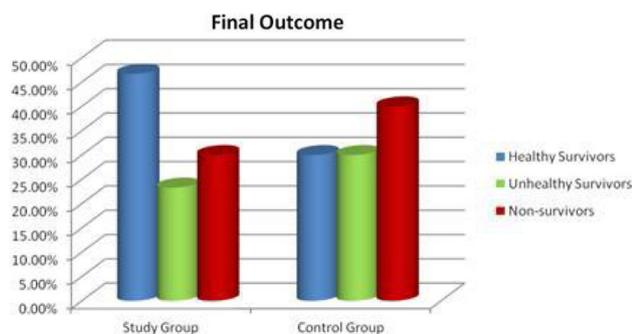
¹Om Almasryeen Hospital/Cairo University Hospitals, Intensive Care Medicine, Giza, Egypt, ²Sidawy Medical Insurance Hospital, Intensive Care Medicine, Cairo, Egypt, ³Cairo University Hospitals, Intensive Care Medicine, Cairo, Egypt

INTRODUCTION AND AIM. Therapeutic hypothermia is an established neuroprotective intervention in post-cardiac arrest patients. In our study we investigated the therapeutic value of mild induced hypothermia in ischemic stroke patients and its effect on mortality and degrees of disability.

METHODS. A total of 40 patients admitted to the ICU with ischemic stroke were included in a prospective, randomized, double centre study, and were randomly assigned to group A (30 patients) as the study group and group B (10 patients) as the control group. Group A patients were subjected to induction of mild hypothermia (34-35 degrees Celsius) for a 24 h period, plus the conventional stroke therapy. On the other hand, group B patients received the conventional stroke therapy alone. Hypothermia was achieved by IV acetaminophen, external cooling methods, and IV cold saline infusion. All patients were subjected to a thorough physical examination, GCS and SOFA score calculations upon admission and daily thereafter. Brain CT scan imaging was performed upon admission, 48 h and 5 days after admission. Clinical outcome (conscious level, motor function, brain edema, duration of ICU stay, mortality) was recorded for all patients, as well as the development of any complication.

RESULTS. In the study group A, 63.3 % of patients have shown significantly resolved brain edema, versus only 20 % of patients in the control group B (P value 0.028). The median length of ICU stay (days) in group A was 6 days, versus 8.5 days in group B (P value 0.006). The GCS (cognitive functions) correlated strongly in an inversely proportional relationship to the mean SOFA score (R = -0.89). Mortality in group A was 30 % versus 40 % mortality in group B, (P value = 0.719). In group A, 23.3 % of patients were discharged with marked disability versus 30 % of patients in group B (P value 0.719). In group A, 53.3 % of patients have developed infectious complications versus 50 % of patients in group B (P value 1).





[Final Outcome]

CONCLUSION. Mild induced hypothermia is a promising neuroprotective intervention that is cheap, readily available and almost devoid of serious complications. It decreases the length of ICU stay and effectively controls cytotoxic brain edema associated with large infarctions. Despite the lack of a statistically significant effect on the final outcome, there is a trend for a better outcome in patients treated with hypothermia which calls for further studies on larger numbers of patients.

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Application of mild therapeutic hypothermia on stroke: a systematic review and meta analysis by Shaheen E. Lakhan and Fabricio Pamplona.

0222**CRITICAL CARE STROKE OUTCOMES - NOT AS BAD AS YOU MAY THINK**

M. Georgieva¹, R. Simister², M. Smith³, B. Geerts¹, D. Brealey⁴

¹University College London Hospitals NHS Foundation Trust, Critical Care, London, United Kingdom, ²University College London Hospitals NHS Foundation Trust, Hyper Acute Stroke Unit, London, United Kingdom, ³University College London Hospitals NHS Foundation Trust, Neurocritical Care, London, United Kingdom, ⁴University College London Hospitals NHS Foundation Trust, London, United Kingdom

INTRODUCTION. The recent development, across the UK, of stroke networks and the hyper acute stroke units (HASUs) have enabled a rapid improvement of stroke services and patient outcomes. Approximately 5% of stroke patients develop a critical illness, often related to low levels of consciousness. Though it is recognised that the injured brain is intolerant of hypoxia or deranged blood pressure control, critical care services have been reticent to intervene as outcomes (both mortality and morbidity) are thought to be extremely poor. University College London Hospitals (UCLH) opened a HASU in 2010 to serve all stroke patients in the sector. Pathways were developed to enable medical and nursing staff to recognise the critically ill patient and directly access anaesthetic and critical care services. Anaesthetic teams were equipped with the infra-structure to make rapid and definitive interventions with immediate access to a general or a neuro-critical care unit.

OBJECTIVES. This study aimed to examine the outcomes of a cohort of actively managed stroke patients admitted to critical care to establish both mortality and functional outcome at over 1 year post discharge.

METHODS. A retrospective review of all stroke patients admitted via the HASU pathway and needing admission to either the general or neuro-critical care units, between 2010 and 2012. The Primary Care doctor of survivors was contacted, following at least 1 year post hospital discharge. They were asked to assess the patient's functional capability using a Modified Rankin Score (MRS), Table 1

Score	Disability	Outcome
0	No symptoms	Independent
1	No significant disability	Independent
2	Slight disability, no assistance required	Independent
3	Moderate disability, able to walk unaided	Favourable outcome
4	Moderately severe disability, needs assistance	Unfavourable outcome
5	Severe disability, bed bound	Unfavourable outcome
6	Dead	Unfavourable outcome

[Table 1: Modified Rankin Score]

RESULTS. 144 stroke patients were admitted to UCLH Critical Care Units between 2010 and 2012. 76 had an ischaemic stroke and 48 haemorrhagic. Outcomes are displayed in table 2

	Ischaemic stroke (n = 76)	Haemorrhagic stroke (n = 48)
Mean age, years (SD)	65 (±17)	67 (±13)
Mean ICU length of stay, days (SD)	5 (±7)	10 (±33)
ICU survival, n(%)	48 (62 %)	30 (52 %)
Survival at ≥1 year post hospital discharge, n (%)	33 (43 %)	23 (48 %)
MRS ≤ 3 at ≥1 year post hospital discharge, n(%)	21 (66 %)	11 (50 %)

[Table 2: Stroke outcomes]

CONCLUSIONS. Critical Care mortality rates are not very different from other commonly treated conditions such as ARDS or septic shock. Longer term outcomes demonstrate a significant number of patients making good functional outcomes and becoming fully independent. This demonstrates that active and early intervention of all critically ill stroke patients is warranted.

0223**RELATION OF HEMATOMA VOLUME AND INFLAMMATORY MARKERS TO MORTALITY IN PATIENTS WITH SPONTANEOUS INTRACEREBRAL HEMORRHAGE**

R. Huerta¹, A. Serrano¹, A. Mesejo¹, D. Aguillón¹, L. Palacios¹, C. Sanchis¹, J.C. Sanchis¹, J.M. Segura¹, M. Juan², J. Romero¹

¹Hospital Clínico Universitario de Valencia, Valencia, Spain, ²Hospital General Universitario de Ciudad Real, Valencia, Spain

OBJECTIVES. To evaluate the utility of hematoma volume (HV) and inflammatory markers (IM) to predict mortality in patients with spontaneous intracerebral hemorrhage (SIH).

METHODS. We included patients admitted in our ICU with SIH. We determined the hematoma volumen in cubic centimeters (cc), inflammation markers (fibrinogen, haptoglobine and ferritine) and metabolic and nutritional parameters (transferrine, prealbumine and albumine) during the first week of ICU stay. We determine ROC curve and the best cutoff point of the HV related to mortality. Results in % and mean (±SD) or median (min-max). We used the T-student and Chi square test to correlate quantitative and qualitative variables respectively with significant $p < 0.05$.

RESULTS. We included 81 patients with SIH. 70 % were men, with a median of age of 63 years (28-80), with a 41 % mortality, the median length of ICU stay was 7 (1-55) days and 4 (0-51) days of mechanical ventilation (DMV). APACHE II 13 (0-30) and Glasgow coma scale at admission (GCS) 11 (3-15). The median of hematoma volumen was 21 cc (1-252). The cutoff point of HV with the best area under the curve (AUC) was 20 cc (AUC 0,7; $p < 0,009$; CI 95 %: 0,55-0,79) in relation to mortality. The patients were separated into two groups according to this cutoff point (Group 1 HV > 20 cc and Group 2 HV < 20 cc). The Group 1 (HV > 20 cc) had higher APACHE II ($p < 0,01$) and SOFA score ($p < 0,001$), more days of ICU stay ($p < 0,004$), and DMV ($p < 0,001$), lower GCS at admission ($p < 0,002$) and more complications shown in Table 1 than the Group 2 (HV < 20 cc). On the other hand, there was an increase in ferritine, fibrinogen and haptoglobine levels which are positive biomarkers, and a decrease in transferrine, albumine and prealbumine levels, as negative biomarkers during the first 7 days of ICU stay.

Complications	Group 1 (HV > 20 cc)	Group 2 (HV < 20 cc)	p
Exitus	26 %	12 %	0,04
Thraqueostomy	26 %	11 %	0,02
Intracranial Hypertension	38 %	11 %	0,000
Rebleeding	26 %	9 %	0,01
Hydrocephalus	22 %	7 %	0,008
Edema	36 %	12 %	0,000

[Table 1]

CONCLUSIONS. A hematoma volumen greater than 20 cc, is correlated to an increased mortality, severity and complications. There is an increase of inflammatory markers and a decrease of metabolic-nutritional markers during the first seven days of ICU stay.

0224**INTRAVENOUS FIBRINOLYTIC THERAPY IN PATIENTS WITH ACUTE ISCHEMIC STROKE**

J.P. Valencia Quintero¹, M. Redondo-Orts¹, F. Pino Sánchez¹, F. Guerrero López¹, P. Navarrete Navarro¹, E. Fernández Mondéjar¹

¹University Hospital Virgen de las Nieves, Department of Intensive Care Medicine, Granada, Spain

OBJECTIVES. To analyze the incidence of patients with acute ischemic stroke treated with fibrinolytic therapy in ICU, evolutionary profile, complications and results.

METHODS. Patients admitted to the ICU for acute ischemic stroke undergoing fibrinolytic therapy with rt-PA since 2002 to 2013. Demographic variables, severity of stroke and general assistance time, complications, and results were reported. Basic descriptive statistics are presented, mean ± SD or median (interquartile range) and to compare between groups we used Chi square and Mann-Whitney test. Is considered statistically significant $p < 0.05$.

RESULTS. 360 patients were included: 58 % male, 67 ± 12 years (16-87 years), APACHE III score of 36 ± 17 and NIHSS prior to administration of the treatment of 14 (Q₁ 9, Q₃ 19). Patients came to the hospital with a delay from the onset of symptoms median 75 min (54, 120) and from then until the administration of fibrinolytic passed 45 min (30, 62); from the onset of symptoms to the administration of rt-PA of 165 min (134, 205) and door-to-needle time of 75 (57-94 min). The NIHSS score at discharge from the ICU was 10.7 (3, 17); ICU mortality was 18 cases (5 %) and hospital 35 (9.7 %). ICU stay a day (1.2) and hospital stay of 15 (8.7 to 37) days. In the period 2002-2008 were admitted in the ICU 103 patients (28.5 %) and since then 258 (71.5 %).

No statistically significant differences between them in sex distribution, NIHSS on admission and at discharge, incidence of hemorrhagic transformation or malignant CMA infarction, hospital or ICU stay. There are differences in age (65 ± 11 vs. 67 ± 12, $p < 0.05$), APACHE III (33 ± 17 vs 38 ± 17, $p < 0.05$), the delay in reaching the hospital [(66 (49, 96) vs 88 (59, 131), $p < 0.001$], administration of rt-PA [162 (126, 175) vs 174 (135, 210) $p < 0.05$]. The time to performed computerized tomography [33 (17, 58) vs 23 (14, 57) minutes, $p = 0.003$] and the door-to-needle [81 (63, 101) vs 75 (55, 92) minutes, $p = 0.04$] were reduced.

CONCLUSIONS. Since 2009 it has increased the incidence of treatment by increasing the "window" period; despite higher treatment delivery times, greater patient age and severity, complications and results are similar, extending the indications of this effective treatment.

0225**INFLUENCE OF AGE, GENDER, STROKE SUB TYPE AND STROKE SEVERITY ON LENGTH OF HOSPITAL STAY IN PATIENTS WITH ACUTE STROKE**

R. Deb¹, K.S. Reddy¹, M.I. Alam¹, S. Razvi², R. Paul¹, R. Babu¹, R. Reddy³, S. Kumar³, S. Prabhakar³

¹Apollo Hospitals, Critical Care, Hyderabad, India, ²Apollo Hospitals, Pediatrics, Hyderabad, India, ³Apollo Hospitals, Neurology, Hyderabad, India

INTRODUCTION. Stroke is among the commonest causes for hospitalization in Neuro-intensive care units (NICU) worldwide. A relative lack of NICU beds is seen in India due to a high stroke burden as well as resource constraints. Data regarding length of hospital stay (LOS) of stroke patients would guide health care providers in better allocation of beds and services to provide best possible care. There is a dearth of published data on this issue from India. This study aims to bridge the information gap.

OBJECTIVES. To evaluate the relationship between age, gender, stroke subtype, stroke severity at admission, use of thrombolytic therapy and mean hospital LOS in patients admitted with acute stroke.

METHODS. A retrospective, hospital-record based study. All patients with acute stroke, within 24 h of symptom onset, admitted to Apollo Health City (JCI accredited stroke center) during a 2 year period (Jan 2012 to Jan 2014) were included. Data was collected for all patients and categorized based on age, gender, stroke subtype (Hemorrhagic-Group 1 or Ischemic-Group 2), stroke severity (based on NIHSS score on admission), use of thrombolytic therapy with tPA (intravenous or intra-arterial) and the LOS. Age was further classified as <45 years, 45-60 years, 60-75 years and >75 years. Stroke severity was graded as mild (NIHSS 0-6), moderate (NIHSS 7-15) and severe (NIHSS 16-42). Statistical analysis was done to determine the influence of the above parameters on LOS, using unpaired t-test for comparison of mean LOS, and considering a p value < 0.05 as significant.

RESULTS. 426 patients (72 %males) were included; 118 patients (27.7 %) with hemorrhagic stroke and 308 (72.3 %) with ischemic stroke (including TIA). LOS increased according to stroke severity in both hemorrhagic and ischemic stroke subtypes (Table 1). LOS for mild, moderate and severe stroke categories was 6.7, 11.2 and 19.2 days for hemorrhagic stroke and 5, 8.4 and 13 days respectively for Ischemic stroke. LOS was higher in severe hemorrhagic strokes as compared to severe ischemic strokes approaching significance (p = 0.05). There was however no difference in LOS in the mild and moderate stroke categories between the two groups. Gender analysis indicated a trend for longer LOS in men with hemorrhagic stroke (Table 2); statistically significant difference was noted in the mild stroke category. LOS did not differ significantly according to the age category; a trend for higher LOS was noticed in those >75 years. LOS was not different between thrombolized and non-thrombolized patients with Ischemic stroke.

CONCLUSIONS. Patients with severe stroke (NIHSS 16-42) had a longer LOS, as compared to mild and moderate strokes. Severe hemorrhagic stroke had a higher LOS, approaching significance, as compared to severe ischemic stroke. There was a trend for longer LOS among men and those aged > 75 years.

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NIHSS Category	Group1-Hemorrhagic Stroke			Group2- Ischemic Stroke			p value
	Number	Mean LOS (days)	Std deviation	Number	Mean LOS (days)	Std deviation	
MILD (0-6)	17	6.71	5.9	134	5.07	9.03	0.2867
MODERATE (7-15)	37	11.24	15.37	111	8.43	9.02	0.2979
SEVERE (16-42)	64	19.23	20.13	63	12.98	15.24	0.05

[Mean LOS: Stroke type and severity]

NIHSS category (stroke severity)	Males				Females			p value
	Number	Mean LOS (days)	Std deviation	Number	Mean LOS (days)	Std deviation		
Group 1- Hemorrhagic stroke	MILD (0-6)	13	7.77	6.35	4	3.25	1.89	0.039
	MODERATE (7-15)	25	13.48	18.16	12	6.58	4.3	0.0826
	SEVERE (16-42)	48	20.98	21.1	16	14	16.38	0.1807
Group 2- Ischemic Stroke	MILD (0-6)	92	5.22	9.21	42	4.74	8.73	0.7724
	MODERATE (7-15)	81	6.57	9.13	30	6.64	9.2	0.9717
	SEVERE (16-42)	48	11.23	12.82				

[Mean LOS: Stroke type and gender]

NIHSS stroke category	Ischemic stroke						p value
	Thrombolized			Non-Thrombolized			
	Number	Mean LOS (days)	Std deviation	Number	Mean LOS (days)	Std deviation	
MILD (0-6)	8	3.37	1.85	126	5.18	9.3	0.0947
MODERATE (7-15)	24	8.87	8.52	87	8.31	9.2	0.7771
SEVERE (16-42)	17	16.77	19.01	46	11.59	13.57	0.3138

[Mean LOS: Thrombolysis status]

0226 VALIDATION OF THE RECOGNITION OF STROKE IN THE EMERGENCY ROOM (ROSIER) SCALE IN A KOREAN EMERGENCY DEPARTMENT

S. Lee¹, H. Doh¹, S. Lee¹, J. Seo¹

¹Dongguk University Ilsan Hospital, Emergency of Medicine, Goyangsi, Republic of Korea
INTRODUCTION. Early assessment and rapid intervention in patients with acute stroke can reduce mortality and complication.

OBJECTIVES. We conducted a validation of the Recognition Of Stroke In the Emergency Room (ROSIER) Scale for use in patients with suspected stroke.

METHODS. We collected data from patients with suspected acute stroke who were admitted to emergency department (ED) within 7 month from August 2013 to February 2014. Compared with the Face Arm Speech Test (FAST), emergency physicians used the ROSIER scale as a stroke recognition tool. Patients meeting the inclusion criteria were evaluated for both the FAST and the ROSIER scale and compared with the final discharge diagnoses. Then, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) of the FAST and the ROSIER scale were calculated.

RESULTS. Total 312 patients were assessed. The patient group consisted of 141 males and 171 females with an average age of 60 years. 115 (36.8 %) patients had the ROSIER scale ≥ 1 indicating a stroke, 100 (32.1 %) of these patients had stroke as a final diagnosis. The FAST showed sensitivity of 88.29 % (95 % confidence intervals [CI] 80.46-93.37 %), specificity of 92.04 % (95 % CI 87.17-95.23 %), PPV of 85.96 % (95 % CI 77.91-91.52 %), NPV of 93.43 % (95 % CI 88.79-96.31 %). Relatively the ROSIER scale showed sensitivity of 90.09 % (95 % confidence intervals [CI] 82.58-94.71 %), specificity of 92.54 % (95 % CI 87.76-95.62 %), PPV of 86.96 % (95 % CI 79.09-92.27 %), NPV of 94.42 % (95 % CI 89.97-97.04 %).

CONCLUSIONS. In this validation study in Korea, the ROSIER scale is a useful stroke recognition tool for potential stroke patients in ED but not better than the FAST.

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0227 SHORT TERM OUTCOME OF PATIENTS WITH HYPERGLYCEMIA AND ACUTE STROKE

R. El-Sherif¹, A. Al-Weshahy¹, K.A.A. Selim¹, A. Heikal¹

¹Cairo Univeristy Hospitals, Critical Care, Cairo, Egypt

INTRODUCTION. Preexisting hyperglycemia worsens the clinical outcome of acute stroke. Do non-diabetic patients with stress hyperglycemia have a similar outcome to those with diabetes mellitus (DM)?

OBJECTIVES. To assess the glycemic status after acute stroke and its role on stroke outcome.

METHODS. 61 consecutive patients with acute stroke were included. 41 patients had hyperglycemia (20 were diabetics and, 21 were non-diabetics), and 20 patients without hyperglycemia or history of DM were taken as control group. Hyperglycemia was defined as blood glucose >200 mg/dl. All patients underwent routine evaluation, CT brain on admission, and after 48 h, carotid duplex, and National Institutes of Health Stroke Scale (NIHSS). 30 days mortality was the study end point.

RESULTS. 61 patients (60.7 % males), with mean age of 62.9 \pm 10.5 years. Patients with hyperglycemia had statistically higher levels of HbA1C % (P < 0.0001), and triglycerides (P 0.05). They had a higher incidence of posterior circulation affection on CT brain compared to control (19.5 % vs. 0.0 %, P = 0.03). There was a higher incidence of intracerebral hemorrhage (17.1 % vs. 5.00 %), and a higher rates of cerebral complications versus control (brain oedema 9.7 % vs. 0.0 %, and hemorrhagic transformation 17.7 % vs. 0.0 %), however, the p was NS.

The NIHSS was statistically higher than the control (14.9 \pm 5.9 versus 7.8 \pm 3.5, p = 0.000). The mortality rate and the hospital length of stay were statistically higher in hyperglycemic patients than control (65.9 % vs. 5.0 %, P < 0.001- and 12.5 \pm 9.1 vs. 3.0 \pm 4.2 days, P < 0.001 respectively).

Comparing patients with hyperglycemia: Diabetic patients had statistically higher platelets count, serum cholesterol, LDL-cholesterol, and lower serum sodium levels compared to hyperglycemic non-diabetics (P = 0.03, 0.01, 0.01, and 0.04 respectively). HbA1C % was higher in diabetics than non-diabetics (8.4 \pm 0.4 versus 5.8 \pm 0.4, p < 0.05). The NIHSS score, and 30 days mortality were significantly higher in patients with stress hyperglycemia compared to diabetic patients (17 \pm 5.1 vs. 12.7 \pm 6.1, P = 0.018, and 85.7 % vs. 45.00 %, P = 0.006 respectively). The hospital length of stay was longer in non-diabetics (16.4 \pm 7.2) versus diabetics (14.5 \pm 6.9) with no statistical significance.

Predictors of 30 days mortality were: History of hypertension (P = 0.04). NIHSS score on admission > 10 (sensitivity 90.9 %, specificity 100 %, +ve predictive value (PPV) 100 %, and -ve predictive value (NPV) 90.3 %), and blood glucose on admission >223 mg/dl (sensitivity 63.3 %, specificity 96.4 %, PPV 95.5 %, and NPV 69.2 %).

CONCLUSIONS.

- Hyperglycemia is associated with poor outcomes after acute stroke.
- Patients with stress hyperglycemia had the highest mortality rates.
- History of HTN, blood glucose level on admission, and NIHSS were predictors of worse stroke outcome.

0228 DIAGNOSTIC CAPABILITIES OF MEASURING THE TEMPERATURE OF THE BRAIN WITH THE HELP OF RADIOTHERMOGRAPHY IN PATIENTS WITH STROKE

A. Butrov¹, D. Cheboksarov¹, O. Shevelev¹, I. Privalova²

¹Peoples' Friendship University, Moscow, Russian Federation, ²Kurskiy State Medical University, Kursk, Russian Federation

INTRODUCTION. Early diagnosis of pathological changes in the brain is relevant due to the increasing frequency of acute cerebrovascular accidents. There is a change in the of blood flow and metabolism intensity in the affected structures in this disease, which affects the temperature of the zone penumbra in turn. Radiometry has a number of advantages (non-invasivity, visibility, rapidity) among the brain temperature measuring methods.

OBJECTIVES. To define the diagnostic ability of measuring the temperature of the brain by radiothermography on the patients with stroke.

METHODS. Measurement of the brain temperature on the patients with stroke was accomplished by detecting the electromagnetic radiation of the brain in the decimeter range by device "RTM- 01". The research has examined 100 healthy volunteers aged 18 to 35 years (control group) and 121 patients with clinical stroke of ischemic type before and after the craniocerebral hypothermia, confirmed by CT (aged 33-80 years).

RESULTS. The healthy individuals' temperature of the left hemispheres (LH) and the right hemispheres (RH) did not differ. The average temperature of 9-point measurement RH was 36,74 ± 0,37 °C, LH - 36,64 ± 0,32 °C. Distribution pattern was uniform thermal fields, ranged 36,0-37,2 °C, Δt not exceed 1-1,2 °C. According to computed tomography (CT), the temperature rose to 38-41 °C in the areas corresponding to the projections of "penumbra" on the patients with ischemic stroke. Δt at the measurement points reached 2-4,5 °C. The average temperature of 9-point measurements made in RH is 38,0 ± 0,45 °C, LH - 37,94 ± 0,28 °C (p < 0.01). There were no authentic differences of temperature between the hemispheres on the patients with localized lesions in the left hemisphere. On the patients with localized lesions in the right hemisphere an average temperature was higher than in the left one up to 0,2 °C (p < 0.01). The hemispheric asymmetry was formed with right-hemisphere localized stroke. The correlation coefficients between the symmetric points of temperature measurement of the left and right hemispheres on the patients with left-hemisphere stroke localization are widely varied from 0,848 ± 0,05 (p < 0.01) to -0,370 ± 0,09 (p < 0.01), demonstrating pronounced brain thermo heterogeneity.

CONCLUSIONS.

1) the upsurge of functional heterogeneity in systems of the body reflects the binding processes between elements of the system and makes the whole instability system, while the decrease of functional heterogeneity showing increased stiffness of the system and the loss of functional reserve of adaptation.

2) The disturbances of the thermal balance in brain with cerebral accidents, as an important link in the pathogenesis of secondary neuronal damage, require the use of objective methods for monitoring temperature, which can be implemented using radiometry and appropriate ways to correct the local hyperthermia brain along with therapeutic hypothermia.

0229

EXPERIENCE OF DECOMPRESSIVE CRANIOTOMY IN PATIENTS WITH ISCHEMIC STROKE AS A TREATMENT FOR LIFE-THREATENING BRAIN EDEMA

A. Gritsan¹, D. Kurnosov², N. Dovbysh², A. Gazenkamp¹, P. Shnyakin³

¹Krasnoyarsk State Medical University, Krasnoyarsk Regional Hospital, Anaesthesiology and Intensive Care, Krasnoyarsk, Russian Federation, ²Krasnoyarsk Regional Hospital, Anaesthesiology and Intensive Care, Krasnoyarsk, Russian Federation, ³Krasnoyarsk State Medical University, Krasnoyarsk Regional Hospital, Neurosurgery, Krasnoyarsk, Russian Federation

INTRODUCTION. One of the promising methods of treatment of malignant massive (hemispheric) ischemic stroke (MIS) is a decompressive craniotomy (DCT) as it aims to eliminate the impact of compressing the swollen ischemic hemisphere of the brain stem structures and reverse the development of dislocation syndrome. However, in our country, this method has not found wide application. Furthermore, in the literature there are many controversial issues concerning features DCT.

OBJECTIVES. To evaluate the effectiveness of decompression craniotomy as a method of correcting critical brain edema in patients with MIS.

METHODS. A retrospective analysis of 27 cases of decompression craniotomy patients with MIS in treatment ICU for 2011 - 2013. The study involved 12 men and 15 women at a mean age of 47.8 (25 - 64) years. Complex surveys, the amount of intensive care, including exhibiting indications for surgery were performed according to Guidelines for Management of Ischemic Stroke in 2008.

Surgical intervention was to create a defect of at least 10 × 15 cm with the mandatory inclusion in the scope of operations infratemporal region.

All patients were evaluated: alertness (Glasgow coma scale) at the time of receipt of the patient and of the operation; from time to clinic development, is an indication for surgery, prior to the surgery; the severity of the dislocation of midline structures according MSCT at the beginning of the operation; duration of mechanical ventilation in patients; time the patient is under intensive care; level of final neurological deficit Glasgow outcome scale (GOS); the outcome of treatment.

RESULTS. Wakefulness in patients on admission ranged from ICU clear consciousness (GCS 15 points), moderate to stupor (11 points). In all patients during the first 4 - 7 h observed depression of consciousness to the level of sopor (from 9 to 10 points on the GCS) on the background of progressive brain edema with the development bias midline structures, according to MSCT, an average of 8 mm (5 - 12 mm) (Table 1).

Indicator	Value, Me (min - max)
level of consciousness on admission GCS, points	13.2 (11 - 15)
level of consciousness at the time of surgery GCS, points	9.1 (9 - 10)
time of development clinics, is an indication for surgery, prior to the surgery, hours	5 (4 - 7)
intensity dislocation of midline structures according MSCT at the start of the operation, mm	8 (5 - 12)
duration of mechanical ventilation, days	13 (6 - 37)
the duration of stay in the ICU, days	21 (11 - 40)
level of final neurological deficit survivors by GOS, points	6.4 (5 - 7)
mortality (%)	7 (43,7)

[Table 1]

15(56 %) of surveyed patients were discharged from the hospital with an average level of neurologic deficit by GOS 6.4 points (5-7). 12 (44 %) patients died as a consequence of a progressive clinical edema and herniation of the brain.

CONCLUSIONS.

1. Decompression craniotomy was sufficient treatment for life-threatening brain edema on the background of MIS.

2. Further research is needed to clarify the indications for decompression craniotomy, the volume of resected portion of the bone.

0230

ENDOVASCULAR TREATMENT IN ACUTE ISCHAEMIC STROKE: OUTCOME AND COMPLICATIONS

A. Raigal Caño¹, P. Sanchez Rodriguez¹, P. Lopez-Reina¹, R. Gonzalez Gutierrez², J.M. García Benassi², G. Alonso Gomez¹

¹Hospital Virgen de la Salud, Intensive Care Unit, Toledo, Spain, ²Hospital Virgen de la Salud, Neuroradiology, Toledo, Spain

OBJECTIVE. The aim of this study was to analyse the outcome and complications in our cohort of patients with stroke treated with endovascular treatment (ET).

METHODS. Consecutive patients in Intensive Care Unit (ICU) with acute stroke treated with stent retriever were analysed between June 2011 and December 2013. Data on characteristics of endovascular interventions, complications, and clinical outcome were collected retrospectively. Patients who died were compared with those who did not.

RESULTS. A total of 67 patients were included. 64,3 % males (36) with an median age 63,2 ± 13,4 years; 58,2 % (39) were hypertensive patients, 17,9 % (12) diabetes mellitus, 31,3 % (21) chronic heart disease (valvular disease was the most frequent in 13,4 %), 16,4 % (11) oral anticoagulation treatment, 26,9 % (18) antiplatelet therapy, 22,4 % (15) atrial fibrillation and 44,8 % (30) were cardioembolic cerebral infarction. Median National Institutes of Health Stroke Scale Score (NIHSS) on admission was 16 (range, 5-30). The anterior circulation localization was in 88,9 %, right middle cerebral artery-M1 was the most frequent in 23,6 % of the patients. The indication of ET was contraindication for intravenous tissue plasminogen activator in 43,3 % (29). Reperfusion was successful (thrombolysis in cerebral infarction, TICI, 2b-3) in 70,1 %. Outcome was favourable (modified Rankin Scale, 0-2) in 44,8 % of patients. The rates for symptomatic intracranial haemorrhage were 10,4 % (7) and for death 17,9 %, of which 63,6 % were brain death.

Comparing patients by mortality, median age was 61,8 ± 13,8 years for survivors and 69,6 ± 9,9 years for dead patients. Median time to treatment was 195 ± 133 min and 205 ± 131 min respectively. Median NIHSS score on admission was 16 for both groups. The average number of days with mechanical ventilation was 4 and 9, ICU stay was 7 and 11 days and the length of hospital stay was 15 days, similar for all patients. 66,7 % (8) of the patients died in ICU. The rates for optimal reperfusion were 77,8 % for survivors and 41,7 % for dead patients. ET was not effective in a 13 % and a 33,3 %, respectively.

CONCLUSIONS. Our patients outcome, reperfusion rates and mortality results are similar to those published in other papers. The age, time to treatment, ICU stay and length of mechanical ventilation show a higher value in the non-survival group. In the surviving patients, successful reperfusion was higher than non-survival.

0231

DYNAMICS OF THE CONCENTRATION OF URIC ACID IN THE CEREBROSPINAL FLUID AND DEATH IN CEREBRAL STROKE

E. Oreshnikov¹, S. Oreshnikova²

¹Chuvash State University, Internal Medicine Dept, Cheboksary, Russian Federation, ²Perinatal Center of Municipal Clinical Hospital N1, Dept of Anaesthesiology and Intensive Care, Cheboksary, Russian Federation

INTRODUCTION. Uric acid (UA) - the most important hydrophilic antioxidant of the human body. It is known that intravenous administration of exogenous UA can extend twice as "therapeutic window" for stroke thrombolysis.

OBJECTIVES. We study and compare the factors of death in intensive neuro patients according to the presence/absence of reducing uric acid levels in the cerebrospinal fluid during the acute period of cerebral stroke.

METHODS. In 626 adult ICU patients in the acute period of cerebral ischemic and haemorrhagic stroke, along with conventional clinical, instrumental and laboratory tests, the samples of CSF and venous blood on the 1st, 3rd-5th, 7-10th day the onset of illness was performed spectrophotometric determination of the concentration of adenine, guanine, hypoxanthine, xanthine and UA, malondialdehyde (MDA). Calculated activity of xanthine oxidase in the CSF and serum: total - as the ratio of the concentrations of uric acid and hypoxanthine (XOsum) start - as the ratio of the concentrations of xanthine and hypoxanthine (XO1), of course - as the ratio of the concentrations of uric acid and xanthine (XO2).

RESULTS. In patients with a reduction UA level in the CSF in the acute period of stroke (54 % patients), significantly important factors contributing to death, were on the 1st day XOsum high levels (RR = 2,6, OR = 5), reduced XO2 (RR = 3,6, OR = 7,7) and high XO1 (RR = 7,2, OR = 12,2) in the cerebrospinal fluid, as well as the UA (RR = 1,8, OR = 5,1), xanthine (RR = 2,7, OR = 6,5), MDA (RR = 3,3, OR = 8,0) of serum. The factors significantly contributing to the survival, were: identified in the 1st day of stroke increased activity in CSF XO2 (RR = 7,0, OR = 11,8), hyperglycemia (RR = 3,0, OR = 5,0) and hyperadeninemia (RR = 2,7, OR = 5,1). In the absence of reducing uric acid levels in the CSF in the acute period of stroke (46 % patients), any parameters, is significantly associated with a fatal outcome, were not found. In patients with a reduction in uric acid levels in the cerebrospinal fluid in the acute period of stroke, significantly important clinical factors contributing to death, were: initial (on admission to ICU) tachypnea (RR = 4,5, OR = 8,0) and baseline depression of consciousness (RR = 3,9, OR = 9,0), without reducing the level of uric acid in the CSF in the acute period of stroke - background COPD (RR = 2,9, OR = 8,6), and the background of CHD (RR = 2,6, OR = 5,0). Drugs, significantly "contributes to" death by reducing uric acid levels in the CSF in the acute period of stroke, were osmotic diuretics (RR = 2,3, OR = 4,5), haemostatics (OR = 3,0, OR = 5,0). In the absence of reducing uric acid levels in the CSF in the acute period of stroke significant influence of pharmacotherapy on death was absent.

CONCLUSIONS. Probably, in patients with a reduction in UA levels in the CSF in the first 7-10 days period of stroke osmotic diuretics and hemostatics not want to use, and it is desirable to maintain moderate hyperglycemia (6-10 mmol/L).

Non invasive ventilation: 0233-0244

0233

SEVERE CARDIOGENIC PULMONARY EDEMA TREATED BY NON-INVASIVE VENTILATION: INCIDENCE AND IMPACT OF HYPERCAPNIA ON OUTCOME

D. Contou¹, C. Fragnoli¹, A. Cordoba-Izquierdo¹, F. Boissier¹, C. Brun-Buisson¹, A.W. Thille^{1,2,3}

¹CHU Henri Mondor, Medical ICU, Créteil, France, ²CHU Poitiers, Medical ICU, Poitiers, France, ³INSERM CIC-P 1402, Poitiers, France

INTRODUCTION. The impact of hypercapnia on prognosis in patients with cardiogenic pulmonary edema (CPE) is poorly known.

OBJECTIVES. To assess the incidence, causes and role of hypercapnia on outcome in patients with severe CPE treated by non-invasive ventilation (NIV).

METHODS. Observational cohort study using data prospectively collected over a 3-year period in a 24-bed medical ICU of a teaching hospital. After excluding patients with any underlying respiratory disease and those with a do-not-intubate order, all patients treated by NIV for CPE were included. Hypercapnia was defined as $\text{PaCO}_2 > 45$ mm Hg and severe hypercapnia as $\text{PaCO}_2 > 60$ mm Hg. Failure of treatment was defined as need for intubation or continuation of NIV longer than 48 h.

RESULTS. Among 112 patients receiving NIV for severe CPE, treatment failure occurred in 31 patients (28 %) including 7 patients who needed intubation (6 %). At admission, 56 patients (50 %) had hypercapnia and 25 patients (22 %) had severe hypercapnia. After NIV initiation, 26 % of the patients had persistent hypercapnia. Treatment failure was more frequent in patients who had severe hypercapnia at admission or persistent hypercapnia under NIV. After adjustment, severe hypercapnia at admission was the strongest variable associated with treatment failure. Hypercapnic patients were older and more frequently obese. Whereas they received a higher level of pressure-support they had lower tidal volume and lower minute ventilation indicating more severe alveolar hypoventilation.

CONCLUSIONS. Fifty percent of the patients treated by NIV for severe CPE had hypercapnia at admission. Hypercapnic patients were older, were more frequently obese and had lower tidal volumes despite higher pressure-support levels. Treatment failure was more frequent in patients who had severe hypercapnia at admission ($\text{PaCO}_2 > 60$ mm Hg) or persistent hypercapnia under NIV ($\text{PaCO}_2 > 45$ mm Hg).

0234 HIGH TIDAL VOLUME IS ASSOCIATED WITH NIV FAILURE IN ACUTE HYPOXEMIC RESPIRATORY FAILURE

G. Carreaux^{1,2,3}, T. Millán-Guilarte⁴, N. De Prost^{1,2,3}, K. Razazi^{1,3}, A.W. Thille⁵, F. Schortgen¹, L. Brochard^{6,7}, C. Brun-Buisson^{1,2,8}, A. Mekontso Dessap^{1,2,3}

¹CHU Henri Mondor, Réanimation médicale, Créteil, France, ²UPEC - Université Paris Est Créteil Val de Marne, Créteil, France, ³INSERM U955, Créteil, France, ⁴Hospital Quirón Palmplanas, Unidad de Cuidados Intensivos, Palma de Mallorca, Spain, ⁵CHU Poitiers, Poitiers, France, ⁶St. Michael's Hospital, Critical Care Department, Toronto, Canada, ⁷University of Toronto, Keenan Research Centre and Interdepartmental Division of Critical Care, Toronto, Canada, ⁸Inserm U657, Institut Pasteur, Pharmaco-épidémiologie et Maladies Infectieuses, Paris, France

INTRODUCTION. There is strong evidence that high tidal volume has an impact on morbidity and mortality [1, 2] in patients receiving invasive mechanical ventilation. During noninvasive ventilation (NIV) for acute hypoxemic (non-hypercapnic) respiratory failure (AHRF), the role of tidal volume has however never been investigated.

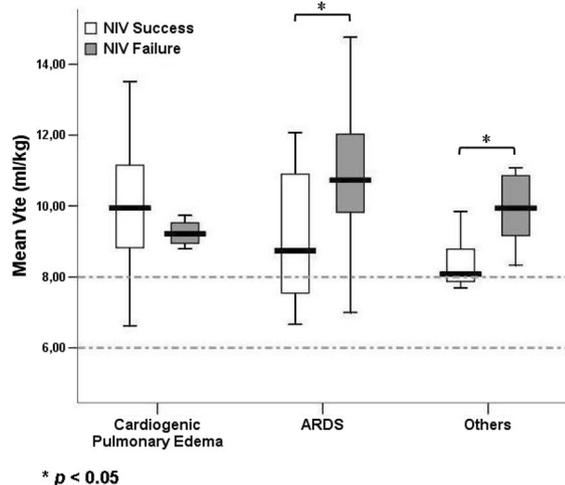
OBJECTIVES. To describe tidal volumes generated by patients under noninvasive pressure support ventilation for AHRF and their potential relationship with outcome.

METHODS. During a 30 month period, respiratory parameters, including expiratory tidal volume (V_{te}) from all NIV sessions of all consecutive patients with AHRF in our center were prospectively collected. Ventilator settings were adjusted using a nurse-driven protocol aiming at maintaining the tidal volume in a target range of 6-8 ml/kg. NIV failure was defined as the need for intubation or occurrence of death in the ICU. Continuous data are expressed as median [25th-75th percentiles].

RESULTS. Ninety three patients were included, among whom 30 had a cardiogenic pulmonary edema (CPE) and 45 fulfilled the acute respiratory distress syndrome (ARDS) criteria (Berlin definition). The $\text{PaO}_2/\text{FiO}_2$ ratio at first NIV session was 206 [136-275] mm Hg. Patients underwent a median of 4 [2-9] NIV sessions for a total duration of NIV of 595 [340-1265] min. NIV failed in 32 (34 %) patients. The mean pressure support level was not significantly different between NIV success and failure (8.0 [7.2-9.0] cmH_2O vs. 8.0 [7.0-8.2] cmH_2O ; $p = 0.558$). Seventy three patients (78 %) had a mean V_{te} during NIV sessions above the 6-8 ml/kg target range. Mean V_{te} was significantly higher in NIV failure group as compared to success (10.4 [8.9-11.8] ml/kg vs. 9.0 [7.9-10.8] ml/kg; $p = 0.013$). A subgroup analysis revealed that this difference was mainly due to patients without CPE (see Figure 1). Forty nine patients (52 %) had a V_{te} always above the 6-8 ml/kg target range, among whom 20 (21 %) had a V_{te} always above 10 ml/kg. A V_{te} always above the 6-8 ml/kg target range was an independent risk factor for NIV failure.

CONCLUSIONS. V_{te} was higher than targeted values in the majority of patients receiving NIV for AHRF despite a relatively low pressure support level. Higher V_{te} values were associated with NIV failure, especially in ARDS patients.

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[Figure 1]

0235 PREVALENCE AND FACTORS ASSOCIATED WITH LATE RESPIRATORY FAILURE OF NONINVASIVE VENTILATION IN PATIENTS WITH CHRONIC RESPIRATORY DISEASE

M. Fernandez¹, A. Lopez¹, J. Canovas¹, S. Botias¹, L. Capilla¹, M. Alcazar¹, G. Quintanilla¹, M.C. Lorente¹, J.A. Soler¹, A. Carrillo¹

¹Hospital Morales Meseguer, ICU, Murcia, Spain

INTRODUCTION. Late respiratory failure (LRF) is defined as the presence of respiratory deterioration after 48 h of noninvasive ventilation (NIV) start, $\text{pH} < 7.35$ with an increase > 15 -20 % of PaCO_2 with dyspnea or neurological impairment in patients who need NIV at least 6 h per day.

OBJECTIVES. To analyze the prevalence, risk factors for development and evolution of the LRF of NIV in patients with acute on chronic respiratory failure (ACRF) that need non-invasive support.

METHODS. Prospective observational study of all patients with previous lung disease and chronic respiratory failure worsened during a period of 15 years and initially treated successfully with NIV. Late failure is defined as a new episode of respiratory failure with respiratory acidosis after 48 h of the initial success. Results are expressed as mean \pm standard deviation and percentages. Comparisons between variables using Student T and Pearson χ^2 . Multivariate analysis using logistic regression.

RESULTS. During the study period 885 ACRF received NIV with success. Of these 105 (11.9 %) presented LRF. 63.5 % were COPD, chronic asthma 3.8 %, 15.2 % obesity hypoventilation syndrome, and 11.4 % other etiologies. 63.8 % were men and the age was 75 ± 9 years. Mean days of LRF was 7 ± 2 most frequently presenting at 7th day (20 cases, 17.1 %) and 8th day (19 cases, 18.1 %). At the moment of LRF, pH was 7.27 ± 0.03 and PaCO_2 68 ± 10 By multivariate analysis, factors related to LRF were SAPS II (OR: 1.02, 95 % CI 1.01 to 1.04), do not intubate order (DNI) (OR: 2.44, 95 % CI: 1.59 - 3.76) and hours of NIV at first episode (OR: 1.02, 95 % CI: 1.01 to 1.02). 98 patients (93.3 %) received NIV as treatment and 7 were directly intubated. In patients without DNI, those treated with NIV 16 died (34.1 %) and 1 (14.3 %) was intubated ($p < 0.410$).

CONCLUSIONS. The late respiratory failure in patients with chronic respiratory disease initially treated successfully with NIV is common. Related factors are to present more severity at the symptoms onset, do not intubation order and longer initial duration of NIV. Mortality is very high especially in those who need NIV again.

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0236 COMPARISON BETWEEN HIGH-FLOW DEVICES WITH ACTIVE OXYGEN HUMIDIFICATION AND VENTILATION NOT INVASIVE IN HYPOXEMIC RESPIRATORY FAILURE

J. Canovas¹, A. Lopez¹, M. Fernandez¹, L. Capilla¹, S. Botias¹, M. Alcazar¹, A. Esquinas¹, L. Casado¹, G. Quintanilla¹, A. Carrillo¹

¹Hospital Morales Meseguer, ICU, Murcia, Spain

INTRODUCTION. The treatment of hypoxemic respiratory failure may be performed by different devices. Although noninvasive ventilation (NIV) has been used in the initial stages, systems of high flow oxygen with active humidification (HFOAH) are being used for the same purpose and are better tolerated.

OBJECTIVES. Compare the effectiveness of treatment with HFOAH versus BiPAP mode in the treatment of patients with hypoxemic acute respiratory failure (HARF) and comparing complications depending on the device used.

METHODS. Case-control study matched for 4 variables (etiology of respiratory failure, age ± 5 years, respiratory rate ± 3 and $\text{PaO}_2/\text{FiO}_2 \pm 20$). Patients included were those with respiratory rate > 25 and $\text{PaO}_2/\text{FiO}_2 < 250$. Technique failure was defined as the need for endotracheal intubation or death during therapy. Patients receiving HFOAH could receive NIV if they didn't find improvement of hypoxemia. Results are expressed as mean \pm standard deviation and percentages. Comparisons between variables by Student T and Pearson χ^2 .

RESULTS. Over a period of 2 years, 50 patients with HARF treated with HFOAH were matched with 50 patients treated with NIV in BiPAP mode. The mean age of both groups was 64 ± 12 and 66 ± 13 ($p < 0.426$) respectively, male predominated (74 % and 78 %, $p < 0.815$). The etiology was similar in both groups: 11 patients with cardiogenic acute lung edema, 25 community-acquired pneumonia, nosocomial pneumonia 5 and 9 post-extubation respiratory failure. Respiratory rate in both groups was 29 ± 3 and 30 ± 4 ($p < 0.161$) and $\text{PaO}_2/\text{FiO}_2$ 155 ± 44 and 145 ± 36 ($p < 0.216$). At the therapies onset, $\text{PaO}_2/\text{FiO}_2$ in HFOAH group was 170 ± 55 and 190 ± 50 in NIV group ($p < 0.060$). Do not intubation order had 12 % and 10 % respectively ($p < 1$). The duration of support by HFOAH was 60 ± 30 h and 39 ± 35 in NIV group ($p < 0.001$). Of the 50 patients in HFOAH group, 15 patients required NIV. The failure rate was 56 % (28 cases) and 34 % (17 cases), respectively ($p < 0.044$). The device-related complications were more frequent in the NIV group (16 cases, 32 %) than in HFOAH (8 cases, 16 %). The most frequent complication in the NIV group was the skin injury (13 patients) and intolerance in HFOAH group (7 patients). Hospital mortality was similar in both groups, 24 % and 22 % respectively.

CONCLUSIONS. Treatment with NIV in BiPAP mode was more effective than the therapy with HFOAH in the treatment of hypoxemic respiratory failure. Nevertheless, we did not find differences in hospital mortality.

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0237 NON INVASIVE VENTILATION AND EARLY EXTUBATION IN CARDIAC SURGICAL PATIENTS OVER 75 YEARS OLD

F. Ampatzidou¹, M. Sileli¹, C.-P. Koutsogiannidis², A. Vlachou², K. Diplaris², A. Madesis², G. Drossos²

¹General Hospital 'G. Papanikolaou', Cardiac Surgery Intensive Care, Thessaloniki, Greece, ²General Hospital 'G. Papanikolaou', Cardiac Surgery, Thessaloniki, Greece

INTRODUCTION. Concerns of safety in fast tracking decision in case of elderly cardiac surgery patients are always exist. In selected cases with careful monitoring especially in departments where staff is familiar with the application of non-invasive ventilation (NIV), early extubation is feasible even in over-aged patients.

OBJECTIVES. Purpose of our study was to investigate whether the capability of early therapeutic NIV application, can contribute in expanding the fast tracking group including the elderly population.

METHODS. From July 2012 to March 2014, 776 consecutive patients underwent cardiac surgery. Among these, 407 patients (52.4 %) were extubated in ≤ 8 h (Fast track patients). Fast tracking patients aged ≥ 75 were totally 57 (14 %) - Group A, while younger patients were 350 (86 %) - Group B. Mean Euroscore II for group A was 3.04 ± 3.14 and for group B 1.42 ± 1.12 . Mean ejection fraction was 55.71 ± 10.8 for group A and 55.75 ± 11.03 for group B. Median cardiopulmonary bypass times were 91 min and 87 min for groups A and B respectively. The following - prospectively collected - variables were compared between the 2 groups: mortality, postoperative respiratory complications managed by non invasive ventilation (NIV), incidence of Acute Kidney Injury (AKI), postoperative atrial fibrillation (POAF), postoperative stroke and re-intubation rate. Chi square test was used for the statistical analysis.

RESULTS. There was 1 death in group A, while the mortality in group B was 0 %. ($p = 0.013$). Patients of Group A had higher incidence of NIV application (21.1 vs. 7.4 %, $p = 0.01$), AKI (19.3 vs. 9.4 %, $p = 0.026$), POAF (42.1 vs. 22.9 %, $p = 0.002$), stroke (1.8 vs. 0.3 %, $p = 0.141$) and re-intubation (1.8 vs. 0.9 %, $p = 0.524$) compared to those of Group B. **CONCLUSIONS.** Fast -tracking patients aged ≥ 75 had statistically significant higher incidence of postoperative respiratory complications. NIV application was more common in the elderly group contributing in reintubation avoidance. Incidence of postoperative AKI and atrial fibrillation in fast-tracking elderly patients were higher ($p = 0.026$ and 0.002 respectively). Incidence of postoperative stroke and re-intubation rate had no statistical significant difference between the 2 groups. Decision for fast tracking in patients aged ≥ 75 is feasible with acceptable morbidity and mortality rates although these rates are higher compared with younger patients.

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0238

DOES IMMEDIATE INTUBATION OR DELAYED INTUBATION AFTER A NON-INVASIVE VENTILATION TRIAL IS MORE BENEFICIAL IN PATIENTS DURING POSTEXHIBITION RESPIRATORY FAILURE AFTER ABDOMINAL SURGERIES?

A. Ozensoy¹, Y.G. Gül², T. Akarsu Aydogdu³, A. Baysal¹, G. Korkmaz⁴, M. Calim⁵

¹Kartal Kosuyolu High Specialty Research and Training Hospital, Anesthesiology and Reanimation, Istanbul, Turkey, ²Arnavutkoy State Hospital, Istanbul, Turkey, ³Goztepe Research and Training Hospital, Anesthesiology and Reanimation, Istanbul, Turkey, ⁴Bagcilar Research and Training Hospital, Anesthesiology and Reanimation, Istanbul, Turkey, ⁵Vakif Gureba Research and Training Hospital, Anesthesiology and Reanimation, Istanbul, Turkey

INTRODUCTION. Non-invasive ventilation (NIV) is a preferred treatment in the care of patients with acute respiratory failure (ARF) however, the use of NIV followed by a delayed intubation may increase the risk of death.

OBJECTIVES. In a prospective, randomized study, the effects of NIV on reintubation, adverse events and thirty day mortality were compared in patients after gastrointestinal tumor surgeries in the intensive care unit.

METHODS. From a total of 160 patients with a preoperative spirometric criteria of FEV1 % (forced expiration volume in one second) above 75 % that were diagnosed with ARF within 48 h after postextubation, a division into two groups to receive either immediate intubation after the beginning of ARF (Group 1, n = 76) versus delayed intubation within 12 h and at least two episodes of NIV trial of 20 min and 2 h apart (Group 2, n = 77). Bilevel positive airway pressure (BiPAP) was applied with expiratory positive airway pressure (EPAP) of 4 cmH₂O and inspiratory positive airway pressure (IPAP) of 8 cmH₂O in a spontaneous mode. The data collected include: heart rate, respiratory rate, tidal volume, arterial blood gas values (pH, PaO₂, PaCO₂, HCO₃) at baseline, 1 and 4 h after BiPAP. All patients received a standard therapy protocol including diuretics and inhaled beta-agonists and inhaled ipratropium bromide. Intravenous theophylline was not used in both groups. The primary end-point was the duration of intensive care unit stay. Thirty day mortality and adverse events (reintubation, pneumothorax, bronchospasm) were investigated.

RESULTS. There was no significant difference regarding demographic data and co-morbidities ($p > 0.05$). Seven patients (9 %) in Group 2 required immediate reintubation during NIV trial and were not included into the study. In comparison between groups, intensive care unit stay was more prolonged in Group 1 in comparison to Group 2 (7.5 ± 2.4 day versus 5.6 ± 1.2 day, $p < 0.001$). In Group 1, 11 of 76 patients (14.5 %) and 4 of 77 patients (5.2 %) required reintubation ($p = 0.054$). No significant differences were observed for mortality and adverse events ($p > 0.05$).

CONCLUSION. The use of NIV followed by a delayed intubation in patients with COPD after abdominal surgeries prolongs the intensive care unit stay however, no differences were observed regarding mortality and adverse events.

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0239

ACUTE EFFECTS OF CPAP VS BIPAP LOW OR HIGH INTENSITY IN PATIENTS WITH STABLE SEVERE CONGESTIVE HEART FAILURE

A.D.N.C. Nogueira^{1,2}, I.T. Takakura Guedes³, L.S. Marinho¹, R.D.S. Vasconcelos¹, R.P. Sales^{1,2}, T.B. de Vasconcelos¹, S.M.M. Pontes¹, C.R.M. Rodrigues Sobrinho¹, M.A. Holanda¹

¹Federal University of Ceara, Medical Sciences Department, Fortaleza, Brazil, ²Estácio University Center of Ceara, Physiotherapy, Fortaleza, Brazil, ³Fortaleza University, Cardiology, Fortaleza, Brazil

INTRODUCTION. The acute effects of noninvasive ventilation (NIV) by comparing continuous positive airway pressure (CPAP) versus bilevel positive airway pressure (BiPAP) should be more investigated in patients with stable congestive heart failure (CHF). **OBJECTIVES.** To analyze the acute effects of NIV on cardiac function and pulmonary ventilation in patients with stable CHF.

METHODS. Prospective, intervention, randomized study. Patients: Seven patients (4 men and 3 women) with stable chronic CHF with left ventricular ejection fraction (EF) ≤ 35 %; mean age 54 ± 28.9 years. Interventions: CPAP (10 cmH₂O), BiPAP (15/10 and 25/10 cmH₂O) of inspiratory and expiratory pressures respectively, via facial mask. NIV application lasted 20 min each, with periods of spontaneous breathing for 30 min between

them as a washout period. Myocardial performance and changes were measured using clinical and echocardiography parameters. We analyzed heart rate (HR), ejection fraction (EF), the relationship between the filling pressures (E/E' septal), pulmonary capillary pressure (PCP), tidal carbon dioxide (EtCO₂), tidal volume (TV) and oxygen saturation (SpO₂). Baseline parameters were compared with the same parameters after NIV. Statistically significant ($p < 0.05$).

RESULTS. CPAP significantly decrease of HR (pre: 80.6 ± 11.2 , post: 78.2 ± 11.4 bpm, $p = 0.004$) and E/E' septal (pre: 18.5 ± 11.6 , post: 17.7 ± 13.2 bpm, $p = 0.03$) and increased TV (pre: 5.05 ± 1.61 ; pós: 9.36 ± 5.50 L/min, $p = 0.01$). BiPAP significantly decrease of HR (pre: 80 ± 11 , post: 77 ± 10 bpm, $p = 0.01$), TV (pre: 5.05 ± 1.61 ; pós: 9.36 ± 5.50 L/min, $p = 0.01$) and EtCO₂ (pre: 35 ± 3 ; post: 25 ± 7 mmHg, $p = 0.05$); no significantly decrease of E/E' septal (pre: 17.35 ± 13.2 , post: 17.4 ± 12.2 bpm, $p = 0.21$) and increased SpO₂ (pre: 97 ± 1.5 , post: 98 ± 1.4 %, $p = 0.05$). High intensity BiPAP (25/10) decreased EtCO₂ (pre: 35.4 ± 3.6 , post: 27 ± 5.1 mmHg, $p = 0.02$) and increased PCP (pre: 22.4 ± 10 , post: 28.3 ± 13.1 , $p = 0.01$), TV (pre: 5.16 ± 1.86 ; pós: 15.55 ± 4.84 L/min, $p = 0.002$) and SpO₂ (pre: 96.7 ± 1.2 , post: 98.7 ± 1.4 %, $p = 0.01$).

CONCLUSIONS. These preliminary results show reduces ventricular preload and that high intensity increases PCP in patients with severe stable CHF.

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GRANT ACKNOWLEDGMENT. PROEL hospitalar.

0240

NONINVASIVE VENTILATION INSIDE THE CATH LAB CAN BE AN EFFECTIVE AND SAFE ALTERNATIVE FOR PATIENTS WITH ACUTE RESPIRATORY FAILURE

P. Verissimo¹, K.T. Timenetsky¹, E. Colucci¹, L.H.G. Rodrigues¹, D.M. May², R.A. Caserta¹

¹Hospital Israelita Albert Einstein, Critical Care, São Paulo, Brazil, ²Hospital Israelita Albert Einstein, Anesthesiology, São Paulo, Brazil

INTRODUCTION. Noninvasive ventilation (NIV) used in several clinical conditions can avoid endotracheal tube (ET) and invasive mechanical ventilation complications. NIV is widely used in the intensive care unit (ICU), but in other hospital environments, such as in cath labs, its use is limited, and the safeness of NIV in this environment is still unknown. **OBJECTIVES.** Evaluate the safety of NIV use in the cath lab to avoid ET due to respiratory failure.

METHODS. A prospective study including patients submitted to surgical procedures in the cath lab. We evaluated patients that used NIV due to the following reasons: acute respiratory failure before or during the procedure, use of NIV during hospitalization and those patients who might need sedation and had previous history of pulmonary complications. Patients were ventilated with bilevel positive pressure ventilation (BiPAP[®] Vision[®] Respiroics) through a total face mask with sufficient inspired oxygen fraction to maintain a pulse oximeter above 95 %. The inspired and expired pressure levels were adjusted to maintain a tidal volume of 6-8 ml/kg (predicted body weight). We evaluated the demographic data, hospital admission diagnosis, ejection fraction (EF), type of procedure, NIV time, related complications, NIV success rate, ET rate, ventilatory parameters, ICU and hospital length of stay, and hospital mortality rate.

RESULTS. We evaluated 14 patients with NIV in the cath lab, 50 % (7) were male, mean age of 78.5 (± 13.1) years old, height of 165 (± 9.6) cm, weight of 72.7 (± 12.8) kg and BMI of 26.9 (± 4.6). The mean EF was 51 % (± 15). The hospital admission diagnoses were heart failure, acute coronary syndrome, arrhythmia, acute pulmonary edema, pulmonary hypertension, and chronic pulmonary thromboembolism. The following procedures were performed: 6 percutaneous coronary interventions, 1 percutaneous aortic valvuloplasty, 1 ablation of atrial fibrillation, 1 implantation of cardiac pacemaker, 1 thrombolysis of pulmonary embolism, and 4 diagnostic cardiac catheterization. During the procedures there were no respiratory complications, none of the patients needed ET. Only one patient presented hemorrhagic shock and lead to death. The reason and use for NIV (Table 1) and NIV parameters, time and success, as well as ICU and hospital length of stay of each patient are described in Table 2. Of the 14 patients, 8 required vasoactive drugs and 7 some level of sedation.

CONCLUSIONS. The NIV use inside the cath lab seems to be effective and safe as an alternative to ET, in well selected and monitored patients.

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Acute Pulmonary Edema-n(%)	9 (64.5)
Hypoxia-n (%)	4 (28.5)
Hypercapnic respiratory failure-n (%)	1 (7)
Elective use-n (%)	5 (35.5)
Emergency use-n (%)	9 (64.5)

[Reason and use of Noninvasive Ventilation]

IPAP (cmH ₂ O)	19 \pm 3.4
EPAP (cmH ₂ O)	9. \pm 0.9
FiO ₂ (%)	42.6 \pm 13
NIV time (min)	121.8 \pm 69
NIV Success- n (%)	13 (93)
ICU LOS (days)	1.1 \pm 1.6
Hospital LOS (days)	19.6 \pm 25.0

[NIV parameters and length of stay (LOS)]

0241 COMPARISON OF THE ALVEOLAR RECRUITING EFFECT BETWEEN NON-INVASIVE MECHANICAL VENTILATION AND OPTIFLOW®

G. Besch¹, Y. Barrande¹, B. Barrucand¹, D. Ferreira¹, E. Samain¹, F. Stéphan², S. Pili-Floury¹

¹CHRU de Besançon, Anesthesiology and Critical Care Medicine, Besançon, France, ²Centre Chirurgial Marie Lannelongue, Intensive Care Unit, Le Plessis-Robinson, France
INTRODUCTION. Postoperative acute respiratory failure (PARF) is frequent after cardiac and thoracic surgery. The main cause of hypoxemia is atelectasis. The alveolar recruiting effect (ARE) of non-invasive mechanical ventilation (NIV) has already been well documented. NIV is often used as the first-line ventilatory support when postoperative PARF occurs. Nasal high-flow therapy (HNF) delivered by the Optiflow® system is considered as an alternative to NIV but its ARE has never been studied.

OBJECTIVES. The AERATION study aimed to compare the ARE of NIV and HNF as ventilatory support for postoperative PARF in cardiac and thoracic surgery.

METHODS. Single center prospective observational study conducted in our postoperative Intensive Care Unit from May to July 2013. The AERATION study is an ancillary study of the OPTIFLOW trial (ClinicalTrials.gov NCT01458444) approved by the local ethical committee. All patients presenting an episode of PARF or at least one risk factor for PARF (BMI > 30 kg.m⁻², LVEF < 40 %) after elective cardiac or thoracic surgery were eligible. HNF delivered by the Optiflow® system (O group) or NIV delivered by the BiPAP Vision® system (N group) were randomly allocated. An ultrasound assessment (Vsan™, 3.8 MHz, GE Healthcare, Fairfield, CT, USA) of the aeration of 6 regions of each lung was performed by 2 independent observers blinded to the treatment allocated just before the beginning of the ventilatory support and after 1 h of NIV or HNF. Four ultrasound entities were described: normal aeration, multiple abutting ultrasound lung "comets" issued from the pleural line or a small subpleural consolidation, multiple irregularly spaced B-lines, consolidation. A re-aeration score from (-5) to (+5) was calculated for each region based on the evolution of the ultrasound aeration during the ventilatory support. The primary outcome was the mean value of the re-aeration score. The secondary outcome was the value of the PaO₂/FiO₂ ratio after 1 h of NIV or HNF (P/F_{HI} ratio). Categorical variables are expressed as number of patients (percentage) and continuous variables as mean ± SD. P < 0.05 was considered significant.

RESULTS. 12 and 8 patients were respectively included in the O group and in the N group (respectively: age: 70 ± 11 vs 68 ± 10 year; male gender: 5 (50) vs 5 (62); BMI: 30 ± 3 vs 33 ± 6 kg.m⁻²; IGS2: 19 ± 7 vs 23 ± 4; PaO₂/FiO₂ ratio: 217 ± 74 vs 273 ± 75; number of regions assessed: 11 ± 1 vs 11 ± 1). The re-aeration score did not significantly differ between the O group (1.4 ± 3.4) and the N group (3.6 ± 3.2) (p = 0.20). The value of the P/F_{HI} ratio was significantly higher in the N group (P/F_{HI} ratio = 316 ± 73 vs 201 ± 54, p < 0.01, respectively in the N group and in the O group).

CONCLUSIONS. The ARE of HNF delivered by the Optiflow® system could be lower than the ARE of NIV, but the difference did not reach the statistical significance in our study.

0242 EFFECTIVENESS OF NONINVASIVE VENTILATION IN THE PREVENTION OF POST-EXTUBATION RESPIRATORY FAILURE

J. Canovas¹, A. Lopez¹, M. Fernandez¹, L. Capilla¹, S. Botias¹, M. Alcazar¹, A. Ramos¹, C. Lola¹, A. Carrillo¹, M.A. Fernandez¹

¹Hospital Morales Meseguer, ICU, Murcia, Spain

INTRODUCTION. Noninvasive ventilation (NIV) has been used as prevention for post-extubation respiratory failure in patients at high risk.

OBJECTIVES. Primary objective: To examine the effectiveness of use of non-invasive ventilation (NIV) to prevent post-extubation respiratory failure in patients at high risk. The secondary objective is to analyze the risk factors associated with failure of NIV.

METHODS. Prospective, during 5 years, about patients admitted to the ICU with mechanical ventilation more than 48 h and who met criteria for extubation, but at risk for developing post-extubation respiratory failure: presence of chronic respiratory disease and hypercapnia during T test. After extubation NIV was initiated by facial mask, keeping it at least 24 h. Success of NIV is defined as avoidance of intubation and be discharged alive to the ward. Results are expressed as mean ± standard deviation, median interquartile range (IQR) and percentages. Comparisons between variables were made using Student T and Pearson Chi².

RESULTS. 100 patients were analyzed, 63 % men, 71 ± 11 years old. The previous lung involvement was COPD (55 %), bronchiectasis (8 %), restrictive lung disease (22 %), chronic asthma (5 %) and heart disease (10 %). 19 patients showed muscle weakness of critical patient polyneuropathy. The prior invasive ventilation time was 6 days median (IQR:3- 10). At the time of extubation respiratory rate was 26 ± 5, pH: 7.35 ± 0.03, PaCO₂: 49 ± 4 and PaO₂/FiO₂ 200 ± 34. Nine patients had tracheotomy when they were decannulated. All patients received NIV in BiPAP mode (IPAP: 14 ± 1 and EPAP: 6 ± 1). The duration of NIV was a median of 24 h (IQR:24 -44). 20 patients had complications, the most common, skin injury (15 %). Success was achieved in 89 patients and hospital survival was 87 %. Related factors of NIV failure were the presence of polyneuropathy of the critically ill patient (31.6 and 6.2 % with and without muscle weakness respectively, p:0.006), complications related with NIV (40 and 3.8 % with and without complications, p < 0.001), previous tracheostomy (44.4 and 7.7 %, p:0.008), respiratory rate at the start of NIV (32 ± 5 failures and 25 ± 4 success, p < 0.001) and PaO₂/FiO₂ at NIV start (160 ± 37 in the failing and 212 ± 42 in the success group; p < 0.001).

CONCLUSIONS. NIV can be used as a measure to avoid the presentation of post-extubation respiratory failure in patients with prior cardiopulmonary disease. Knowledge of risk factors should help in proper selection of patients.

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0243 EXPERIENCE WITH HIGH FLOW NASAL CANNULA IN AN ADULT INTENSIVE CARE UNIT

N. Martínez Sanz¹, S. Alcántara Carmona¹, M. Perez Redondo¹, B. Lobo Valbuena¹, I. Fernández Simón¹, J. Palamidessi Dominguez¹, R. Fernández Rivas¹, A. Pérez Lucendo¹, L. Pérez Pérez¹, M. Valdivia de la Fuente¹, J.J. Rubio Muñoz¹, P. Galdós Anunciabay¹

¹Hospital Universitario Puerta de Hierro - Majadahonda, Intensive Care Unit, Madrid, Spain

INTRODUCTION. High flow nasal cannula (HFNC) is a variety of non-invasive respiratory support that provides respiratory assistance with a distending pressure. Its use is extended in infants, but there is little evidence in adults.

OBJECTIVE. Analyze, in an adult medical intensive care unit (MICU), the use of HFNC for the management of acute respiratory failure (ARF).

METHODS. Descriptive and retrospective study of adult patients admitted, during 2012, to the MICU of a tertiary hospital and treated with HFNC. Demographic data, cause of ARF, previous respiratory support, MICU mortality, highest FiO₂ and flow administered, length of treatment, complications and need for sedation were recovered. We considered treatment failure when it was necessary to change to others forms of mechanical ventilation, invasive (IMV) or non-invasive. We analyzed vital signs, clinical characteristics and gasometric parameters before the start of HFNC therapy and for the first 24 h after its initiation. Statistical analysis was performed with SPSS 15.

RESULTS. 34 patients were included, 23 men and 11 women with mean age of 55.7 ± 15.2 years. APACHE II score was 16.8 ± 7.3 points. Diagnosis on admission: acute respiratory failure (62 %), sepsis (18 %), heart disease (6 %), others (14 %). The most common cause of ARF that made necessary the use of HFNC was pneumonia (47 %) followed by acute respiratory distress syndrome (20 %) and pleural effusion (14 %). 11 patients (32 %) had received IMV before HFNC therapy. Highest FiO₂ applied was 0.74 ± 0.15 with a maximum flow of 40.8 ± 7.4 lpm. The median length of treatment was 76 h (range 10-384). 4 patients had minor complications, but they did not carry treatment suspension. Sedation during the use of HFNC was required in 4 patients. In 70 % of patients clinical improvement was achieved in the first hours. Twenty-four hours after treatment initiation, breathing rate decreased 4.6 rpm [IC95 (1.4-7.8) p = 0.005], heart rate decreased 7 bpm [IC95 (1.05-13.2) p = 0.02], oxygen saturation increased 2.8 [IC95 (4-1.3) p < 0.001] and pH increased 0.02 [IC95 (0.03-0.005) p = 0.011]. There were no statistical significant differences among the other parameters studied (PaFiO₂, HCO₃, PCO₂ and blood pressure). Treatment failure was found in 32 % of patients, and 10 required IMV. MICU mortality was 20 %, been the most frequent causes of death the withdrawal of life support and refractory hypoxemia. The RR of death in patients with HFNC failure was 4.4 (IC 15.5-1.5).

CONCLUSIONS. HFNC is an alternative for non-invasive mechanical ventilation that can effectively be used to treat patients with acute respiratory failure. This system is safe and well tolerated in adults with acute respiratory failure of different etiologies. Clinical improvement is found in the first hours without serious complications and without the need for sedation.

REFERENCE(S). Ward JJ. High-flow oxygen administration by nasal cannula for adult and perinatal patients. *Respir Care*. 2013

0244 PRACTICE OF NONINVASIVE MECHANICAL VENTILATION IN A NEW TUNISIAN INTENSIVE CARE UNIT

H.G. Ben Ghezala¹, A. Hamdouni²

¹Faculty of Medicine of Tunis, Intensive Care Unit, Zaghouan, Tunisia, ²Faculty of Medicine of Tunis, Zaghouan, Tunisia

INTRODUCTION. In the last 20 years, non-invasive ventilation (NIV) was a revolution in the management of patients with acute respiratory failure in intensive care. The consensus conference of the French intensive care society had recommended in 2006 the practice of NIV in COPD, in the case of cardiogenic pulmonary edema and immunocompromised patients with acute respiratory failure. This conference included also the means required for the initiation of NIV, its success criteria and its complications.

OBJECTIVE. After the opening of a new teaching intensive care unit (ICU) in Zaghouan hospital in Tunisia, we introduced for the first time noninvasive ventilation. That is why we wanted to evaluate the use of the NIV in our unit: its indications, its parameters and settings and its complications.

METHODS. Single-center retrospective study that included between 1 January 2012 and 30 June 2013, all patients admitted to the ICU for acute respiratory failure and who had NIV. Anamnestic characteristics, primary diagnosis, time to initiation and duration of NIV were noted. The blood gas data before and after NIV and the outcome of patients were also collected.

RESULTS. 84 patients were enrolled and received this mode of ventilation. The average age was 67 years. The noninvasive ventilation was used for pre-oxygenation before intubation in 23 % of cases. The other indications were hypoxicemic acute respiratory failure (12 %), cardiogenic pulmonary edema (22 %), acute exacerbation of chronic obstructive pulmonary disease (19 %), severe asthma (4 %), postoperative (4 %), prevention of post-extubation respiratory failure (15 %) and neuromuscular disease for one patient. The face mask was the only patient interface mask used in our patients to perform noninvasive ventilation. The most frequent mode used was bi-level positive airway pressure (BiPAP).

Medical treatment was administered for every patient according to the cause of respiratory failure. The efficacy of the ventilation mode was tested on the evolution of clinical and blood gas parameters. 70 % of patients included in the study had a good outcome.

Complications of NIV were facial erythema (40 %), dry mouth (12 %), the nasal pain (11 %) and gastric distension (12 %). Eight patients (9 %) were intubated and were discharged from hospital. Eleven patients (13 %) were intubated and ventilated and died.

CONCLUSION. The use of noninvasive ventilation in the management of acute respiratory failure is a major revolution. Our study showed that since its introduction its use in resuscitation is becoming wider with excellent results. Specific team training and protocols still to be implemented in order to improve the management of our patients.

Ethics in the ICU I: 0245–0258

0245 LIFE SUPPORT TREATMENTS (LST) LIMITATION AT ICU ADMISSION: RESULTS OF A NATIONAL MULTICENTER SURVEY

O. Rubio¹, S. Cano², A. Arnao³, J.M. Sánchez⁴, I. Saralegui-Reta⁵, R. Poyo⁶, P. Monedero⁷, M. Fernández-Vivas⁸, S. Altaba⁹, C. Guía¹⁰, R. Fernández¹¹, Life Support Treatments (LST) Limitation Study Group

¹Hospital Sant Joan de Déu, Althaia, Universitat Internacional Catalunya, Critical Care Department, Manresa, Spain, ²Hospital Sant Joan de Déu, Critical Care Department, Manresa, Spain, ³Hospital Sant Joan de Déu, Epidemiology Department, Manresa, Spain, ⁴Hospital Santa Creu i Sant Pau, Critical Care Department, Barcelona, Spain, ⁵H. U. Alava-Hospital Santiago, Vitoria, Spain, ⁶Hospital Son Llàtzer, Mallorca, Spain, ⁷Clinica Universitaria, Navarra, Spain, ⁸Hospital Virgen Arrixaca, Murcia, Spain, ⁹Hospital General de

Castellón, Castellón, Spain,¹⁰Hospital Parc Taulí, Sabadell, Spain,¹¹Hospital Sant Joan de Déu, Althaia, Universitat Internacional Catalunya, Manresa, Spain

OBJECTIVE. To determine the incidence and profile of patients with LST limitation at admission (patients' characteristics, LST limited and the criteria used, factors associated with LST limitation) and their outcome.

METHODS. Prospective observational multicenter survey. Ethical approval was obtained. We included all patients admitted at 39 Spanish ICUs along May and June 2011. We recorded demographics and clinical variables (diagnosis for ICU admission, severity scores, Knauss at admission, Sabadell Score at ICU discharge), reasons to decide LST limitation, and ICU and hospital survival. The statistical analyses include logistic regression models.

RESULTS. We studied 3,042 patients of mean age 62.5 years (64 % men). ICU mortality was 12.2 % and hospital mortality was 16.4 %. Of them, 238 (7.8 %) patients already have limitation of some LST at ICU admission, that were most commonly related to: severe chronic disease (60.1 %), previous functional limitation (46.2 %) and age (37.8 %).

In these patients, the incidence of withholding LST were: CPR (91.5 %), dialysis (86.8 %), and intubation (54.8 %), vasopressor drugs (30.7 %), non-invasive ventilation (26.4 %) and transfusions (23.8 %). The withdrawal of LST was rare in any supports being the most removed intubation (9.1 %).

Patients' variables associated with limitation of some LST at ICU admission in bivariate analysis were: female sex (OR = 1.4), worsening of chronic disease (OR = 5.5), coma or encephalopathy (OR = 4.4), SAPS III/APACHE II (OR = 1.04), and prior functional Knauss class B (OR = 5.2) or C-D (OR = 19.8).

Hospitals' variables associated with admission of patients with LST limitations were: public ownership (OR = 1.98), lack of step-down units (OR = 1.89), restrictive criteria for ICU admission (OR = 1.57), lack of LST limitation guideline (OR = 1.35), and unable to provide LST outside ICU (OR = 1.46).

Patients with limitation of some LST at admission in ICU had higher ICU mortality (44.5 % vs. 9.4 %; $p < 0.001$), more frequently a Sabadell Score 2 (poor prognosis in the short term) (29.8 % vs. 6.5 %; $p < 0.001$) and higher hospital mortality (59.2 % vs. 12.7 %; $p < 0.001$).

CONCLUSIONS. LST limitation at admission in ICU is a widespread reality, being the previous functional limitation, previous chronic diseases and age the most commonly criteria for decision. Despite the higher ICU and hospital mortality, these patients still get survival.

0246

A FOUR-YEAR PROSPECTIVE AUDIT OF END OF LIFE PRACTICES IN AN INDIAN CANCER HOSPITAL ICU

S.N. Myatra¹, J.V. Divatia¹

¹Tata Memorial Hospital, Mumbai, India

INTRODUCTION. There are wide variations in limitation and withdrawal of life-support practices in ICUs across the world. Little information is available from Indian ICUs.^{1,2} Our ICU is a 35-bed ICU-HDU of a tertiary cancer referral centre in Mumbai, India, where end-of-life care (EOLC) practices may be different from that reported in general ICUs.

OBJECTIVES. This study was performed to audit EOLC decisions and practices over a 4-year period in an ICU of a cancer centre in India.

METHODS. Between January 1, 2008 and December 31, 2011, 440 patients underwent some form of EOLC in the ICU. ICU staff notified investigators whenever an EOL decision was made. We recorded demographic details, documentation of the EOLC care process in the case notes, and interviewed ICU staff to determine the EOLC processes involved.

RESULTS. 270 patients (61 %) were male and 170 (39 %) females. Mean age was 48.9 ± 15.5 years. Admission APACHE II score was 17.9 ± 7.8 , which increased to 27.0 ± 8.1 on the day of EOLC decision. 38 % patients had metastatic cancer. Main reasons for initiating EOLC care were refractory acute illness in 55 %, advanced cancer in 39 %, brain death in 4.5 %, end-stage medical disease 1.1 %. Lack of finances was an additional reason for EOLC in 13 %. EOLC discussions were initiated by the family in 4.3 %, and by the ICU medical team in 95.7 % patients. The ICU consultant was involved in all discussions with the family, the primary consultants in 95 % and primary team residents in 88 %. Nurses were involved in only 8.2 % discussions. Agreement on EOLC was reached after 1 discussion in 84.1 %, 2 discussions in 10.7 %, 3 discussions in 4.8 % of cases and four discussions were required in 2 patients. Documentation of the EOLC care process was not done in 36.1 % cases. Withholding of life support (WH) was practised in 328 patients (74.5 %) and Withdrawal of life support (WD) in 112 patients (25.5 %). Intubation was withheld in 8.4 % patients, CPR in 70.2 %, inotropes in 29.1 % and dialysis in 8.4 %, while mechanical ventilation was not given or not escalated in 27.7 %. Regarding WD, only 3 patients (0.7 %) were extubated and the ventilator withdrawn in another 13 patients (3 %). Inotropes were withdrawn in 77 patients (17.5 %) and FiO₂ reduced to 0.21 in 22 % patients. Dialysis was withdrawn in 5 patients (1.1 %), whereas enteral feeds and intravenous fluids were not withdrawn. All patients received opioid infusions during WH/WD. Family members were present by the bedside in 69.5 % cases. Religious practices (mostly pictures) at the bedside were in 59 % patients.

CONCLUSIONS. WH is preferred over WD. Documentation of the EOLC process does not occur in a significant proportion of cases. Nurses are rarely involved in the EOLC decision making process. Cultural and legal issues may be barriers to good EOLC in our ICU, and perhaps in India.

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0247

INTENSIVE CARE PHYSICIANS' ATTITUDES TOWARDS END-OF-LIFE DECISIONS: A EUROPEAN SURVEY

A.J. Nieuwenhof¹, A.R.J. Girbes²

¹Medisch Spectrum Twente, Intensive Care, Enschede, Netherlands, ²VU Medical Centre, Intensive Care, Amsterdam, Netherlands

INTRODUCTION. The decision to withhold or withdraw life support in an end-of-life situation is probably influenced by social factors like relatives' attitudes. Euthanasia has been legalized in the Netherlands and in Belgium. Except for Switzerland, where assisted suicide is legal, active measures to end life are illegal in all other European countries. Although euthanasia plays no significant role in the dying process of patients in the intensive care, public opinion and legislation on this issue are likely to influence opinions on end-of-life decisions of relatives and physicians.

OBJECTIVES. To evaluate differences in attitudes surrounding end-of-life decisions and euthanasia between European countries; specifically whether regional differences in

requests by relatives to end life sustaining treatment, and local and personal acceptance of euthanasia interrelate, and relate to attitudes towards end-of-life decisions.

METHODS. A ten-question web-based questionnaire among European intensive care physicians. Results were analyzed using cross tabulation and Chi square tests.

RESULTS. Data from a total of 286 respondents from 13 European countries were included in the analysis. On the question whether in appropriate cases a switch between life sustaining therapy and comfort care was made (end-of-life decision), 266 respondents indicated they did so, 1 indicated never to do this and 19 did not answer this question. Most respondents indicated they discussed these decisions with relatives (93 %). All Belgian and Swiss critical care physicians reported to be confronted with more than two annual requests by relatives to end life-sustaining treatment, in Dutch respondents this was 85 %. This percentage was lower in the other countries (17 to 77 %). Most physicians did not consider these requests a valid contributing reason for making such decisions (82 %). Attitudes towards euthanasia significantly differed between nationalities with universal acceptance in the respondents from the Netherlands and Belgium, to less than half of respondents in other countries. 25 Critical care physicians did not answer this question. Religious physicians showed less acceptance (38 %) than their non-religious colleagues (67 %).

CONCLUSIONS. Although end-of-life decisions were almost universally accepted in our sample, attitudes towards euthanasia and frequency of relatives' wishes to end treatment differ within Europe. Requests to end life-sustaining treatment were more frequently encountered in countries that legalized euthanasia or assisted suicide. Although physicians generally indicate not to incorporate wishes of the relatives in their decision process, they themselves are also part of a regional social context that differs in attitude to medico-ethical issues like euthanasia.

0248

ATTITUDES OF PHYSICIANS TOWARD WITHHOLDING AND WITHDRAWAL OF LIFE-SUSTAINING TREATMENTS IN ASIAN INTENSIVE CARE UNITS

J. Phua¹, G.M. Joynt², M. Nishimura³, Y. Deng⁴, S.N. Myatra⁵, Y.H. Chan⁶, N.G. Binh⁷, C.C. Tan⁸, M.O. Faruq⁹, Y. Arabi¹⁰, B. Wahjuprajitno¹¹, S.F. Liu¹², S.M.R. Hashemian¹³, W. Kashif¹⁴, D. Staworn¹⁵, J.E.M. Palo¹⁶, Y. Koh¹⁷, the ACME Study Investigators and the Asian Critical Care Clinical Trials Group

¹National University Hospital, National University Health System, Division of Respiratory and Critical Care Medicine, University Medicine Cluster, Singapore, Singapore, ²Chinese University of Hong Kong, Prince of Wales Hospital, Hong Kong, Hong Kong, China, ³University of Tokushima Graduate School, Tokushima, Japan, ⁴West China Hospital of Sichuan University, Chengdu, China, ⁵Tata Memorial Hospital, Mumbai, India, ⁶Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, ⁷Bach Mai Hospital, Hanoi, Viet Nam, ⁸Sultanah Aminah Hospital, Johor Bahru, Malaysia, ⁹BIRDEM General Hospital, Ibrahim Medical College, Dhaka, Bangladesh, ¹⁰King Saud Bin Abdulaziz University for Health Sciences and King Abdullah International Medical Research Center, Riyadh, Saudi Arabia, ¹¹Dr. Soetomo General Hospital, Surabaya, Indonesia, ¹²Kaohsiung Chang Gung Memorial Hospital and Chang Gung University College of Medicine, Kaohsiung, Taiwan, Province of China, ¹³National Research Institute Tuberculosis and Lung Diseases, Tehran, Iran, Islamic Republic of, ¹⁴Aga Khan University, Karachi, Pakistan, ¹⁵Phramongkutklao Hospital, Bangkok, Thailand, ¹⁶The Medical City, Pasig, Philippines, ¹⁷Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea

INTRODUCTION. Asia has diverse socioeconomic conditions, cultures, and religions that may impact on decision making for the dying. Little data exist on end-of-life care in Asian intensive care units (ICUs).

OBJECTIVES. We aimed to describe physicians' attitudes toward withholding and withdrawal of life-sustaining treatments in end-of-life care, and to evaluate factors associated with observed attitudes.

METHODS. We conducted a questionnaire survey of physicians who manage patients in ICUs in 16 Asian countries/regions.

RESULTS. In all, 1465 physicians (response rate 51.0 %) from 466 ICUs (response rate 58.5 %) completed the survey. For patients with no real chance of recovering a meaningful life, 70.2 % of respondents almost always/often withheld life-sustaining treatments, 20.7 % withdrew life-sustaining treatments, and 2.5 % actively shortened the dying process with drugs. Attitudes varied depending on the specific life-sustaining treatment. In severe hypoxic-ischemic encephalopathy post-cardiac arrest, 82.0 % (range between countries 48.4-100 %) would implement do-not-resuscitate orders, but 53.8 % (range 6.1-87.2 %) would maintain mechanical ventilation and start antibiotics and vasopressors if required. On multivariable analysis, non-implementation of do-not-resuscitate orders was independently associated with country/region, low/middle income economies, respondents who did not value families/surrogates' requests (22.1 %), respondents who were uncomfortable discussing end-of-life care with families/surrogates (56.1 %), respondents without religion (39.2 %), and greater perceived legal risk (28.7 %).

CONCLUSIONS. While physicians in Asian ICUs were less likely to limit life-sustaining treatments than their Western counterparts from similar surveys, attitudes and practice varied widely across countries. A thorough understanding of each country/region's culture, its physicians' perspectives, and its ethico-legal framework is required to improve end-of-life care.

0249

LIVE SUPPORT THERAPY LIMITATION PRACTICES IN SPAIN

A. Sandiunenge^{1,2,3}, M. Llauroda-Serra^{1,2,4}, N. Masnou⁵, E. Oliver⁶, M. Ibáñez⁷, M.D. Bosque⁸, M. López⁹, M. Badia¹⁰, M. Jurado¹¹, E. Navas¹², G. Miro¹³, B. Cancio¹⁴, J. Twose¹⁵, P. López¹⁵, M. Bodí^{1,2,3}, cCD Study Group

¹Joan XXIII, University Hospital of Tarragona, Intensive Care Unit, Tarragona, Spain, ²Institut d'Investigació Sanitària Pere Virgili, Tarragona, Spain, ³Universitat Rovira i Virgili, Tarragona, Spain, ⁴Universitat Rovira i Virgili, Nursing Department, Tarragona, Spain, ⁵Vall d'Hebron Hospital, Barcelona, Spain, ⁶Bellvitge University Hospital, Barcelona, Spain, ⁷Verge de la Cinta University Hospital, Tortosa, Spain, ⁸Hospital General de Catalunya, Barcelona, Spain, ⁹Hospital de Vic, Vic, Spain, ¹⁰Arnau de Vilanova University Hospital, Lleida, Spain, ¹¹Hospital de Terrassa, Terrassa, Spain, ¹²Mútua de Terrassa, Terrassa, Spain, ¹³Hospital de Mataró, Mataró, Spain, ¹⁴Hospital Moissès Broggi, Barcelona, Spain, ¹⁵Organització Catalana de Trasplantaments i Teixits, Barcelona, Spain

INTRODUCTION. Live support therapy limitation (LSTL) is a common practice in ICU. The extent and type of LSTL may vary depending on the geographical location and cultural patterns and has changed over the years.

OBJECTIVES. To describe the LSTL practices in Catalonia and to define the profile of patients in whom LSTL is applied.

METHODS. Prospective, multicentre, observational, 4-months study of all adult patients who died and/or underwent LSTL in the ICUs of 11 hospitals of Catalonia. Patient's characteristics as well as the timing, cause, type and outcome of the first (F-LSTL) and last or definitive (D-LSTL-the one that preceded patient's death) LSTL actions were prospectively recorded.

RESULTS. A total of 3315 patients were admitted during March-June 2013 in the participating centres with a global mortality rate of 9.3 % (n = 309). 326 (9.8 %) patients underwent LSTL (63.7 % male; 71.1 ± 12.8 years old (y/o); APACHEII 21.9 ± 7.3; 71.8 % Medical, and 15.9 % neurocritical). F and D-LSTL actions were taken 5.2 ± 9.9 and 6.8 ± 11.6 days after admission respectively, mostly due to admission diagnosis (56.7 % and 70.6 %), therapy futility (58.3 % and 73.8 %) and comorbidity (48.2 and 52.8 %).

Withholding measures (71.0 %) was the most common form of F-LSTL followed by withdrawing (23 %), do not resuscitate orders (DNR - 4 %-) and conditioned intensive therapy (2 %). Contrarily, treatment withdrawal was the most common form of D-LSTL (57.7 %) followed by withholding (41.4 %) and DNR (0.9 %). A wide variability in LSTL practices was observed among centres. Sedation and/or analgesia was provided in 84 % of patients in whom ventilatory and/or vasoactive support was withdrawn.

A total of 215 (65.9 %) patients died after LSTL (D-LSTL) (61 % male; 70.3 ± 12.8 y/o; APACHEII 23.2 ± 7.4; 71.3 % Medical, 18.1 % neurocritical) Time to death after D-LSTL initiation was significantly shorter after treatment withdrawal (n = 124) (197.5 min (25-75 ICR 52.5-685) compared to those in whom treatment withholding was applied (n = 89) (1425 (25-75 ICR 386-3405)(p < 0.05).

111 patients (34.0 %) who underwent LSTL survived ICU and 79 (24.2 %) of them were alive at hospital discharge. Survivors were older (73.6 ± 12.7), less severely ill at admission (APACHEII 18.6 ± 6.1) and underwent LSTL 2 days earlier (4.5 ± 8.6 days) than those who died after LSTL (p < 0.05). Treatment withholding was the most common form of LSTL in survivors (93.7 %) when compared with D-LSTL (41.4 %) (p < 0.05).

CONCLUSIONS. LSTL is a frequent practice in the ICU, with a wide variability in the magnitude and form of its application. One out of four patients undergoing LSTL survives hospital stay. Time to death is shorter in patients in whom measures are withdrawn than in those who undergo withholding.

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0250

'MAKING SENSE' OF LIFE AND DEATH: A PHENOMENOLOGICAL EXPLORATION OF FAMILIES END OF LIFE EXPERIENCES IN INTENSIVE CARE

M. Coombs^{1,2}, A. Richardson³

¹Graduate School of Nursing Midwifery and Health, Wellington Regional Hospital, Wellington, New Zealand. ²Capital and Coast District Health Board, ICU, Wellington, New Zealand. ³Faculty of Health Science, University of Southampton, Southampton, United Kingdom

INTRODUCTION. Death in intensive care is often resultant from planned treatment withdrawal when further intervention is considered futile.¹ With only a minority of patients able to contribute to decisions about treatment withdrawal, families become proxy decision makers in intensive care placing complex demands on family members.² Understanding family experience and need during end of life care can inform the type of information and support offered. This is important as the quality of bereavement care impacts on health outcomes for bereaved family members.³

OBJECTIVES. This study explored the perceived experiences of family members during end of life in intensive care.

METHODS. This interpretive phenomenological study undertook face-to-face interviews with family members bereaved in the previous year from a single hospital site. Bereaved family members were identified retrospectively through case note review and screened for inclusion. Interviews were digitally recorded and transcribed. Data analysis drew on phenomenological reduction. Ethical approval was given by NHS National Research Ethics Service.

RESULTS. 21 family members were interviewed. The mean duration of interviews was 51 min (range 28 - 86). In the interviews, bereaved family members spoke about the person's life and death and how they made sense of end of these events. Key themes included: 'Older people die'; 'Independence is paramount'; 'Freedom from suffering'; 'Life and death is dignified'; 'Maintaining a relationship with the person' and 'The identity of the person'. Families in this study used cognitive processing to make sense of the person's life and death in intensive care. This approach was used in combination with emotional processing strategies in order to understand the transition of care to end of life and find 'benefit' in the person's life as death approached in intensive care unit.

CONCLUSIONS. This study identifies how bereaved family members make sense of end of life by aligning situating meaning of dying in intensive care to personal world views, beliefs and values. Understanding the cognitive and emotional processing used by families and key issues held by families as important in making sense of the death in intensive care can help staff identify family centered priorities in care at end of life.

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0251

APPLICABILITY OF ADVANCE DIRECTIVES IN THE ICU - A PROSPECTIVE STUDY OF PHYSICIANS' AND PROXIES' ASSESSMENTS

N. Leder¹, D. Schwarzkopf^{1,2}, M. Brauer¹, U. Skorsetz³, H. Hoyer⁴, C. Hartog^{1,2}

¹Jena University Hospital, Anesthesiology and Intensive Care, Jena, Germany, ²Center for Sepsis Control and Care, Jena University Hospital, Jena, Germany, ³Jena University Hospital, Clinical Ethics Committee, Jena, Germany, ⁴Jena University Hospital, Institute of Medical Statistics, Informatics and Documentation, Jena, Germany

INTRODUCTION. Advance directives (AD) are difficult to interpret in the ICU; retrospective analyses suggest they may have only limited impact on clinical practice (1). The

challenge is to determine applicability, i.e. by matching an ICU patient's present condition to the medical situation specified in the AD.

OBJECTIVES. To prospectively explore how ICU physicians and patient proxies assess applicability and relevance of ADs.

METHODS. Prospective observational patient-based study in 4 multidisciplinary ICUs of a German university hospital. Patients were included if they stayed >48 h, were mentally incompetent and had a written AD. Treating physicians and main relatives were questioned on the day of patient inclusion. The study was IRB approved.

RESULTS. Fifty patients and 19 main relatives were included; 36 (72 %) patients were male, 29 were mechanically ventilated, 21 had therapy limitations, 23 died in the ICU. Relatives claimed very good knowledge of patient wishes; 13 relatives (68 %) were spouses. 43 consultant intensivists and 45 residents participated. Consultants were older and had much experience with AD, while residents were younger and were less experienced. 78 % of AD were standard forms. 25 (59 %) consultants, 17 (37 %) residents but only 2 (13 %) relatives thought that AD were intended for the current ICU setting.

28 % of consultants, 37 % of residents and 46 % of relatives who answered judged AD to be applicable; 19, 26 and 23 %, respectively, were unsure. Direct comparison between physicians' and proxies' answers was possible in 13 cases and showed no significant difference. Most consultants and residents who did not consider the AD applicable at the present time expected it to become applicable within the next 6 months (88 % and 84 %, respectively).

On a Likert scale (0 = not at all - 5 = very much), proxies rated AD as very helpful (median 5, [IQR 4, 5]), more so than consultants (3 [2, 5]) or residents (4 [2, 5]). Proxies judged that AD should be interpreted quite literally according to patients' wording (median 4 [3, 5]), more so than consultants (median 3, [2, 5]) or residents (median 4, [2.25, 5]); the difference between physicians (median 3 [1, 4]) and relatives (5 [3, 5]) became significant (p = 0.018, N = 17). After one month, 11 relatives were asked if patient wishes had been fully implemented; 8 agreed fully but 3 agreed only partially; reasons given were delayed implementation or doubtful applicability.

CONCLUSION. In this small study, physicians and proxies made similar judgments about the applicability of ADs in the ICU. However, proxy follow-up suggests that doubts remain concerning the interpretation of patients' wishes.

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0252

PATIENTS' AND RELATIVES' KNOWLEDGE, INTERESTS AND DISCUSSION ABOUT ADVANCE CARE PLANNING

F. Gigon^{1,2}, P. Merlani^{2,3}, B. Ricou^{1,2}

¹University Hospitals of Geneva, APSI-Intensive Care Unit, Geneva, Switzerland, ²University of Geneva, Geneva, Switzerland, ³Ospedale Regionale di Lugano, Intensive Care Unit, Lugano, Switzerland

INTRODUCTION. Decision-making in ICU put strains on intensivists when no information on the patients' desires is available. Advance care planning through advance directives (AD) or the health care surrogate decision maker (HCS) may help caregivers to respect the patients' autonomy whenever their competence is affected.

OBJECTIVES. To investigate patients' and relatives' knowledge, interests and discussion about AD and HCS.

METHODS. Patients planned for major cardiovascular surgery and their relatives were met before or after surgery and interviewed separately according to a questionnaire.

RESULTS. Of 405 eligible patients, 361(89 %) patients, 256(71 %) with relatives and 105(29 %) without relatives answered the interview. Patients: male: 256(71 %); age(mean ± SD):68 ± 15 years. Relatives: male: 70(27 %); age(mean ± SD):56 ± 18 years; life partner: 152(59), children: 69(27), siblings: 16(6), other: 19(8).

Of the 361 patients, 54(15 %) had heard about AD and 12(3 %) about HCS. 9(4 %) patients had AD, 6(3 %) a HCS. 118(33 %) were interested in AD for themselves, 126(35 %) in HCS, whereas 255(71 %) considered that AD were useful and 267(74 %) that the HCS was useful.

67(26 %) relatives had heard about AD and 37(14 %) about HCS. AD and HCS were thought useful by 208(81 %) and 205(80 %) relatives respectively. 108(42 %) said the patient would be interested in AD, 100(39 %) in HCS.

125(35 %) patients thought the primary care physician should initiate discussions on these subjects, 44(12 %) themselves, 99(27 %) their relatives and 88(24 %) other (5(1 %) missing data). 126(35 %) would have liked to discuss these subjects with their physician and 91(25 %) thought easier to speak about such subjects with their relatives after the interview. 134(52 %) relatives thought the primary care physicians should initiate discussions on these subjects, 21(8 %) themselves, 12(5 %) the patient, 52(20 %) another relative and 37(14 %) other. 53(21 %) would have liked the physician to discuss these subjects with the patient and 83(32 %) thought easier to speak about such subjects with their relatives after the interview.

CONCLUSIONS. Few patients and relatives had heard about AD or HCS and very few patients had some, even when scheduled for surgery. More relatives than patients had heard about AD and HCS, said they were useful and thought the patient would have an interest in them. Up to 81 % thought AD and the HCS useful, however patients' rated interest to possess AD or a HCS was not higher than 39 %. Physicians are thought by the majority to be the best person to initiate discussion about advance care planning. Further detailed analyses and comparison with what physicians think are awaited.

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0253

THE MEDICAL EMERGENCY TEAM'S ROLE IN END-OF-LIFE CARE

L. Proença¹, A.O. Gomes¹, R. Silva¹, I. Aragão¹, G. Campello¹

¹Unidade de Cuidados Intensivos Polivalente, Hospital de Santo António - Centro Hospitalar do Porto, Porto, Portugal

INTRODUCTION. Medical Emergency Teams (MET) have as primary goal the early identification and prompt intervention in situations of clinical deterioration in order to prevent cardiac arrests and improve hospital outcome. Nevertheless, questions regarding end-of-life care are frequently raised during MET activation, namely withholding therapy including cardio-pulmonary resuscitation (do not resuscitate - DNR order).

OBJECTIVES. To evaluate the role of the MET in the placement of end-of-life decisions.

METHODS. We conducted a retrospective cohort study at a university, tertiary care hospital evaluating MET activation episodes from 1st January 2011 to 31st December 2013

(3 years). All patients with a DNR order decided previously or during MET activation were included. End-of-life decisions included withholding or withdrawing therapy (including artificial life support measures) and DNR order.

RESULTS. Over the study period there were 700 MET activations and 137 corresponded to cases in which a DNR order existed previously (12 %) or was established (88 %) by the MET team. The mean age of these patients was 78 ± 13 years, with a slight predominance of the male gender (52 %). The activations occurred a week after hospital admission - median 7 days (IQR 3-16), mostly during the week days (44 % vs 34 % by nights and 22 % during weekends). Cardiac arrest was the main activation criteria (39 %), followed by respiratory distress (19 %). Comparing activation for surgical and medical wards, there was no significant difference in the establishment of DNR orders by the MET (87 % vs 89 %, $p = 0.685$), and only a slight difference in the initiation of comfort measures (21 % vs 9 %, $p = 0.055$). The majority of patients remained in the same place after MET intervention (52 %), and 42 % died during the team's activation. Of those who survived after MET intervention, 45 % died later (of these, the majority - 24 % died until 6 h after intervention) and 22 % were discharged.

CONCLUSIONS. Our study reinforces the role played by MET as a trigger for the discussion of end-of-life decisions and care. The huge rate of DNR decisions taken at the moment of MET activation highlights the need to promote this discussion before life-threatening events, in order to deliver timely appropriate care, and prevent unnecessary, harmful interventions and an undignified death.

0254

WE SAY WE CARE FOR THE DYING, BUT (HOW) DO WE REALLY CARE?

J. Epker¹, E.J.O. Kompanje¹

¹Erasmus Medical Centre (ErasmusMC), Intensive Care, Rotterdam, Netherlands

INTRODUCTION. Although, major improvements have been made in ICU survival over the past years, unfortunately still 15-20 % of all ICU patients will eventually die in the ICU. In a lot of countries death is preceded by a decision on withholding or withdrawing life-sustaining measures, in percentages up to 87 % for reasons of inappropriate use of ICU resources. When an ICU treatment is discontinued and death is imminent, communication and care should shift from cure to care, but should still be of the highest quality. Literature and relevant research on these subjects is however still relatively scarce. Every intensive care specialist will agree that good and evidence based care for the dying is relevant, but research in this field seems highly undervalued.

OBJECTIVES. To evaluate whether the relevant literature on ethical- and end-of-life issues in the past 6 years is in balance with the need for information in comparison with the amount of patients that need high quality end-of-life of care and their families that need well timed, emphatically communicated, reliable information.

METHODS. We searched the past Intensive Care Medicine ESCIM congress abstract supplement issues from 2008-till 2013 for abstracts concerning, ethical issues and/or issues concerning end-of-life care/decision-making, end-of-life communication or organ donation as part of end-of-life care or decision making.

RESULTS. The main results are shown in the table below. Abstracts directly on end-of-life care are very scarce; they represent far less than 1 % of all the published abstracts in the past 6 years.

	Total number of abstracts	End-of-life care or decision making	End-of-life communication	Organ donation	Ethics other	Totals	Percentage
2008 Lisbon	1002	8	-	10	-	18	1.7
2009 Vienna	1195	10	-	1	-	11	0.9
2010 Barcelona	1386	8	1	9	3	21	1.5
2011 Berlin	1157	14	1	-	2	17	1.5
2012 Lisbon	1140	6	-	1	2	9	0.8
2013 Paris	1102	7	5	5	1	18	1.6
Total	7032	53	7	26	8	94	1.3

[Abstracts numbers over the years]

CONCLUSION. Since at least 15 % of our total IC patient population will eventually die and will need adequate and accurate care accordingly and their families need the right contextual information and deserve sincere communication, the very small number of identified abstract does not seem to be in proportion with the size of the patient group and the difficulties associated. Knowing that for example failure in end-of-life communication is a major cause of conflict in the ICU, we should, if we take care profession (from the decision of admittance till death) seriously, pay more attention to research in this field.

0255

END OF LIFE CARE IN CRITICALLY ILL CANCER PATIENTS ON THE ICU: PREDICTORS AND OUTCOMES

N. Desai¹, S. Miller¹, J. Drone¹, A. King¹, N. Pattison¹, P. Farquhar-Smith¹, P. Gruber¹

¹Royal Marsden NHS Foundation Trust, London, United Kingdom

INTRODUCTION. As outcomes of critically ill cancer patients have improved over the last decade, intensivists are increasingly willing to initiate a 'trial of intensive care unit (ICU) therapy' in patients with advanced cancer.¹ The transition from intensive care therapy to end of life care (EOLC) can often be difficult to make for clinicians, patients and families. Clinical parameters to identify those patients who transition from full active ICU care to EOLC are often not easily defined.

OBJECTIVES. The aim of this study was to describe and compare the clinical characteristics and outcomes of medical patients with cancer who during their ICU stay had a change in focus to EOLC versus those who remained on full active ICU care.

METHODS. Following local approval to undertake this project, a retrospective analysis was undertaken of medical patients admitted to a specialist cancer ICU over a 6-month period. Surgical patients were excluded. Patients were divided into 2 cohorts: those receiving full active ICU care and EOLC. The EOLC group was defined by patients who had a documentation of transition from full active ICU care to EOLC or those who died. Data collected included demographics, cancer specific factors, organ support and palliative care. Data was analysed using SPSS for windows software.TM

RESULTS. Eighty-five patients were included in this study; 38 (45 %) required EOLC and 47 (55 %) remained for full active ICU care. Overall ICU mortality for both groups was 34 %. The ICU mortality in the EOLC cohort was 76 %. In the EOLC cohort 71 % required symptom control and 52.6 % of patients were seen by palliative care teams. Median age and APACHE II score was higher in the EOLC group compared to the full active ICU care group (66.5 vs. 59 years, $p = 0.017$) and (21 vs 16, $p < 0.0001$) respectively. The EOLC cohort required a higher level of organ support (intubation 44.7 % vs 12.8 %, $p = 0.001$;

vasopressors 55.3 % vs 27.7 %, $p = 0.014$ and renal replacement 28.9 % vs 8.5 %, $p = 0.021$). There was no statistical difference in the disease stage or co-morbidities. Cancer prognosis (16.5 %), performance status (40 %) and do not resuscitate status (DNACPR) (7 %) were poorly documented prior to ICU admission. In the EOLC cohort 47 % of DNACPR orders were completed in the first 48 h of ICU admission.

CONCLUSIONS. We identified that patients in the EOLC cohort were older, had higher APACHE II scores and required more organ support during their ICU admission. Interestingly, disease stage or co-morbidities were not predictive of patients' transition from full active ICU care to EOLC. Documentation of DNACPR, performance status and cancer prognosis was poor. This study demonstrates that parameters to identify patients' transition from full active ICU care to EOLC are often difficult to predict, highlighting the importance of early palliative care input and good communication to ensure best possible end of life ICU care.

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0256

AREAS OF UNCERTAINTY AND DIFFERENCE IN ATTITUDES ABOUT END OF LIFE NURSING CARE PRACTICES: AN INTERNATIONAL COMPARISON

M. Coombs^{1,2}, R. Tester¹, S. Donovan¹, K. deVries¹, P. Fulbrook³

¹Graduate School of Nursing Midwifery and Health, Wellington Regional Hospital, Wellington, New Zealand, ²Capital and Coast District Health Board, ICU, Wellington, New Zealand, ³Australian Catholic University, Brisbane, Australia

INTRODUCTION. As caring for dying patients is a significant component of clinical work¹ in intensive care, managing end of life care (EOLC) continues to cause moral distress in nurses.² The purpose of this study was to ascertain intensive care nurses attitudes about EOLC practices and make international (NZ/Europe) comparison.

OBJECTIVES. To:

identify the attitudes towards EOLC in NZ intensive care nurses
identify particular attitudes towards EOLC practices contributing to similarities and differences between European and NZ intensive care nurses.

METHODS. Cross-sectional survey design replicating a previous European study³ exploring nurses' (n = 164) views on EOLC. The 45 item survey tool had attitudinal statements about EOL care, nurses' involvement with EOL decisions and statements of beliefs about EOLC practice. Post-pilot, the web-based survey was distributed to nurses (n = 465) in four tertiary ICUs in NZ. An identical model of statistical analysis³ was undertaken. European and NZ results were subsequently compared.

RESULTS. 203 fully completed surveys were returned (response rate 44 %) from four NZ ICUs. Respondents were: female (88 %), aged 40+ years (48 %) with 5+ years in ICU (69 %, n = 152).

Most NZ nurses (55 %, n = 111) disagreed that withholding and withdrawing life support treatment were ethically the same. Whilst NZ nurses generally supported reduced inspired oxygen to air for ventilated patients (71 %, n = 139) this was an area demonstrating one of the highest levels of uncertainty (21 %, n = 41).

Post hoc analysis of results demonstrated similar international attitudes about EOLC practice. However, the view of NZ nurses that withholding life support treatment was ethically more acceptable than withdrawal, was not held by European nurses. There were aspects of EOLC that divided opinion within both populations. Statements regarding use of nutritional support, passive limb and deep sedation during end of life care were rated strongly agree/agree AND strongly disagree/disagree range within 31 - 47 % range. These also received the highest number of 'Don't know' responses internationally (range 16.1 - 23.5 %).

CONCLUSIONS. Whilst there is broad agreement amongst European and NZ nurses this study demonstrates specific areas of uncertainty about EOLC practices requiring further practice guidance.

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0257

IS IT ETHICAL TO USE NON-INVASIVE MECHANICAL VENTILATION (NIMV) IN PATIENTS CONSIDERED AS TO BE UNDER LIMITATION OF THERAPEUTIC EFFORTS (LTE)?

E. del Campo Molina¹, M.N. Parias Ángel², F. García Delgado¹, R. Artacho Ruiz¹, J.A. Guzmán Pérez¹, E. Fernández Romero¹, F. Caballero Güeto¹

¹Hospital Alto Guadalquivir, Montilla, Córdoba, Spain, ²Hospital Santa Barbara, Puertollano, Ciudad Real, Spain

INTRODUCTION. Acute respiratory failure in patients with many comorbidities and elderly is an increasing common disease in emergency department. In many cases is developed in patients with limited quality of life, who suffer from weakening illnesses and whom live in a situation in which, therapeutic efforts could be considered as futile. Then, where we draw the line? Is it ethical to use non-invasive mechanical ventilation (NIMV) in these patients?

OBJECTIVES. The aims of this study was to assess the survival after the application of BIPAP in patients suffering from advanced chronic diseases and considered as LTE, and to analyze whether it is ethical to perform this treatment in these circumstances.

METHODS. We conducted a retrospective study from October 2008 to December 2011. A total of 211 patients were admitted to a unit of NIMV, and were analyzed. Up to 95 (45 %) patients were considered as LTE, either on admission or during hospitalization according to age, comorbidities or poor prognosis. All patients were classified as LTE III (No mechanical ventilation, no intubation, and no CPR) for his physician, and in 100 % of cases, consensus was reached on clinical session and reported to the family, and finally the decision of LTE was accepted. All patients were treated with NIMV. Data were collected in a database for tracking on these patients. We collected demographic variables, medical history and clinical parameters. Were collected demographic variables such as age and gender, personal history and clinical parameters. We also collected the APACHE II, survival to discharge, and 1 month and 3 months after discharge. Data were analyzed with SPSS 17.0.

RESULTS. Mean age was 78.42 years, with a maximum and minimum value of 41 and 97 years. Up to 72 % of patients were older than 75 years, and 25 % older than 85 %. According to the pathology leading to admission, cardiac failure was 24.21 %, respiratory was 69.47 % and 6.32 % were others (post surgery, septic, poisoning and neurological disorders). APACHE II mean was 18.37 (maximum and minimum values 12/33), which would correlate with an expected mortality of 40 %. Mortality at discharge was 31.58 %, a month after was 41 % and 3 months, 46.32 %.

CONCLUSIONS.

1. - The average age and APACHE II is high in our patients and could be the cause of the high percentage of LTE.
2. - Survival in our patients applying NIMV is higher than expected according to APACHE II score prognosis.
3. - Despite the high mortality of these patients, we believe it is ethical to use NIMV because:
 - decrease dyspnea
 - It gives us time to get to know the patient and their limitations, in order to adapt the treatment that best suits his needs.
 - It decreases anxiety within the family facing no opposition from not paying any support treatment.

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0258

INADEQUATE ICU-ADMISSIONS IN A UNIVERSITY MEDICAL-CENTER - ONE YEAR PROSPECTIVE OBSERVATIONAL STUDY

J. Borch¹, K. Bangert¹, S. Ferahl¹, S.A. Braune¹, S. Kluge¹

¹University Medical Center Hamburg-Eppendorf, Department of Intensive Care Medicine, Hamburg, Germany

INTRODUCTION. Intensive care medicine (ICM) is increasingly utilised worldwide. The reasons for this are an increasingly ageing and multi-morbid population and technological improvements in ICM. Inadequate patient admissions to the Intensive Care Unit (ICU) can be a threat to patient autonomy and to rational resource allocation.

OBJECTIVES. To evaluate the incidence, characteristics and resource utilisation of patients inadequately admitted to ICU.

METHODS. Prospective cohort study of all consecutive patients admitted from September 2012 till August 2013 to the Department of Intensive Care Medicine of a German university hospital comprising of 10 ICUs and 124 beds. Inadequacy of admission was defined according to category 4B of the recommendations of the Society of Critical Care Medicine (1) ("futility of treatment" or "ICU refused by patient") and was determined in each suspected case by structured group discussions between the study team and all involved care givers including the referring team.

RESULTS. 66 of 6452 ICU admissions (1 %) were suspected to have been inadequate on retrospect evaluation on the day after admission. In 50 patients (0.8 %) an interdisciplinary consensus was reached on the inadequacy of the admission. 41 out of these 50 patients (82 %) had previously refused ICU treatment in principle. This information was based on the patients presumed wish as expressed by next of kin (56 %) or on a written advanced directive (26 %). In 9 patients (18 %) ICU treatment was considered futile. In all cases a lack of information on the patients' wish or clinical prognosis was the reason for inadequate ICU admission.

CONCLUSIONS. During the 1 year study period a relevant number of patients were admitted to ICU despite their contrary wish or an unfavourable clinical condition. Optimising pre ICU-admission information flow about important non-admission criteria not only helps to respect patients' autonomy but also allows for more adequate resource allocation. Means to avoid inadequate ICU-admissions would be to further implement advanced directives in the general society. This could be accompanied by the introduction of emergency health cards containing information on existing advanced directives as well as by educational activities to emphasise the importance of adhering to advanced directives both intra-hospitality and pre-hospitality.

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Organisation and delivery of ICU care: 0259–0272

0259

WORKLOADS (WL) EVALUATION IN CRITICALLY ILL PATIENTS (CIP) ACCORDING TO THE NEEDS OF MECHANICAL VENTILATION (MV)

J. Ruiz Moreno¹, M.J. Esteve Paños¹, E. González Marín¹, N. Suárez Álvarez¹, M. Moral Guiteras¹, S. Godayol Arias¹, M. Julia Mill¹, R. Corcuera Romero de la Devesa¹

¹IDC Salud Hospital Universitari Sagrat Cor, Critical Care Department, Barcelona, Spain

INTRODUCTION. It is considered that WL are greater in CIPs who need MV. However, it is unclear what type of MV (IMV or nIMV) requires more WL.

OBJECTIVES. To evaluate workloads in CIPs according to the needs of invasive mechanical ventilation (IMV) or non IMV (nIMV).

METHODS.

- Prospective, analytical, longitudinal, and observational study
- Period: Between January 1-2012 and August 31-2013 (20 months)
- Setting : Medical/Surgical ICU belonging to a 290 acute care teaching hospital
- Population and sample: All the CIPs admitted consecutively to the ICU. Sample: 1090 CIPs.
- Exclusion criteria: CIPs < 16 years, major burn patients, incomplete clinical documentation, and voluntary discharge
- Groups of CIPs: a) CIPs without MV; b) CIPs with nIMV; c) CIPs with IMV.
- Dependent variables: nIMV and IMV.
- Independent variables: a) age, b) length of stay (LOS), c) readmission, d) hospital mortality, e) scales: TISS 28, Nursing Activity Score (NAS).
- It is assumed that both a longer LOF and readmission are indirect measures of workload.
- Statistical analysis: ANOVA, comparison with Scheffé's method.

RESULTS.

- TISS 28: F Scheffé 563,12.
- NAS: F Scheffé 291,74
- See Tables I (results), II (TISS: Scheffé, ANOVA), and III (NAS: Scheffé, ANOVA)

	CIPs	Age	LOS	Exitus Letalis	Readmissions	TISS	NAS
Global	1248	66,1	3,35	5,85 %	3,77 %	32,6	78,68
No MV	810 (64,9 %)	63,7	1,79	0,12 %	1,98 %	28,47	76,41
nIMV	62 (4,9 %)	72,8	3,82	3,23 %	6,45 %	34,4	79,80
IMV	376 (30,1 %)	69,9	6,62	18,62 %	7,18 %	41,0	83,39

[Results]

TISS 28		t	p
no MV	n IMV	7,049	<0,001
no MV	IMV	33,5	<0,001
nIMV	IMV	8,474	<0,001

[TISS 28 (Scheffé, ANOVA)]

NAS		t	p
No MV	nIMV	5,548	< 0,001
No MV	IMV	24,08	< 0,001
nIMV	IMV	5,627	< 0,001

[NAS (Scheffé, ANOVA)]

CONCLUSIONS.

· WL of IMV CIPs are higher WL of the nIMV CIPs, which, in turn, are greater WL of CIPs without MV.

· Both LOS and readmissions are higher in IMV CIPs than in nIMV CIPs, which, in turn, are higher than in CIPs without MV

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0260

CORRELATION ANALYSIS OF NORTH AMERICAN NURSING DIAGNOSIS ASSOCIATION TO DIAGNOSIS RELATED GROUPS IN CRITICALLY ILL PATIENTS

J. Ruiz Moreno¹, M.J. Esteve Paños¹, M. Julia Mill¹, E. González Marín¹, M. Moral Guiteras¹, N. Conesa Folch¹, M.J. Riba Ribalta¹, R. Corcuera Romero de la Devesa¹, A. Cruz Oliveras²

¹IDC Salud Hospital Universitari Sagrat Cor, Critical Care Department, Barcelona, Spain, ²IDC Salud Hospital Universitari Sagrat Cor, Hospital Management Committee, Barcelona, Spain

INTRODUCTION. Despite attending the same patient, in the same place (ICU) and at the same time, we establish the hypothesis that the North American Nursing Diagnosis Association (NANDA) are not related to medical diagnostics in reference to critically ill patients (CIPs); medical diagnostics understood as Diagnosis Related Groups (DRG)

OBJECTIVES.

· In regard to CIPs, to analyze and evaluate which DRG involve a greater number of NANDA.

· To analyze the correlation between the relative weight (RW) of the DRGs and the number of NANDA.

METHODS.

- Prospective, analytical, longitudinal, and observational study
- First period: Between December 10-2012 and May 22-2013.
- Second period: Between August 19-2013 to December 31-2013.
- Setting : Medical/Surgical ICU belonging to a 290 acute care teaching hospital
- Population and sample: All the CIPs admitted consecutively to the ICU. Sample: 556 CIPs.
- Exclusion criteria: CIPs < 16 years, major burn patients, incomplete clinical documentation, and voluntary discharge.
- DRG AP-DRG 25.0 version (684 DRG are grouped into 25 Major Diagnostic Categories and 1 extra Category)
- NANDA 2012-2014 (216 diagnoses and 12 domains). In this classification, specific critical care nursing diagnoses (SCCND) are identified. Such diagnoses correspond mostly with 'actual nursing diagnoses' and 'risk nursing diagnoses', not so much with 'nursing diagnoses of health'.
- 176 SCCND are identified
- Data collection: 6 registered CC nurses trained in case-mix.
- Statistical analysis: ANOVA, 'F' of Snedecor value = 1.448; 'p' value = 0,05.

RESULTS.

- CIPs: 556
- CIPs included in DRG = 6 > 5 cases: 407.
- 37 DRGs embrace 5 > 5 CIPs
- NANDA average per CIP: 73.76 (confidence interval 0.05, SD ± 0.749)
- ANOVA statistically significant (F = 1.458, p = 0.047); so it is made a correlation study between RW and number of NANDAs: r = 0.18. So:
 - The distribution of NANDA in the DRG is not uniform. Some GRD comprises a different number of NANDA than others (not sure if more or less).
 - A greater RW does not involve a greater number of NANDAs

CONCLUSIONS.

- The distribution of NANDA by DRG is uniform: high RW do not involve a greater number of NANDA.
- The NANDA are not correlated with the GRD. In other words, although the patient is the same, in the area of CIPs, nursing diagnoses are not associated with medical diagnoses.

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0261

ACUTE EFFECTS OF NOISE REDUCTION ON THE CLINICAL EVOLUTION OF MECHANICALLY VENTILATED PATIENTS

C. Domínguez¹, L. Carrasco¹, C. Subira¹, M. Mateu¹, R. Fernández¹

¹Althaia Xarxa Hospitalària Universitària i Assistencial de Manresa, Intensive Care Unit, Manresa, Spain

INTRODUCTION. The World Health Organization recommends that noise levels inside hospital should not exceed 45 dB during the day and 30 dB at night. However in ICUs noise between 50-75 dB is common, with peaks up to 103 dB, that could have some impact in the clinical evolution of the patients.

HYPOTHESIS. Noise reduction could improve the clinical outcome of critically ill patients.

OBJECTIVES. Analyze whether physiologic variables improve in a short-term with the implementation of a noise reduction strategy in mechanically ventilated patients.

METHODS. Clinical trial in a 14-bed general Intensive Care Unit during 1 year. We studied mechanically ventilated patients on steady-state, defined as 3-h without changes in vasoactive drugs, sedation or ventilatory pattern. Level of sedation between 3-4 of Ramsay Sedation Scale. The trial had 3 sequential 1-h periods:

1) Basal: Without sound masking;

2) With sound masking: Headphones: Peltor Optime III 3 M H540/Hi-Viz, and

3) Without sound masking. We collected demographic data (age, sex, medical history), clinical data (blood pressure, heart rate, respiratory rate, and SpO₂), Ramsay score and Bispectral analysis. Statistical analysis: Wilcoxon Test (SPSS v.15).

RESULTS. We studied 21 patients (71 % men) with 64 ± 13 years. Comorbidities were: Hypertension (55 %), Diabetes (25 %), COPD (10 %), psychiatric condition (10 %), and chronic treatment with benzodiazepines (20 %). We did not find differences between the clinical data in the 3 stages: BP (SBP 123 ± 23,05/DBP (63 ± 14,87) vs. SBP 117 ± 19,16/DBP 60 ± 13,40 vs. SBP 121 ± 20,45/DBP 70 ± 14,43; pNS); HR (101 ± 19,48) vs. 97 ± 19,65 vs. 100 ± 20,15 b/min; pNS); RR (22 ± 4,19 vs. 20 ± 4,94) vs. 22 ± 4,06 b/min; SpO₂ (95 % ± 2,07 vs. 95 % ± 1,68 vs. 95 % ± 1,99, pNS); Ramsay score (4 ± 1,23 vs. 4 ± 1,19 vs. 4 ± 1,23, pNS); and BIS (63 ± 19,22 vs. 59 ± 18,64 vs. 72 ± 19,44, pNS). The length of ICU stay was 9.5 days (IQR = 5.50-28.5) and the length of Hospital stay was 24 days (IQR = 9 - 64). The mortality rate was 45 %.

CONCLUSIONS. In our study, noise reduction has not effect on the clinical data in the short-term.

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0262

HOSPITAL STAY PRIOR TO ICU ADMISSION: EFFECT ON MORTALITY AND LENGTH OF STAY

M.E. Sinnott¹, N. Lucas¹, P. Morgan¹

¹Surrey and Sussex Healthcare NHS Trust, Intensive Care Unit, Redhill, United Kingdom

INTRODUCTION. Accurate prognostic indicators are vital in intensive care¹. While the APACHE II score focuses on the health and physiology of the patient, other studies have examined the effect of the circumstances surrounding ICU admission^{2,3}.

OBJECTIVES. To assess the effect of duration of hospital stay prior to ICU admission on ICU mortality and length of ICU stay.

METHODS. Retrospective review of electronic patient records system, comprising 8,973 ICU admissions. Patients were categorised into 5 groups according to length of hospital stay prior to ICU admission in days: <1, 1 - 2, 3 - 5, 6 - 10, and >10.

1. *Outcome.* The number of patients who improved or died in each length of prior hospital stay group was compared using the Chi squared test.

2. *Length of ICU stay.* Length of total ICU stay for each group was recorded as 0 - 5, 6 - 10, 11 - 15, 16 - 20 and >20 days.

RESULTS.

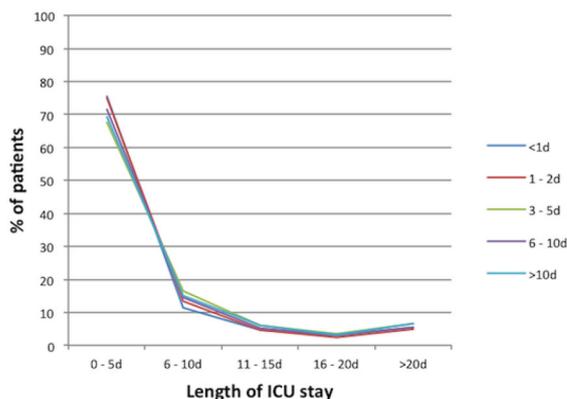
1. Length of hospital stay prior to ICU admission affects mortality (table).

Hospital stay prior to ICU admission (days)	n	Unit mortality (%)	Median (IQR) APACHE II score
<1	4023	22.0	15 (10)
1-2	2764	19.2	14 (8)
3-5	834	28.4	15 (8)
6-10	603	31.2	16 (8)
>10	749	30.2	16 (9)
Total	8973		

[Effect of hospital stay prior to ICU admission]

There is a significant (p < 0.001) increase in mortality if length of stay prior to ICU admission is >2 days (29.8 %) rather than <2 days (20.8 %). This is also true for 5 days (30.7 % vs 21.7 %, p < 0.001), and 10 days (30.2 % vs 22.4 %, p < 0.001).

2. Length of hospital stay prior to ICU admission does not appear to affect length of ICU stay, as can be seen by the broadly similar curves in the figure.



[Prior hospital stay affecting length of ICU stay]

CONCLUSIONS. Length of hospital stay prior to ICU admission significantly affects observed unit outcome. There is a definite increase in mortality when patients are admitted after 2 days, 5 days and 10 days compared to before. This is another circumstantial factor, which can be used alongside other prognostic indicators to help inform the clinician, patient and family about likely outcome.

Length of hospital stay prior to ICU admission does not affect length of ICU stay.

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0263

PATIENTS WITH ACUTE MYOCARDIAL INFARCTION WHO RECEIVE CARE IN THE EMERGENCY DEPARTMENT OBSERVATION UNIT DO NOT RESULT IN WORSE OUTCOMES THAN THOSE TREATED IN THE INTENSIVE CARE UNIT

J. Rubio Quiñones¹, J.A. Rubio Mateo-Sidron², R. Sierra Camerino¹, B. Hernandez Alonso¹, A. Gordillo Brenes¹

¹Puerta del Mar Hospital, Intensive Care, Cadiz, Spain, ²Infanta Cristina Hospital, Intensive Care, Badajoz, Spain

INTRODUCTION. Little is known about patients with Acute Myocardial Infarction (AMI) who do not receive critical care due to a lack of ICU beds (1). It makes sense that the outcomes of AMI patients who receive more healthcare in a Intensive Care Unit (ICU) would be better than those cases not admitted to ICU (2).

OBJECTIVES. To compare long-term outcomes of two groups of patients with AMI diagnoses, those who were received care in Emergency Department Observation Unit (EDOU) versus the AMI patients admitted to the ICU.

METHODS. Retrospective observational study (July 2012 - June 2013). We included patients with AMI treated in an ED OU of a 750-bed University Hospital. A subgroup with AMI admitted in ICU was used as control. All patients underwent strict clinical and management, evidence based, protocol applied by a multiprofessional team staff (Emergency Medical system, ED, cardiac catheterization laboratory and cardiologist) headed by Intensivists. We analyzed clinical variables, demographic characteristic, co-morbidities, elevated and non-ST coronary syndrome, risk scores (TIMI, Killip, Troponin-Ts) and percutaneous coronary interventions (PCI). The outcomes analyzed were length of hospital stay (EDOU, ICU, ward), electrical and hemodynamic complications, left ventricular ejection fraction (LVEF), readmissions, need for cardiac surgery and death. Patients were followed up to 6 months. Univariate statistical analysis using Fisher's exact test or Mann-Whitney test were used as appropriate.

RESULTS. 68 patients were included in the 12-month study period (29 % of the 235 AMI admitted to the hospital), 32 treated in ED OU and 36 in ICU (control group). There were not significant differences between both groups in terms of clinical features, cardiac risk, coronary syndrome type, complications, LVEF and readmissions. More PCI procedure were performed in ICU than the ED OU group (n = 36 (100 %) versus n = 28 (87.5 %) p < 0.05). The length of ED OU stay was shorter than ICU group (44.35 h IC 95 % (36.2-52.5) versus 79.2 h IC 95 % (57.1-71.3) p < 0.05). Only one patient died in the hospital and one patient required bypass surgery, both belonging to the ICU group.

CONCLUSIONS. In our setting, ED OU location is an effective alternative for management of patient with early AMI when there are not available ICU beds.

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0264

APPLICATION OF A CONTINUOUS INTRAVASCULAR BLOOD GLUCOSE SENSOR TO A MICU PATIENT POPULATION

G. Palepu¹, K.P. Mulavasilala¹, J.M. Ganshyam², S. Srinivas², N. Ravindra³, P. Sudhir³, K. Subba Reddy⁴, S. Sudeep⁴, G. Manam⁵, R. Chandana⁵, C. Ravi⁶, S. Mohan⁶

¹Care Nampally Hospital, Hyderabad, India, ²Care Hospital Banjara Hills, Hyderabad, India, ³Awara Global, Hyderabad, India, ⁴Apollo Hospitals, Hyderabad, India, ⁵Star Hospital, Hyderabad, India, ⁶Global Lakdikapul, Hyderabad, India

INTRODUCTION. Today the importance of continuous glucose monitoring (CGM) for effective glucose management within ICU is well documented. An accurate and truly continuous glucose monitoring system can continuously display a patient's glucose level, assess glycemic variability and use the direction and magnitude of change of glucose levels

to predict impending glucose excursions (hypo- and hyperglycemia). This early warning of changing glucose levels may allow the clinicians to be proactive rather than reactive in managing patient's condition.

There is a need for more clinical evidence to support the use of continuous glucose monitoring in diverse patient groups within the ICU.

We have previously published our experiences of the GlySure CGM sensor within the context of postoperative care of a cardiac surgery patient population [1, 2, 3], which has been the preferred patient group for many of the initial studies of novel sensor developments. We have now extended our investigations to include the potentially more challenging environment of a number of Medical Intensive Care Units, where the compromised patient immune system and organ function may generate many endogenous protein based molecules, which could have the potential to interfere with sensor chemistry.

OBJECTIVES. The aim of this study was to evaluate the accuracy and safety of the GlySure continuous intravascular glucose monitoring system versus intermittent blood glucose monitoring using the Yellow Springs Instrument (YSI) in a total of 20 patients admitted in 10 Medical Intensive Care units (MICU) across 6 hospitals.

METHODS. The study used the GlySure sterile, single use sensors and a 5 lumen 9.5 Fr CVC device, allowing the fluorescence optical based sensor to be placed into the patient's right internal jugular vein. The screen data was blinded to the bedside staff. Data from the monitor was later compared to the sample measurement from the Yellow Springs (YSI) glucose analyser. The data accuracy was measured using the mean absolute relative difference (MARD), an accepted error calculation tool.

RESULTS. The device met the primary safety and effectiveness endpoints of the trial. The 297 samples values recorded by the monitor were correlated with samples taken from the YSI and the MARD for the study was 8.95 %. The analysis showed that 99.3 % of the data fell within the A + B zone of the Clark error grid.

CONCLUSIONS. The use of a truly continuous sensor, placed in an intravascular environment has again demonstrated clinically relevant accuracy and safety that could optimise glucose management in critically ill MICU patients.

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0265

AN AUDIT OF POST RESUSCITATION CARE ON THE INTENSIVE CARE UNIT

C.J. Thome¹, J. Cheshire², A. Bell², L. Jones², G.D. Perkins^{1,3}

¹Heart of England NHS Trust, Critical Care Department, Birmingham, United Kingdom,

²University of Birmingham, Birmingham, United Kingdom, ³University of Warwick, Warwick, United Kingdom

INTRODUCTION. Post-resuscitation care aims to minimise the impact of the post-cardiac arrest syndrome. The European Resuscitation Council (ERC) advocates a care bundle approach, which improves long term prognosis from cardiac arrest. The intensive care unit at Heartlands Hospital, a large district general hospital utilises its own such bundle.

OBJECTIVES. To determine outcomes and compliance with the post-cardiac arrest care bundle on the ICU.

METHODS. The ICNARC database was searched for patients admitted to the ICU post-cardiac arrest from 1/1/13 to 31/12/13. Data were abstracted from the ITU nursing charts (n = 80) and scanned notes (n = 30). Data were collected and analysed in Microsoft Excel. Performance data were compared to the post-cardiac arrest care bundle with expected compliance of 100 %. The care bundle targets are as follows: PaO₂ 8-13 kPa, PaCO₂ 4.5-5 kPa, urine output >1 ml/kg/hr. Therapeutic hypothermia for all patients not regaining consciousness following return of spontaneous circulation (ROSC) unless contraindicated. This entails cooling for 12-24 h to 32-34 degrees and re-warming at 0.25-0.5 degrees/hr. Temperatures of >37 degrees should be avoided within 72 h or re-warming.

RESULTS. Of the 96 patients, 60 (62.5 %) were male and 36 (37.5 %) female. Mean age was 62.2 years (SD 17.3). The commonest causes of cardiac arrest were acute myocardial infarction (41/96, 42.7 %), pneumonia (10/96, 10.4 %) and metabolic (8/96, 8.3 %). There were 56 (58.3 %) in hospital cardiac arrests (IHCA) and 40 (41.7 %) out-of-hospital (OHCA). For IHCA 30/56 (53.6 %) died whilst on the ICU and 23/56 (41.1 %) survived until hospital discharge. For OHCA 21/40 (52.5 %) died whilst on the ICU and 15/40 (37.5 %) survived until hospital discharge.

The mean PaO₂ for ventilated patients was 12.6 kPa (SD 5.5). The mean PaCO₂ was 6.1 kPa (SD 2.5). Compliance with ventilation targets improved with time spent on the ICU. Mean urine output for the first 24 h post ROSC was 0.88mls/kg/hr (SD 0.88). Therapeutic hypothermia was undertaken in 32/36 (88.9 %) OHCA and 20/49 (40.8 %) IHCA. The mean duration of time spent at <34 degrees was 15.1 h (SD 7.9). The mean rate of re-warming was 0.33 degrees/hour (SD 0.18). 41/56 (73.2 %) of patients had a temperature of >37 degrees within 72 h of re-warming. Only 4/56 (7.1 %) were re-cooled.

CONCLUSIONS. Outcomes post-ROSC are similar to national statistics. Overall compliance with the post-resuscitation care bundle was good; with the exception that hyperpyrexia post-therapeutic hypothermia was poorly managed. Ventilation targets could be improved by having a checklist at the end of the day to identify whether these have been achieved.

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0266

PREOPERATIVE ACTIVITY OF DAILY LIVING (ADL) DOES NOT CORRELATE WITH PREOPERATIVE COGNITIVE FUNCTION, BUT DECLINES IN ASSOCIATION WITH POSTOPERATIVE DELIRIUM

U. Guenther¹, N. Theuerkauf¹, K. Brimmers¹, R. Malik¹, S. Stori¹, J. Popp², C. Putensen¹

¹Bonn University Hospital, Clinic of Anaesthesiology and Intensive Care Medicine, Bonn, Germany, ²Centre Hospitalier Universitaire Vaudois, Département de Psychiatrie, Prilly, Switzerland

INTRODUCTION. Activity of daily living (ADL) is often impaired at early stages of cognitive impairment. Cognitive impairment is a well established risk of postoperative delirium and cognitive decline (POCD) after cardiac surgery (1). The ADCS-ADL is an inventory of informant based (not self-reported) items to assess activities of daily living and functional performance to observe early symptoms of cognitive impairment (2).

OBJECTIVES. To determine whether patients' relatives are aware of a possible mild cognitive impairment (MCI) and if ADL is affected by delirium following elective cardiac surgery.

METHODS. With permission from institutions ethics committee, 119 patients scheduled for cardiac surgery were assessed preoperatively for their cognitive function with the Mini-Mental State Exam (MMSE), and ADCS-ADL was reported by their relatives. Delirium was assessed in the ICU with the CAM-ICU. Relatives were interviewed 180d after surgery for patients' ADL. This investigation was part of a project to investigate risk factors of delirium and outcomes of cardiac surgery (3).

RESULTS. Preoperative ADL was 46 (41-50, median [IQR]), did not correlate with cognitive impairment (MMSE \leq 25), and was not associated with the incidence of delirium in ICU. Cognition, though, was significantly impaired in patients who developed delirium in ICU (MMSE, 29 [27-30] vs. 27 [22-30] without delirium; P = 0.025). Of note, ADL was significantly lower 180d after surgery in patients who suffered delirium in ICU (post-OP ADL, 41 [37-47] vs. 45 [39-50], P = 0.002).

CONCLUSIONS. Patients' relatives were not aware of the degree of pre-OP cognitive impairment, since reported ADL did not correlate with cognitive function or impairment. Delirium, of note, was associated with a loss in ADL half a year after cardiac surgery. Further work should be directed towards tools to allow relatives to observe early signs of pre-operative cognitive dysfunction in order to facilitate identifying risk factors of delirium and POCD.

REFERENCE(S). (1) Rudolph et al.: Delirium: an independent predictor of functional decline after cardiac surgery. *JAGS* (2010). (2) Galasko et al.: An inventory to assess activity of daily living [...]. *Alz Dis Assoc Disorders* (1997). (3) Guenther et al.: Predisposing and precipitating factors of delirium after cardiac surgery. *ANN SURG* (2013)

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0267

RE-LOCATION OF A CRITICAL CARE UNIT - SPECIFIC CHALLENGES AND PATIENT OUTCOMES

R.A. O'Leary¹, C. O'Loughlin¹, B. Marsh¹

¹Mater Misericordiae University Hospital, Intensive Care Medicine, Dublin, Ireland

INTRODUCTION. Intrahospital transport (IHT) of critically ill patients is associated with increased morbidity. Overall complication rates are as high as 70 %. Re-location of critical care units is associated with mass transfer of critically ill patients.

OBJECTIVES. The aim of our study was to describe the process of relocating our intensive care unit (ICU) and assess impact on patient outcomes.

METHODS. In February 2014 our ICU relocated to a facility in a new building. The estimated transfer time was 17 min, including transit in 2 lifts. Preparations prior to transfer included staff orientation and provision of extra portering, nursing and medical engineering staff. A rest station was provided on the transfer route in case of patient instability or equipment failure. Data was collected on 21 patients. Transfer times and complications associated with transport were recorded prospectively. We followed patients until hospital discharge and collected details of their critical care course, including adverse events.

RESULTS. 21 patients were transferred over a 7 h period. 71.4 % of patients were ventilated (15/21). 33 % of patients required intropes (7/21) and 1 patient required extracorporeal life support (ECLS). 2 consultant intensivists managed patients in the old ICU and 2 consultant intensivists received care in the new ICU. A dedicated transport team of 6 non-consultant hospital doctors with anaesthesia and intensive care medicine training managed all patient transfers. Average transfer time was 11 min 14 s, 2 transfers required interruption for equipment failure and 1 transfer was delayed by lift malfunction. No patient suffered significant haemodynamic or respiratory deterioration during or after transfer. There was no statistically significant increase in mortality and 30-day mortality was 14.3 % (3/21 patients).

CONCLUSIONS. IHT in critically ill patients has an associated morbidity. Our experience shows that this can be minimised with planning and adequately skilled personnel. We propose that IHT with a high level of organisation allows necessary interventions, such as radiology, to proceed in a timely manner with minimal risk and avoids patient risks associated with delay.

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0268

SOCIO-ECONOMIC DEPRIVATION MAY BE INDEPENDENTLY ASSOCIATED WITH MORTALITY IN PATIENTS WITH MAJOR BURN INJURIES ADMITTED TO THE BURNS INTENSIVE CARE UNIT

O.H. Clancy^{1,2}, J.S. Heng^{1,2}, I. Jones³, J. Atkins³, A. Williams³, J. Leon-Villalpalos³, M.P. Vizcaychipi^{1,2}

¹Chelsea and Westminster Hospital, Magill Department of Anaesthesia, Intensive Care and Pain Medicine, London, United Kingdom, ²Imperial College London, The Faculty of Medicine, London, United Kingdom, ³Chelsea and Westminster Hospital, The Burns Service, London, United Kingdom

INTRODUCTION. The survival rates of patients admitted to burns units have improved significantly over the past ten years with advancing critical care and surgical management. However major burns injuries admitted to the burns intensive care unit (BICU) still carry a high risk for mortality and morbidity. The Belgian Outcome in Burn Injury (BOBI) Score is a validated predictor of survival in patients with acute burn injury. It takes into account the age of patient, total body surface area burned (TBSA %) and inhalation injury. However, burns injuries do not affect the population uniformly. It has been observed that rates of admission, and the severity of burns injuries, are higher in lower socioeconomic groups (LSE) (1,2), and we know that mortality rates following a traumatic injury (3), and admission to general intensive care (4) are higher in people from LSE groups. We aimed to investigate whether similar trends in mortality were observed in the BICU.

OBJECTIVES. This study aimed to investigate whether socioeconomic deprivation is independently associated with mortality on the BICU.

METHODS. Medical notes from the past 14 years were retrospectively reviewed and BOBI scores calculated for all patients with a burn injury of TBSA > 15 % admitted to the BICU at Chelsea and Westminster Hospital. A deprivation score of residence, as measured by the English Index of Multiple Deprivation (IMD), was derived for each patient, and categorised into above or below the median IMD score for London.

RESULTS. A total of 187 patients were admitted to the BICU with TBSA burn injury of >15 % during the study period. The median BOBI score was 3 (range 0 - 10) with 123

low-risk patients, 57 moderate-risk patients and 7 high-risk patients. There were 98 deaths (52 %). BOBI scores were highly predictive of survival in the study cohort (log-rank $p < 0.001$). We found that LSE did not confer an increased risk of mortality in patients with a high predicted mortality based on BOBI score; however a trend towards reduced survival rates in patients with lower BOBI scores was seen, although not found to be significant (Figure 1).

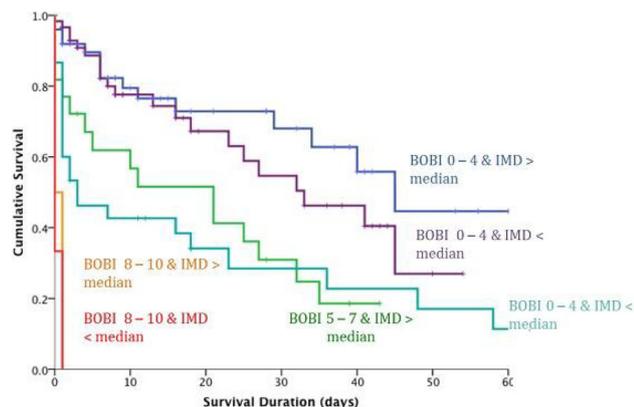


Fig. 1 A Kaplan-Meier Plot for Burns

CONCLUSIONS. We found that socioeconomic deprivation may be independently associated with poorer survival in patients with major burn injuries admitted to the BICU who would otherwise have been predicted to have low mortality rates based on BOBI scoring. Further cross-centre, high powered, clinical studies are required to further investigate this association.

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GRANT ACKNOWLEDGMENT. Thank you to the Chelsea and Westminster Health Charity (#1067412) for supporting this work.

Figure 1. A Graph to show a Kaplan-Meier plot for survival following admission to a Burns Intensive Care Unit associated with burn severity and socioeconomic status.

0269

NO EXTRAORDINARY-LIFE-SUPPORT-MEASURES ORDER (ELSM) IN POSTICU PATIENTS: HIDDEN NO ELSM ORDER

P. Martinez-Lopez¹, M. Nieto-Gonzalez¹, J. Perez-Vacas¹, C. Reina-Artacho¹

¹Hospital Universitario Virgen de la Victoria, Intensive Care Unit, Malaga, Spain

INTRODUCTION. Up to one-third of the total mortality that occurs after a critical illness occurs after a successful discharge. This high mortality rate after a discharge from the intensive care unit (ICU) emphasizes the need for analyze the causes.

OBJECTIVES. To analyze hospital mortality of postICU patients with bad prognosis but without no ELSM order.

METHODS. Observational and retrospective study of 216 patients, who were discharged from ICU during an 18 months period. Inclusion criteria:

- 1) Sabadell Score 1 or 2 (worse long term prognosis),
- 2) discharged patients without no ELSM order, so readmissible to ICU. We collected data from medical record and ward nursing charts.

These variables were related to severity and prognosis at ICU discharge moment. We analyze in which conditions death occurred.

RESULTS. 35 of 216 patients died in the ward (16.2 %). The cause of death was cardiologic in 14.2 %, respiratory failure in 11.4 %, impaired consciousness in 11.4 %, palliative sedation in 8.5 % and infections in 8.5 %. We could't find the cause of death in 16 medical histories. When patients got worse, ICU team was called in 8 cases (22.8 % of death). The period of time between the first warning signs and the doctor in charge call was 18 ± 17 h (mean \pm SD).

CONCLUSIONS. After ICU discharge, there is a trend to restriction in care measures in weak patients postICU. These situations are not registered in the medical record; this is what some authors call "hidden ELSM order".

0270

INFECTION CONTROL IMPROVEMENT INITIATIVES IMPACT ON MORTALITY RATE AND LENGTH OF STAY (LOS) IN ICU

N. Butskhrikidze¹, M. Geleishvili², V. Kaloiani³, N. Kvachadze⁴

¹Kipshidze Central University Hospital, Quality Assurance Department, Tbilisi, Georgia,

²Kipshidze Central University Hospital, Infection Control Group, Tbilisi, Georgia,

³Suchtermann Scheller'sche Klinik, Bad Rothenfelde, Germany, ⁴Kipshidze Central University Hospital, ICU, Tbilisi, Georgia

INTRODUCTION. The ICU is often epicenter of emerging nosocomial infections (NI) problems in the hospital. Patients admitted to ICU are 5 to 10 times high risk of acquiring of NI due to both intrinsic and extrinsic risk factors. According some data, nosocomial infections are main reason of mortality in intensive care units (ICU). The same time NI increase LOS in ICU. The infection control initiatives should reduce the mortality and LOS in ICU. The evidence that quality improvement initiatives lead to improvement in these outcomes are limited.

OBJECTIVES. To figure out how infection control improvement activities influence the ICU main outcomes.

METHODS. Retrospective, observational comparative study. Quality improvement initiatives was defined as: to create the evidence-based protocols for all procedures and manipulations, to put the nurse as a infection control supervisor and define the responsibilities for this person, to organize the training course regarding the infection control for nurses and physicians, to optimize the antibiotic therapy in ICU. The initiatives were implemented in January-June of 2010. All adult patients with LOS in ICU more than 48 h.

RESULTS. Two groups before and after implementation was compared regarding the outcomes: LOS and mortality rate. The baseline continuous variables were tested for difference by independent sample *t* test and nonparametric variables by Chi square test with 95 %CI. Continuous variable was adjusted by Univariate Analysis and nonparametric variable by logistic regression with 95 % CI. The total number of patients involved in this investigation was 570: 286 patients pre and 284 post-implementation. The baseline data for these two groups were compared regarding APACHEII and there was not found statistically significant difference (independent sample *t*-test $p = 0.267, 95\% \text{ CI } -0.843-3.016$). The mortality rate was 42(7.4 %) in the pre-implementation period and 32(5.6 %) in post-implementation period. The difference between these data were not statistically significant (Pearson Chi square 1.473, $p = 0.025$). Mortality rate was adjusted for APACHE II using Logistic Regression analysis and adjustment of mortality rate did not show the statistically significant difference between these two groups.

Mean LOS in the pre-implementation period was 14 days and in the post-implementation period 9. The difference between these data was tested by two independent sample *t*-test and there was found statistically significant difference ($p < .002, 95\% \text{ CI } 1.08-7.94$). The Mean LOS was adjusted for APACHE using Univariate Analysis. There was not found interaction between two variables: period and APACHE ($F 2.041; p = 0.132$).

CONCLUSIONS. Quality improvement initiatives project shows the statistically significant improvement regarding the LOS in ICU, but there was not found statistically significant reduction in mortality rate.

REFERENCE(S). Infect Control Hosp Epidemiol 2006; Critical Care 2006; Am J Infect Control 2003

0271

UPTAKE AND IMPACT OF SMART INFUSION PUMP TECHNOLOGY IN A CARDIOTHORACIC INTENSIVE CARE UNIT THREE YEARS ON FROM ITS IMPLEMENTATION

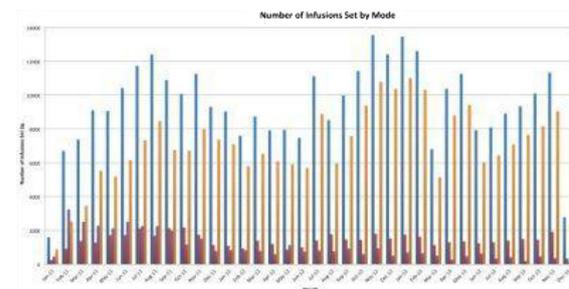
S. Shah¹, A. Fischer¹, D. Hunter²

¹Royal Brompton and Harefield Hospital NHS Foundation Trust, Pharmacy, London, United Kingdom, ²Royal Brompton and Harefield Hospital NHS Foundation Trust, Anaesthetics and Intensive Care, London, United Kingdom

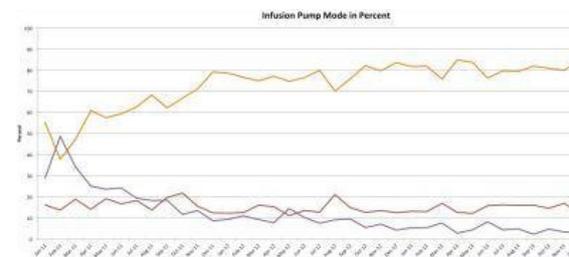
INTRODUCTION. Smart infusion pumps (SPs) include software which allows standard concentrations of specific drugs to be chosen from a menu, with both hard and soft dose limits preset. They are thought to reduce drug errors in critical care (CC) but the impact of their introduction has not yet been quantified. Smart software records all programming steps taken and this data can be downloaded for subsequent analysis. A recent local review of self-reported medication incidents from the Hospital Incident Reporting System revealed 109 errors relating to wrong infusion rates reported in a 3 year period. Of those relating to syringe pumps, it was estimated that 69 % might have been prevented by using SPs within CC.

METHODS. Standard concentrations and hard and soft infusion limits for a drug library of common drugs used in CC were compiled by CC consultants and pharmacy staff, and uploaded to the devices (Alaris[®] CC Syringe Pump). These pumps have 3 modes which can be chosen by the user at set-up: "drug" mode provides alerts based on the set limits in drug library, "dosing" mode provides guidance taking weight and dose units into account and calculates the rate, "ml/hr" mode provides no support but allows the pump to be set up quickly. For drugs not in the library, either the dosing or ml/hr modes must be used. Where a user attempts to programme a pump outside of the preset limits in drug mode a "Guardrail" event is logged by the software. After staff training, SPs were introduced in CC areas in January 2011. Data from all accessible devices were downloaded from Jan 2011 to Dec 2013*, analysed & reviewed by a pharmacist & CC consultant. *data provided until 11/12/2013

RESULTS. An average of 7200 (73.1 %) infusions were set up per month in drug mode compared to 1100 (11.8 %) in dosing and 1400 (15.1 %) in ml/hr mode (Graph 1 and 2).



Total no. of infusions set by mode



Infusion pump mode set up in percentage

Over the 3 year study period there was a total of 5210 (2 %) Guardrail events. Of these 457 (8.8 %) were hard limit events. The user re-programmed the pump after 374 of these events. 360 events involved drug classes most commonly used in CC. Of these 86 (23 %) involved setting a rate > 2 times higher than the hard limit. Of concern, cardiology drugs (such as GTN, amiodarone and furosemide) were the class with highest recorded errors (fig 1).

	Factor rate set > hard limit						
	Total	>1-1.5	>1.5-2	>2-2.5	>2.5-5	>5-10	>10-50
Inotropes / vasopressors	78	21	32	4	11	8	4
Anticoagulants	54	23	5	3	11	5	7
Sedatives	13	7	3	1	2		
Cardiology drugs	209	148	33	5	11	7	5
Others	5	4			1		
Total	360	203	73	13	37	18	16

No. of infusion rate set > hard limit

CONCLUSIONS. The use of the smart software increased over the study period and is up to 80 % uptake currently. The recorded error rate was 1 event every 50 infusions set up and 1 hard limit event every 550 infusions. This is much higher than the self-reported rate in our retrospective audit. As 81 % of the hard limits were reprogrammed it is assumed that these were true errors recognised by the user. Moreover, 23 % of infusion rate errors involved rates at least 2 times the preset limit. We conclude that the software may well have prevented major drug errors & believe that this data suggests that smart software improves patient safety.

0272

EVALUATION OF THE RELATIONSHIP BETWEEN NUTRITIONAL INTAKE AND FUNCTIONAL INDEPENDENCE MEASURE IN THE CRITICALLY ILL PATIENTS

I. de Brito-Ashurst¹, S. Cooke², I. Young³

¹Royal Brompton and Harefield Hospital NHS Foundation Trust, Nutrition, London, United Kingdom, ²Royal Brompton and Harefield Hospital NHS Foundation Trust, Rehabilitation & Therapies, London, United Kingdom, ³Kings College London, Nutrition, London, United Kingdom

INTRODUCTION. Nutritional support has been shown to have a strong correlation with an improvement in the Functional Independence Measure and Functional Assessment Measure (FIM + FAM) in the stroke population [1]. The FIM + FAM is a 30 item global measure of disability with 16 motor and 14 cognitive components. It has recently been demonstrated to be a useful outcome measure and sensitive to change during rehabilitation on our Adult Intensive Care Unit (AICU) [2]. However, its relationship with nutrition in this setting is yet to be established.

OBJECTIVE. To determine the relationship between FIM + FAM scores and nutritional intake during the rehabilitation pathway on critical care.

METHODS. A retrospective cohort study was conducted for a year between February 2013 and 2014. All patients mechanically ventilated for more than 10 days, able to start active rehabilitation and with a Richmond Agitation Sedation Scale score of > -1 were included. Patients were seen by a dietician and their requirements and feeding plan were recorded in the AICU electronic database. The FIM + FAM was assessed by a physiotherapist on AICU at the start of the rehabilitation pathway and repeated throughout the pathway on high dependency unit, the ward and discharge from hospital. All the data were collected from AICU database by an independent dietician.

RESULTS. Forty-seven patients met the criteria for inclusion of which 16 were female. The mean age of the patients was 53.4 ± 33.5 years, 30 were admitted post cardiac surgery and the remaining for respiratory support. Mean day for initial FIM + FAM measurements were 12 ± 3.1. During these initial days patients were receiving a caloric and protein intake <60 % of requirements. Regression analysis showed that caloric and protein intakes were significant predictors of initial FIM + FAM motor and total scores. Paired t tests of the changes in FIM + FAM motor, cognitive and total scores showed significant increments of 24.7 ± 23.4 (p < 0.04), 9.7 ± 11.4 (p < 0.05) and 34.4 ± 13.3 (p < 0.01) respectively from initial measurement through to discharge. Caloric and protein intake remained >87 % (range 80-110 %) of patients' nutritional requirements during all the additional FIM + FAM measurements for all subjects. Thus, not surprisingly it was not correlated with FIM + FAM increments.

CONCLUSIONS. Inadequacy of caloric intake predicts initial FIM + FAM motor and total scores. FIM + FAM measurements increased considerably for all patients when nutritional intake was optimal at >80 % of requirements.

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Optimisation of nutrition practices: 0273–0286

0273

ANALYSING THE EFFECT OF GUIDANCE AND EDUCATION ON ENTERAL NUTRITION INTERRUPTION

I.R. Barker¹, E. Segaran¹, A. Hartle¹

¹Imperial College Healthcare National Health Service Trust, London, United Kingdom
INTRODUCTION. Critically ill patients experience prolonged and repeated stoppages of enteral nutrition which can contribute to underfeeding and malnutrition (1, 2). This increases the risk of all-cause mortality, bloodstream infection and sepsis (3). ICU patients frequently undergo procedures either at the bedside or in theatre. Usual practice is for enteral nutrition (EN) to be held for 6 h (4), as used in elective surgical cases to reduce the risk of aspiration of gastric contents; we question the applicability in ICU. We examined feed cessation periods and introduced guidance to reduce underfeeding whilst maintaining patient safety by providing appropriate and consistent recommendations for stopping and restarting EN before and after procedures.

OBJECTIVES.

- To determine the reasons and duration of stopping feed before and after procedures

- To examine the effect of introducing ICU specific guidelines

METHODS. 2 audits were conducted 1 before and 1 after guideline introduction. Data collected at bedside and from electronic patient records. Repeat audit analysed any resultant changes in feed cessation.

RESULTS. Original audit ran for 1 month in January 2013 and repeated 1 year later. 62 stoppages were recorded in audit 1 and 64 in the follow up. Reasons for stoppages are shown in Table 1. Significant improvements to the fasting times before and after procedures were seen, following guideline implementation (Table 2).

Procedure type	Audit 1 No (n=57*)	Audit 2 No(n=44 *)
Scan	6	9
Awaiting NG tube insertion or position check	12	14
Tracheostomy insertion	17	6 - theatre 3 - perc
Extubation	14	7
Surgery - non airway	8	5

[Table 1 Reason for stopping feed]

Reason for Cessation	Audit 1 Median hrs (IQR)	Audit 2 Median hrs (IQR)	P*
Before all procedures	6 (1.4 - 8.9)	3 (0.2-6.1)	p0.01
Time to restart EN for all procedures	6 (2-8)	3.21 (0.2-4.8)	p0.0001
Before scan	0.25 (0.2-0.6)	0.34 (0.7-2)	p0.80
Time to restart EN after scan	1.5 (0.6-2)	0.1 (0.08-0.4)	p0.03
Awaiting NGT insertion	5 (2.5-6.5)	2.5 (1-4)	p0.12
Time to restart EN post NGT insertion	3 (2.3-5.8)	2.8 (1-5)	p0.32
Prior to non-airway procedure Time to restart EN post non-airway procedure	8 (5-11) 6.5 (3.5-7)	5 (0.3-7.5) 0.8 (0-1.8)	Sample too small
Prior to combined airway procedures (percutaneous & surgical tracheostomy, extubation)	11 (8.2-14)	5 (1.1-8.8)	p0.002
Time to restart EN post combined airway procedures	4.25 (2.2-6.5)	5 (3.7-6)	p0.73

[Table 2 Average cessation times]

CONCLUSIONS. The original audit identified excessive starvation times before and after procedures, particularly non-airway surgery and airway procedures. ICU specific guidelines were introduced, advising on no cessation required prior to non-airway surgery and scans and fasting for 4 h for airway procedures (tracheostomy insertion, extubation). The re-audit saw a significant reduction of cessation times for all procedures (6 to 3 h and post procedure from 6 to 3.21 h) with an even larger reduction of fasting times for airway procedures (11 to 5 h). Significant improvements were seen in re-commencing EN following procedures. Despite the guideline advising no fasting prior to non-airway surgery the EN was still held for an average of 5 h before, an area for improvement. No adverse incidents were recorded during the audit period. We therefore conclude that the introduction of this simple guidance can result in a dramatic improvement in feed stoppages.

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0274

ENERGY REQUIREMENTS IN SIRS, SEPSIS AND SEPTIC SHOCK. (PRELIMINARY STUDY)

O. Chrysoy¹, I. Rodini¹, C. Nakou¹, M. Bitzani¹

¹G. Papanikolaou, ICU, Thessaloniki, Greece

INTRODUCTION. Determination of REE in critically ill septic patients is usually challenging as metabolic response to sepsis, as well as level of stress, are changing over time affected by various endogenous and exogenous factors.

OBJECTIVES. This study was aimed to determine REE at different stages of inflammation (SIRS, Sepsis, Septic shock) and to test for factors that might have an impact on REE variation.

METHODS. Prospective cohort study over 18 months including consecutive patients assigned to SIRS, Sepsis and Septic shock groups, following established criteria. Energy requirements were estimated with the Harris Benedict equation (BMR) and measured (REE) with Indirect calorimetry (IC). REE and BMR were compared within each group and between groups. Data on anthropometry, labs, mechanical ventilation, Temperature, nutrition and drug administration (Noradrenalin, b-blockers, Midazolam, Opiates, Propofol) were tested for possible influence on REE variation. Statistics : Kruskal-Wallis H test and Multiple regression model (IBM SPSS Statistics v. 19).

RESULTS. A total of 52 patients (67.3 % males), mean age 64.71 ± 1.8y (range 35-83) were enrolled in the study. Mean BMR was 1.674.81 ± 51.485 kcal/d (range 1.020-2.610), while mean REE was 2.125.58 ± 65.38 kcal/d (range 1.105-3.180) presenting an increase of 28.19 ± 2.58 % (range -22.73 % to 63.73 %). In the SIRS group (35 pts) BMR was 1.595.43 ± 61.48 kcal/d and REE 2.031.86 ± 70.44 kcal/d (range 1.105 - 2.905) increased by 29.34 ± 3.3 % (range -22.73 % - 63.73 %). In the Sepsis group (6 pts) BMR was 1.880 ± 120.19 kcal/d and REE: 2.315 ± 184.08 kcal/d (range 1.900 - 2.980) with an increase of 23.74 ± 7.55 % (range 0.78 % - 45.08 %), while in the Septic shock group (11 pts) respective values were 1.815.45 ± 113.1 kcal/d, 2.320.45 ± 177.67 kcal/d (range 1.180-3.180) and 26.95 ± 4.99 % (range -9.92 % - 46.63 %). The Kruskal-Wallis H Test demonstrated no statistically significant difference among SIRS, Sepsis and Septic shock patient groups with regard to the increase of REE (H(2) = 0.270, p = 0.874), with a mean rank of 27.23, 24.25 and 25.41 respectively. Variables tested for possible influence on the increase of REE exhibited an R square of 0.975. Nevertheless, based on the beta coefficients none of them presented a p value less than 0.05 (p = 0.000). Even though not statistically significant, the analysis showed a trend towards a decrease of REE in Sepsis and Septic shock **CONCLUSIONS.** According to our results patients were hypermetabolic but there was no significant difference between groups regarding the increase of energy requirements. The wide variability of REE observed in all groups underlines the difficulty in the determination of energy requirements in these patients and makes the use of IC the only reliable practice to that purpose.

0275

EARLY LACTATE AND GLUCOSE LEVELS AND SUBSEQUENT LIVER FAILURE AND MORTALITY IN CRITICALLY ILL PATIENTS

E. de Felice¹, L. Woittiez¹, F. Schierenbeck², A. Oude Lansink¹, J. Bakker³, M.W. Nijsten¹
¹UMC Groningen, ICU, Groningen, Netherlands, ²Karolinska University Hospital, Section of Cardiothoracic Surgery, Stockholm, Sweden, ³Erasmus Medical Center, ICU, Rotterdam, Netherlands

INTRODUCTION. The impact of liver impairment may be underestimated in critically ill patients. Very recently, in a large dataset the statistical relation of elevated lactate and elevated glucose with mortality in the ICU was nearly completely explained by lactate, with no independent contribution of hyperglycemia¹. Discrepantly low glucose levels combined with high lactate levels can indicate an impaired Cori cycle² and may thus herald liver failure.

OBJECTIVE(S). To examine the relation of early lactate and glucose levels with mortality and subsequent liver impairment in ICU patients.

METHODS. Over a 7 year period all patients admitted to our adult 48-bed tertiary ICU consisting of four dedicated subunits, were evaluated. In case of multiple hospital or ICU admissions, the patients' first ICU admission of the last hospital admission was used. Arterial lactate and glucose levels were regularly measured with ABL 700/800 series point-of-care analyzers in all ICU-patients in order to perform computer-guided glucose and potassium control (GRIP). Lactate and glucose levels were analyzed when measured from 6 h before to 24 h after ICU-admission, and only for patients in whom at least 4 of both measurements were done. Mean early lactate and mean glucose for each patient were then calculated. Admission APACHE-IV and hospital mortality were determined as well as the highest-liver component of the SOFA-score³ based on bilirubin measured up to 7 days after ICU admission.

RESULTS. 13,857 patients aged 61 ± 16 years, 63 % males, APACHE-IV 53 ± 28 with a hospital mortality of 13 % were included. 130,000 lactate and 143,000 glucose measurements were performed in these patients within 24 h of ICU admission. Lactate quintiles (q1-to-q5: < 0.95 ; 0.95 - 1.24 ; 1.25 - 1.60 ; 1.61 - 2.20 ; > 2.20 mmol/L) and glucose quintiles (q1-to-q5: < 6.9 ; 6.9 - 7.5 ; 7.6 - 8.0 ; 8.1 - 8.9 ; > 8.9 mmol/L) were univariately related with outcome, with a U-shaped relation for glucose, with a predominant role for lactate upon multivariate analysis. When lactate and glucose were multivariately related, an adverse impact of 'normal' glucose (i.e. < 6.9 mmol/L) on mortality was observed for mild to severe hyperlactatemia ($p < 0.001$; Fig 1).

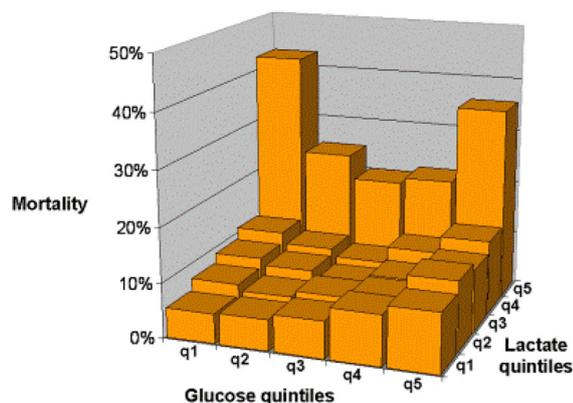


Fig. 1 Glucose, lactate and mortality

Moreover higher lactates and lower glucoses were strongly associated with liver impairment ($P < 0.001$; Fig 2).

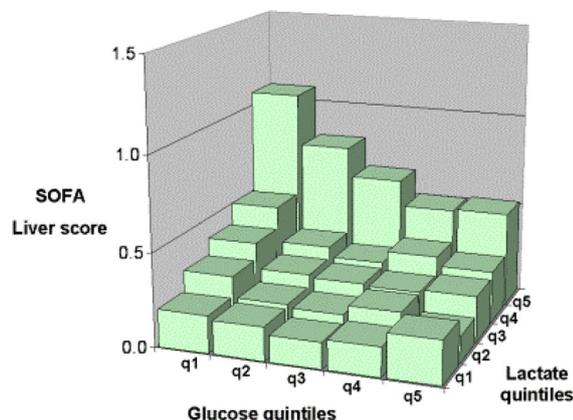


Fig. 2 Glucose, lactate and liver dysfunction

CONCLUSIONS. An early 'normal' glucose in critically ill patients with elevated lactate should not be considered normal, as this points to an inability of the liver to (re)generate sufficient glucose to cope with stress.

In addition to other established benefits, combined lactate and glucose measurements may provide an early indication of potential subsequent liver failure.

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0276

ENERGY EXPENDITURE IN CRITICALLY ILL MECHANICALLY VENTILATED PATIENTS CAN BE ACCURATELY CALCULATED FROM MEAN 24-H VENTILATOR-DERIVED VCO₂ AND NUTRITIONAL RQ

S.N. Stapel¹, P.J.M. Weijts², H.M. Oudemans-van Straaten¹

¹VU University Medical Center, Adult Intensive Care, Amsterdam, Netherlands, ²VU University Medical Center, Nutrition and Dietetics, Amsterdam, Netherlands

INTRODUCTION. In critically ill mechanically ventilated patients indirect calorimetry is recommended to guide energy nutrition. However, availability of indirect calorimetry is limited and estimating equations are inaccurate.

OBJECTIVES. To validate a method in which ventilator-derived VCO₂ combined with nutritional RQ is used to calculate energy expenditure (EE).

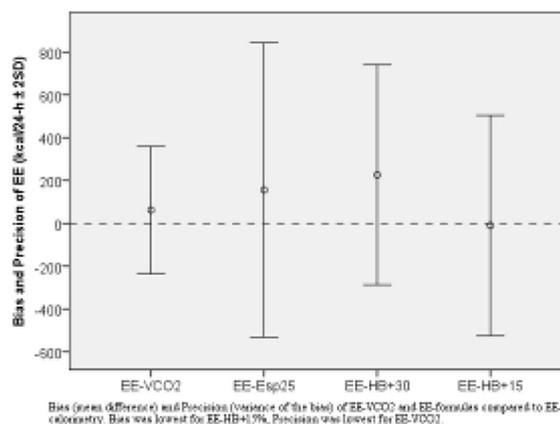
METHODS. In this prospective observational study, indirect calorimetry was measured during 24-hours using the Deltatrac II metabolic monitor (EE-calorimetry), and simultaneously, the ventilator-derived VCO₂ was recorded. Nutritional RQ was calculated, based on the amount and composition of the delivered nutrition. Using mean 24-h VCO₂ and Nutritional RQ, EE-VCO₂ was calculated via the rewritten formula of Weir ($3.941 \cdot (\text{VCO}_2/\text{min})/\text{RQ} + 1.11 \cdot \text{VCO}_2/\text{min} \cdot 1440$). Mean 24-h EE-VCO₂ was compared with EE-Calorimetry and EE as calculated with two formulas: the ESPEN guideline of 25 kcal/kg/day (EE-Esp25) and the Harris Benedict equation with 30 % added (EE-HB + 30) (according to our initial feeding regimen) and with 15 % added (EE-HB + 15) using Bland-Altman plots (data not shown). The bias of the different methods was determined by the mean difference between EE-VCO₂, EE-Esp25, EE-HB + 30, EE-HB + 15 and EE-Calorimetry. Precision was determined by the variance of the difference (Levene's test).

RESULTS. 84 patients were included. 58 were male. Mean age 63.5 ± 14.9 , weight 79 ± 16 kg, APACHE II 23.9 ± 8.4 , Energy Nutrition 1835 ± 627 kcal/24-h, RQ Nutrition 0.86 ± 0.015 .

Mean 24-h EE-Calorimetry was 1823 ± 408 , EE-VCO₂ 1885 ± 414 , EE-Esp25 1979 ± 400 , EE-HB + 30 2049 ± 334 , EE-HB + 15 1818 ± 332 kcal/24-h.

The bias (mean difference with EE-Calorimetry) of EE-VCO₂ was 61.8 ± 148.2 kcal/day. This was significantly lower than the bias of EE-Esp25 (155.9 ± 343.6 kcal/day $p = 0.022$) and EE-HB + 30 (226.5 ± 256.5 kcal/day $p < 0.001$). The bias was smallest for EE-HB + 15 (-9.94 ± 257.04 kcal/day). This bias was significantly smaller than for EE-VCO₂ ($p = 0.028$).

The precision (variance of the difference) of EE-VCO₂ was significantly smaller than the variance of the difference of all equations EE-Esp25 ($F = 33.6$ $p < 0.001$), EE-HB + 30 ($F = 15.2$ $p < 0.001$), and EE-HB + 15 ($F = 14.3$ $p < 0.001$) (see figure).



Figure

CONCLUSIONS. Energy expenditure in critically ill mechanically ventilated patients can be accurately calculated from the mean 24-h ventilator-derived VCO₂ and nutritional RQ. This method is more precise than frequently used formulas allowing better daily tailoring of energy nutrition for the individual patient.

0277

COMPARISON OF RESTING ENERGY EXPENDITURE ESTIMATED USING PREDICTIVE EQUATIONS AND MEASURED USING INDIRECT CALORIMETRY IN CRITICALLY ILL PATIENTS

M.L. Rousing¹, M.H. Simonsen¹, S. Andreassen¹, U. Pielmeier¹, J.-C. Preiser²

¹Aalborg University, Center for Model-based Medical Decision Support, Aalborg, Denmark, ²Erasmus University Hospital, Université Libre de Bruxelles, Department of Intensive Care, Brussels, Belgium

INTRODUCTION. European, American, Australian, and Canadian guidelines recommend nutrition support in critically ill patients initiated within the first 24 h. While hypocaloric feeding (< 60 - 70 % of Resting Energy Expenditure (REE)) is associated with lower hospital mortality compared to target feeding (90-100 % of REE) [1], other studies have shown that a high caloric debt, calculated as the difference between caloric intake and REE, was associated with a high rate of complications and adverse outcome [2]. Thus a reliable assessment of REE is needed.

OBJECTIVES. The purpose of the study was to compare REE estimated by predictive equations and an equation using carbon dioxide production (VCO₂), to REE measured with indirect calorimetry (MREE).

METHODS. The study was conducted in intubated, mechanically ventilated critically ill patients. For each patient, MREE, respiratory quotient (RQ), oxygen consumption (VO₂) and VCO₂ were recorded over a 30-min period. REE was estimated (EREE) with the Harris-Benedict equation (HB) from 1919 using both actual and ideal body mass, the Mifflin St Jeor equation (MSJ), and the Penn State equations (PS)(1998, 2003a, and 2003b). All equations were multiplied with a stress factor (SF) ranging from 1.0-1.8. As indirect calorimetry is not often done in a clinical setting, an estimation of REE using only VCO₂ (EVCO₂) was tested using the following equation.

EREE [kcal/min] = $(0.003819/\text{RQ} + 0.001222) \cdot \text{VCO}_2 - 0.017965$

derived from the equation used by the indirect calorimeter, with VCO_2 being the average VCO_2 for the patient and an RQ of 0.75-0.85. The daily EREE was compared to the daily MREE using Root Mean Square Error (RMSE), with the lowest RMSE being the most precise estimate.

RESULTS. Eighteen patients (mean age 62.7 ± 16.8 years, 5 women) were included. The average daily MREE was 2346.0 ± 521.8 kcal/day. The most precise HB equation used actual body mass and a SF of 1.55 (RMSE: 15.5 %). The MSJ equation with a SF of 1.59 had a RMSE of 14.5 %. The 2003b PS equation with a SF of 1.43 was the most precise with a RMSE of 10.3 %. The VCO_2 equation with an RQ of 0.8 was the most precise estimate of REE with an RMSE of 9.3 %. Fig. 1 shows MREE vs. $EVCO_2$ on the left and the MREE vs. the PS equation with a SF of 1.55 on the right, along with respective fitted linear equations.

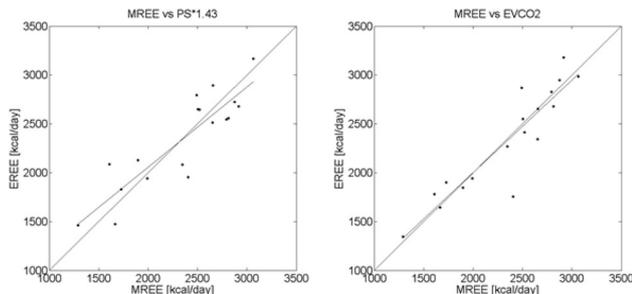


Fig. 1 MREE vs EREE for PS and $EVCO_2$ equations

CONCLUSION. The estimation of REE using VCO_2 is more precise than estimations using the HB, MSJ, or PS equations, even after correction with stress factors. Hence, the use of capnography to estimate MREE should be validated prospectively.

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0279

A MODEL OF CHANGES IN ENERGY EXPENDITURE TO SPECIFY DAILY CALORIC INTAKE TARGETS IN SEPSIS AND TRAUMA PATIENTS

U. Pielmeier¹, M.L. Rousing¹, S. Andreassen¹

¹Aalborg University, Center for Model-based Medical Decision Support, Aalborg, Denmark

INTRODUCTION. European intensive care nutrition guidelines recommend caloric intake close to measured energy expenditure. The daily supply during the first days should not exceed 20-25 kcal/kg body weight (BW). During recovery, 25-30 kcal/kg BW/day is recommended.

OBJECTIVES. We hypothesized that specific daily caloric targets can be defined based on modeled changes in measured energy expenditure (MEE) on consecutive ICU days.

METHODS. We searched the literature for clinical data of MEE by indirect calorimetry on consecutive ICU days. We limited our search to patients with sepsis, trauma, or sepsis and trauma. We excluded studies without daily measurements and studies without data to predict resting energy expenditure (pREE). We estimated daily averages of the increase from pREE by calculating the mean values (\pm standard error of the mean (SEM)) of the ratio of MEE to pREE on each day and constructed a model of the changes in energy expenditure by a mathematical fit to the mean values of the ratios.

RESULTS. We found three studies with daily measurements in seven [1], eight [2], and thirteen [3] patients (mean age 38 ± 20 , 60 ± 16 , 63 ± 16 years, respectively). The patient numbers for the analysis of MEE/pREE ratios on consecutive ICU days differed between 9 (day 14 and 15) and 25 (day 7). Fig. 1 shows the mean MEE/pREE ratios (\pm SEM) by study on consecutive ICU days and a model of the time course for changes in MEE/pREE ratio based on a parabolic fit to the mean values. The model indicates an increase in MEE/pREE ratio during the first week and a peak after 9 days. To estimate daily caloric needs, the MEE/pREE model value is read from the curve and multiplied with the pREE of a patient. For example, at a predicted basal metabolic rate of 1500 kcal/day, the caloric target is 1680 kcal (1.12×1500 kcal) on day 2 and increases to 1995 kcal on day 9 (1.33×1500 kcal).

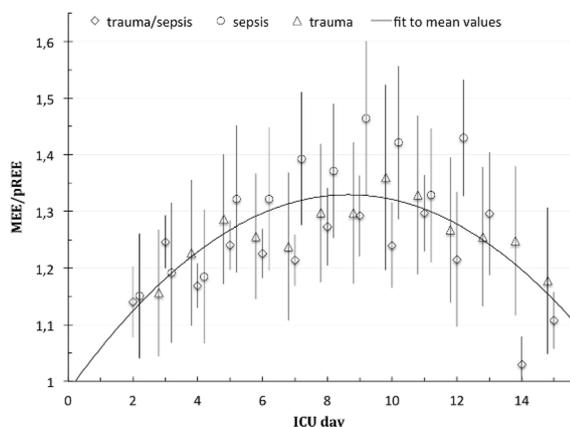


Fig. 1 mean MEE/pREE ratios (\pm SEM) and model fit

CONCLUSION. Changes in energy expenditure over the course of critical illness are evident from daily measurements. Optimized caloric intake close to energy expenditure is

recommended. The modeled time course of changes in MEE/pREE ratio may be a method to define specific daily caloric targets in the absence of indirect calorimetry. We proposed a model for sepsis and trauma patients based on data from three studies. More studies with MEE and pREE on consecutive ICU days and detailed patient care information are needed to validate this approach.

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0280

A PRECISE ESTIMATION OF CALORIC NEEDS OF OVERWEIGHT AND OBESE CRITICALLY ILL PATIENTS TO PREVENT OVERFEEDING AND UNDERFEEDING

M. Theilla¹, I. Ben David², P. Singer³

¹Institute for Nutrition Research, General Intensive Care, Rabin Medical Center, Petah Tikva, Israel, ²Institute for Nutrition Research, Critical Care, Petah Tikva, Israel, ³Institute for Nutrition Research, Critical Care, Petah Tikva, Israel

INTRODUCTION. A precise estimation of caloric needs of overweight critically ill patients can be helpful to prevent overfeeding and underfeeding. Indirect calorimetry (IC) is more precise than predictive equations, but performing the measurement is difficult for several reasons, including shortage of reliable devices, need of training a special staff and time consuming process.

OBJECTIVES. The objective of this study is to compare the predictive equations with multiple IC measurements on overweight and obese critically ill patients.

METHODS. A retrospective study recruited overweight/obese critically ill patients divided into 3 groups according to BMI (29-31), (31-35), (>35 kg/m²). Demographic data, severity scores, resting energy expenditure measured by IC (Deltatrac II, GE, USA) performed between days (1-4)(4-7)(7-11)(>11), predicted energy expenditure using Harris Benedict equations (HB), and Faisy Fagon equations were assessed. In addition, the amount of calories and insulin administered during the day of measurement was noted. Results were compared using one way ANOVA test and correlations were.

RESULTS. Sixty patients were included. Mean age was 58.3 ± 15.5 years, mean BMI for the 3 groups was 34.5 ± 6.7 kg/m², APACHE II 20.6 ± 4.8 , 25.1 ± 4.7 and 21 ± 6.5 in the 3 groups respectively. Measured REE for the 3 groups was 2109 ± 353 kcal/d, 2056 ± 470 kcal/d and 2277 ± 514 kcal/d respectively. Mean HB predictive equation was close to REE measurements (2166 ± 361 kcal/d). Faisy Fagon (2108 ± 252 kcal/d) was more accurate in the second group (BMI: 31- 35 kg/m²). No day to day variability was found in the different groups. No difference was found in the calories and insulin administered.

CONCLUSIONS. Regardless of the severity of the obesity, no difference was found between the various groups and from day to day measurements. One measurement during the all ICU stay could be sufficient in overweight and obese ICU patients. If not available, IC could be replaced by Faisy Fagon or Harris Benedict equations.

0281

ANALYSIS OF NUTRITIONAL PRACTICES AND ASSOCIATED OUTCOMES IN PATIENTS RECEIVING VASOPRESSORS. A STUDY OF THE CALNUCI (CALIDAD DE NUTRICIÓN EN LA UCI) WORKING GROUP

C.I. Loudet¹, L.I. Tumino¹, M.C. Marchena¹, R. Gimbernat², M.L. Cabana³, G. Capurro⁴, P. Astegiano⁵, M.A. Velásquez⁶, M. Casanova⁷, M.C. Roth⁸, G. Roda⁹, P. Okurzati¹⁰, Y. Balmaceda², J. Rodríguez Bugueiro⁷, E. Estensoro¹, CALNUCI

¹Hospital General San Martín de La Plata, La Plata, Argentina, ²Centro de Cuidados Intensivos, San Juan, Argentina, ³Hospital Pablo Soria, Jujuy, Argentina, ⁴Hospital General Dr. Oscar Allende, Mar del Plata, Argentina, ⁵Hospital José María Cullen, Santa Fe, Argentina, ⁶Sanatorio Nuestra Señora del Rosario, Jujuy, Argentina, ⁷Hospital El Cruce, Florencio Varela, Argentina, ⁸Hospital San Juan de Dios, La Plata, Argentina, ⁹Hospital Municipal Eva Perón, Merlo, Argentina, ¹⁰Casa Hospital San Juan de Dios, Ramos Mejía, Argentina

INTRODUCTION. Enteral nutrition (EN) is usually interrupted in critically ill patients receiving vasopressors, but whether this practice increases complications or affects ICU outcomes is uncertain.

OBJECTIVE. To determine if the use of EN in itself, and in increasing daily doses, is associated with mortality, length of ICU stay (LOS_{ICU}), and other clinical complications, in patients receiving vasopressors.

METHODS. Prospective cohort study of consecutive patients receiving EN ≥ 5 days in 10 ICUs in Argentina. Epidemiological data, nutritional variables including symptoms of gastrointestinal (GI) dysfunction, complications (infections, gut ischemia) and outcome variables were recorded. Patients with and without vasopressors were compared. In patients with vasopressors, the decision to maintain, decrease or withhold EN was taken by attending physicians. Comparisons of clinical and outcome variables were performed in 3 predetermined groups, according to the mean amount of calories delivered during vasopressor therapy: < 5 kcal/kg/d, 5-19 kcal/kg/d, or ≥ 20 kcal/kg/d.

To ascertain the effect of EN in patients with vasopressors on their outcomes, independent predictors for ICU mortality and LOS_{ICU} were identified with multiple logistic and linear regression analysis. Predetermined variables significantly associated with ICU mortality, and LOS_{ICU} in univariate analysis ($p < 0.2$) were tested.

Data are presented according to their nature. Software STATA11

RESULTS. Of 452 patients included, 281(62 %) required vasopressor therapy; compared to those not receiving it ($N = 171$, 48 %), were, respectively, more severely ill APACHEII (18 ± 7 vs 16 ± 7 , $p < .01$), SOFA_{24h}($6[4-8]$ vs $4[3-6]$ $p < .01$), more frequently developed ARDS (26 % vs 15 % $p < 0.01$), kidney dysfunction(45 % vs 29 % $p < 0.01$), GI dysfunction(36 % vs 27 % $p < 0.05$), and ICU mortality(44 vs 20 % $p < 0.01$). No cases of gut ischemia were reported. Both groups received similar kcal/kg/d: mean 15.6 ± 6 vs 15.7 ± 7 , $p = 0.45$ and had early EN: 71 % vs 70 %, $p = 0.81$.

Table 1 shows characteristics and outcomes of the 3 subgroups of patients on vasopressors.

VARIABLES	<5 kcal/kg/d (N = 45)	5-19 kcal/kg/d (N = 201)	≥ 20 kcal/kg/d (N = 35)	p value
APACHEII	18 ± 8	18.7 ± 7	17 ± 8	0.37
SOFac 3-4	41 (91)	190 (95)	32 (91)	0.60
ARDS	13 (29)	52 (26)	8 (23)	0.83
GI symptoms	27 (60)	66 (33)	8 (23)	0.0001
VAP	28 (62)	132 (66)	23 (69)	0.79
Catheter-related infection	2 (4)	15 (7)	3 (9)	0.70
LOS ICU	14 [9-19]	13 [9-20]	20 [11-26]	0.06
LO MV	9 [7-13]	11 [7-16]	14 [9-20]	0.01
ICU mortality	18 (40)	87 (44)	18 (53)	0.58

[Mean Kcal and outcomes in patients on vasopressors]

Independent predictors of ICU mortality in patients on vasopressors were age: OR 1.01, CI_{95%} 1-1.03, p 0.048, ARDS: OR 3.07, CI_{95%} 1.73-5.44, p < 0.01, and kidney dysfunction: OR 2.04, CI_{95%} 1.21-3.44, p < 0.01.

Table 2 shows independent predictors for LOS_{ICU} in patients on vasopressors.

Variable	Coef	95 %CI	p value
Kcal/kg/d	0.2	0.02 - 0.4	0.030
Early EN	-2.5	-5.1 - -0.99	0.05
Gastroparesis	5.8	3.3 - 8.4	0.000
VAP	5.02	2.5 - 7.6	0.000
Catheter-related infection	9.5	5.04 - 14	0.000

[Multiple linear regression model for LOS_{ICU}]

CONCLUSIONS. • Mean daily caloric intake was mainly in the hypocaloric range. The mean daily caloric intake was similar in patients with and without concomitant vasopressor use.

- EN appeared to be safe in this cohort: provision of EN during vasopressor use was not associated with higher mortality or more frequent severe clinical complications.
- Increasing daily caloric dose was, however, independently related to longer ICU stay.
- Reasons for not stopping EN in patients receiving vasopressors were not explored, but might include lack of compliance with current guidelines or simply, a prudent approach to the issue.

0282

NUTRITIONAL OUTCOMES IN THE MEDICAL INTENSIVE CARE UNIT

H. Bektas¹, G. Yigit², S. Korkmaz², E. Coban³, E. Terzioğlu³

¹Akdeniz University Nursing Faculty, Medical Nursing Department, Antalya, Turkey,

²Akdeniz University Hospital, Antalya, Turkey, ³Akdeniz University Faculty of Medicine, Antalya, Turkey

INTRODUCTION. Nutritional support is considered as a standard of care for intensive care unit (ICU) patients (1). In the ICU population, malnutrition continues to be a common finding and has been shown to be associated with increased morbidity (higher infection rate, delayed wound healing, prolonged mechanical ventilation, longer length of stay and duration of recovery), mortality, and costs (2).

OBJECTIVES. To determine the nutritional outcomes for patients in the medical intensive care unit.

METHODS. This was a cohort study of patients ≥ 18 years old who had an ICU stay of at least 48 h. A total of 101 critically ill patients in the medical intensive care unit were included in the study. Enteral nutritional support was initiated as early as possible after medical ICU admission. Nutritional outcome measures included the number of patients who received enteral/parenteral nutrition, clinical outcomes included the anthropometric measurements (body mass index (BMI), mid-arm circumference (MAC), and the Harris-Benedict equation), laboratory results (albumin, prealbumin, transferrin, calcium, potassium, magnesium, serum levels of total lymphocyte count [TLC], urine protein test, and nitrogen balance), ICU stay and nosocomial infections. Frequency, paired t-test, and one way anova were used to analyze data.

RESULTS. During the study period, 158 patients were admitted to the ICU, of whom 101, who fulfilled all the inclusion criteria, composed the study population. Of 101, 64 were males, the average age was 54 ± 13 years. The mean Glasgow Coma Scale score was 12 ± 3, and 43.6 % had mechanically ventilated. In this study, 50.5 % of the patients had oral, 43.6 % had parenteral and 5.9 % had enteral feedings. Undernutrition (BMI < 18.5 kg/m²) was present in 5 % of the patients, and mean body mass index was 27 ± 6 kg/m². We also noted the statistically significant decrease in anthropometric parameters in all patients during hospitalization (p < 0.05). Decreases were observed in all the clinical parameters of laboratory test results of the patients indicating end products of fat, protein, and carbohydrate metabolism (p < 0.05). The median duration of ICU stay was 5 days, and 16.8 % had nosocomial infections.

CONCLUSIONS. Early enteral nutrition is recommended for critically ill patients. The combination of enteral and parenteral nutrition may contribute to meeting adequate nutritional requirements. In conclusion, we would like to emphasize that since undernutrition has an adverse effect on morbidity and mortality, careful nutritional evaluation of patients on admission is essential. Special attention should be given to patients who have mild malnutrition on admission, since this population of patients seem to be at highest risk of adverse effect of hospitalization.

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0283

PREDICTION OF PROTEIN CATABOLISM WITHOUT USING 24-HOUR URINE COLLECTION UREA NITROGEN EXCRETION IN CRITICAL ILL PATIENTS

B.G. González Carmona¹, E. Monares¹, J. Aguirre¹, J. Franco¹, N. Bernal¹, F. George¹

¹American British Cowdray Medical Center, Department of Critical Care Medicine

'Dr Mario Shapiro', Mexico, Mexico

INTRODUCTION. In critical ill patients in fasted state, energy is supplied by amino-acids derived from marked muscular catabolism, about 3 to 5 more times than in healthy subjects. Nutrition support provided to the critical ill patient is an effort to prevent loss of nitrogen in the hyper-catabolic phase of the insult and also to promote restoration of protein mass in the recovery period. Therefore it is important to accurately identify which patients have increased protein destruction and require aggressive early nutrition intervention, according to their daily nitrogen losses.

OBJECTIVE. Compare two formulas for determining the nitrogen balance level of the organism. The first formula using the 24-hour urinary urea nitrogen excretion, and the second formula using routine laboratory variables and anthropometric parameters as serum urea nitrogen (SUN mg/dl), actual body weight (WT) and white blood cells count (WBC cells/mm³) in the daily care of critical ill patients.

MATERIALS AND METHODS. A prospective, observational study conducted in The Department of Critical Care Medicine "Dr. Mario Shapiro", American British Cowdray Medical Center from March 2011 to February 2014. **INCLUSION CRITERIA:** patients receiving specialized nutrition support during the first 8 days of stay and underwent 24-hour urine collection urea nitrogen excretion. **EXCLUSION CRITERIA:** serum creatinine >1.5 mg/dl; bilirubin >3.0 mg/dl, INR >3.0; HIV infection; pregnancy; morbid obesity (more than 150 % of ideal weight). Correlation index and Baland and Altman method was performed. The next formulas were used: 1. UNA: A (g/d) = NUU × (0.6 × weight × (BUN2 - BUN1) × 0.012). UNA estimated: A (g/d) = [(0.29 × weight) + (1.2 × White blood cells) + (0.44 × BUN)] - 24.8. (A = clearance of nitrogen), (NUU = 24-hour urine collection urea nitrogen excretion).

RESULTS. We considered a total of 380 cases that have inclusion criteria, 230 were excluded and 150 cases were analyzed using the two formulas mentioned below. The median age was 60 years (20-85), with median SAPS II score of 41 ± 11 points. The correlation index for the 2 formulas was 0.8, with a p < 0.05. The error rate was 36 %.

CONCLUSIONS. The proposed formula does not need a 24-hour urinary urea nitrogen excretion to calculate nitrogen balance. The use of this formula should be assessed in future for aggressive nutritional intervention in the critical ill, employing just routine laboratory screens.

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0284

WHICH NUTRITION SCREENING TOOL FOR THE ELDERLY CRITICALLY ILL PATIENT?

S. Tripathy¹

¹All India Institute of Medical Sciences (AIIMS), Bhubaneswar, India

INTRODUCTION. Malnutrition is a known cause of increased morbidity and mortality in critically ill patients. Geriatric patients may be at a specially increased risk of preexisting malnutrition. Screening for nutritional status is not yet standardized upon admission in many critical care units. Few screening tests are designed for or validated in the geriatric patient population.

OBJECTIVES. Having previously established malnutrition as a cause of poor long term outcome we compared two such screening tools with an aim of identifying a robust screening test for our critically ill geriatric patients.

METHODS. For this prospective, descriptive, non-randomized study, 111 consecutive patients admitted to the intensive care unit, aged >65 years underwent the malnutrition universal screening tool (MUST) and the geriatric nutrition risk index (GNRI) screening tests. Predefined standard definitions of malnutrition risks were taken as the gold standard to evaluate the sensitivity, specificity and predictive values of the tools. The kappa statistic was calculated to measure the agreement between the tools. The Shourt classification was used to interpret its values as follows- 0-0.1, virtually none; 0.11-0.4, slight; 0.41-0.6, fair; 0.61-0.8, moderate; 0.81-1.0 substantial (agreement).

RESULTS. The mean age of the patients screened was 74.7 ± 8.4 years (65-97 years). The standard definition, MUST and GNRI identified 52.2, 65.4 and 64.9 % to be malnourished respectively. The sensitivity and specificity of the tests were 96.5 % CI (87.9-99.5 %) and 72.3 % CI (57.5-84.5 %) for MUST and 89.5 % CI (75.2-96.7 %) and 55.0 % CI (75.2-96.9 %) for GNRI respectively. Screening was not possible by GNRI tool in a higher percentage of the population than with the MUST tool (31 % vs 4 % respectively). The agreement between the tools was moderate for Standard- MUST k = 0.65 and MUST-GNRI k = 0.60 and fair for Standard-GNRI k = 0.43.

CONCLUSIONS. The risk of malnutrition is high among our patients as identified by all the tools. Although both the GNRI and MUST showed a high sensitivity, MUST might be more practical to use due to a higher specificity and greater applicability (lesser missing values).

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0285

CURRENT STATUS OF STUDIES IN THE WORLD ABOUT OPTIMAL COMPOSITION OF THE AMINO ACID AND PROTEIN FOR ICU PATIENTS: SYSTEMATIC REVIEW

T. Takahiko¹, Y. Tomoaki¹, Y. Masataka¹, N. Masaji²

¹Kochi Medical School, Department of Anesthesiology and Intensive Care, Nankoku, Japan, ²University of Tokushima Graduate School, Department of Emergency and Critical Care Medicine, Tokushima, Japan

INTRODUCTION. Nutritional therapy is one of the important factors which improve the prognosis in critical care patients. A meta-analysis has shown that n-3 fatty acid-enriched parenteral nutrition reduces the risk of infection and length of stay in the ICU (1). However, there has been no evidence about the relationship between protein and patients mortality. **OBJECTIVES.** To determine if the nutrient composition of enteral nutrition, particularly that of a high proportion of protein and amino acids, influences the prognoses, ventilator discontinuation rates, and incidence of complications in critically ill patients.

METHODS. PubMed was systematically searched from inception to April 2013 using the following search terms: (protein OR lipid) AND (parenteral OR enteral) AND (nutrition OR feeding OR feedings) AND (critically ill OR critically ill patient OR intensive care OR ICU). We selected randomized controlled trials investigating the effect of nutrition on mortality and/or morbidity in critically ill patients. We limited the search to publications in English that reported studies with human subjects aged ≥13 years. Three independent reviewers selected citations, extracted data.

RESULTS. Of the 1,309 articles identified in the primary search, 436 manuscripts remained after excluding case reports, non-English manuscripts, studies of non-human subjects, and studies of subjects <13 years old. The title and abstract review excluded 349 additional manuscripts. Of the 87 remaining manuscripts, only 5 included information regarding amino acids or proteins. Three of these described prospective randomized studies and are included in the review. However, only 1 study included mortality and length of stay in the intensive care unit (ICU) as primary outcomes, and a meta-analysis could not be performed. In addition, the study concluded that the amount of branched-chain amino acids was more important than the amount of total protein intake (2). No study has documented the effect of amount of amino acid and protein in ICU patients.

CONCLUSIONS. The results of the present systematic review demonstrate that evidence is lacking regarding the appropriate amino acid and protein composition for the nutrition-related care of ICU patients.

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2. Garcia-de-Lorenzo A, et al.: Parenteral administration of different amounts of branched-chain amino acids in septic patients: Clinical and metabolic aspects: *Crit Care Med* 1997; 25: 418-424

Nutrition prescription

Energy prescribed(kcal/d)	1473
delivered	840 (57 %)
Energy prescribed(kcal/kg/d)	20
delivered	12 (60 %)
Protein prescribed(g/d)	96
delivered	49 (51 %)
Protein prescribed(g/kg/d)	1.4
delivered	0.68 (49 %)
Data is mean and percent	

[Table 2. Enteral Nutrition (EN) prescription]

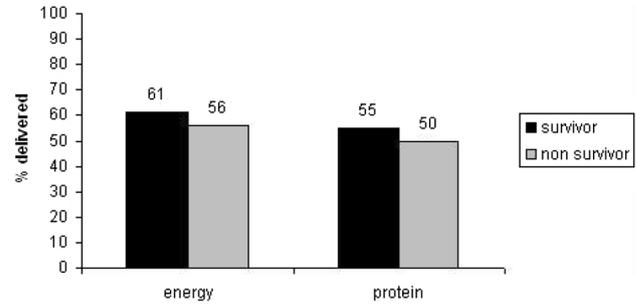


Fig. 1 Figure 1. % energy & protein delivered

CONCLUSIONS. Adults admitted to the ICU with acute leukemia received only 57 % of energy and 51 % protein prescriptions. Our data showing inadequate energy and protein delivery in critically ill patients with acute leukemia is similar to other critically ill populations. There is controversy in the literature about the optimal amount of energy and protein for the critically ill. There is opportunity for future research regarding optimizing nutritional support in this population.

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0286

NUTRITION CARE OF CRITICALLY ILL PATIENTS WITH LEUKEMIA: A RETROSPECTIVE REVIEW

K.N. MacEachern¹, A.P. Kraguljac¹, S. Mehta¹

¹Mount Sinai Hospital, Toronto, Canada

INTRODUCTION. Adults with acute leukemia may become malnourished due to side effects of chemotherapy. Gastrointestinal graft versus host disease may be seen in patients who receive an allogeneic stem cell transplant. Critically ill patients frequently become malnourished due to poor provision of oral and enteral nutrition (EN) and sepsis. Critically ill patients typically receive 60 % of their energy and 40 % of their protein requirements [1]. Inadequate nutrition support may contribute to worse ICU outcomes [1]. There is limited information about the nutrition care of critically ill adults with acute leukemia.

OBJECTIVES. We reviewed the nutrition care provided to patients with acute leukemia admitted to the ICU. We hypothesized that patients admitted to the ICU with acute leukemia receive inadequate nutrition therapy.

METHODS. We performed a retrospective chart review of all adults with leukemia admitted to the Medical/Surgical ICU at Mount Sinai Hospital for >24 h, from 2009 to 2012. This study was approved by the local ethics review board. We collected data on patient demographics, admission APACHE II score, type of nutrition therapy provided during the first 12 days of ICU admission, quantity of EN and parenteral nutrition (PN) administered, reasons for withholding nutrition, and mortality status at ICU discharge.

RESULTS. Data were collected on 84 patients with acute leukemia. Patient demographics are shown in Table 1. Sepsis was the primary admitting diagnosis (53 %). Twenty-two (27 %) patients received an allogeneic stem cell transplant; their average BMI was 23 (vs 27 in non transplant patients, p = 0.04). Patients received nutrition on 62 % of ICU days. An oral diet was prescribed for 38 patients (46 %); 60 % of these patients began eating within 24 h of ICU admission. EN was prescribed for 45 patients (54 %) and started within 2 days of admission in 89 % of these patients. Enteral nutrition prescription details are shown in Table 2. EN was withheld commonly for airway management and GI dysmotility on average twice per patient, for 6 h each time. ICU mortality was 37 %. Energy and protein delivery in survivors and non-survivors are shown in Figure 1. There were no differences in nutrition prescribed or received, or mortality based on BMI or stem cell transplant status.

Sepsis biomarkers: 0287–0300

0287

SYSTEMIC INFLAMMATORY RESPONSE TO INFECTIONS IN PATIENTS ADMITTED TO ICU. PATIENT- RELATED RISK FACTORS. 2013 ENVIN-HELICS REGISTRY DATA

X. Nuvials¹, M. Palomar², F. Alvarez-Lerma³, P. Olaechea⁴, S. Uriona⁵, M.P. Gracia³, T. Seijas⁶, A. Colomar⁷, E. Yuste⁸, A. Arenzana⁹, ENVIN-HELICS

¹Hospital Arnau de Vilanova, Intensive Care Medicine, Lleida, Spain, ²Hospital Arnau de Vilanova, Lleida, Spain, ³Hospital del Mar, Barcelona, Spain, ⁴Hospital de Galdakao, Galdakao, Spain, ⁵Hospital Vall d'Hebron, Barcelona, Spain, ⁶Hospital de Cruces, Barakaldo, Spain, ⁷Hospital Son Espases, Palma de Mallorca, Spain, ⁸Hospital Universitario San Cecilio, Granada, Spain, ⁹Hospital Universitario Virgen de la Macarena, Sevilla, Spain

INTRODUCTION. Severe sepsis and septic shock are frequent in infections that require ICU admission. There is scarce information about patient-related risk factors for developing severe inflammatory response (SIR).

OBJECTIVES. To analyze the influence of patient-related risk factors in developing SIR infections in patients requiring ICU admission.

METHODS. Prospective, observational, multicenter and voluntary enrollment study (Spanish registry ENVIN-HELICS)*. All patients admitted in ICU for >24 h between 1st April and 30th June 2013 were included. All episodes of infection were recorded during the follow-up. Infections associated to severe sepsis (SS) and septic shock (SX) were considered SIR. Systemic inflammatory response to infection was defined according to consensus criteria **. Patients were categorized as SIR(+) when had (≥1) infection with SIR, and SIR(-) when had only infections with sepsis or without inflammatory response. Demographic data, risk factors, and comorbidities were recorded. Univariate analysis were done using Chi square test and variables found to be significant (p < 0.05) were included in a multivariate logistic regression model. p value < 0.05 was considered statistical significant.

RESULTS. Among 20,799 patients admitted in ICU, 8,789 infections were recorded. 2,075 (23 %) developed SX, 1,136 (13 %) SS, 4,099 (47 %) sepsis and 1,479 (17 %) had not inflammatory response. There were 2,652 patients SIR(+) and 4,064 SIR(-). SIR(+) patients were older (65.1 ± 13.9 vs. 62.5 ± 15.9 years) (p < 0.05) and had a higher APACHE II score (25.6 ± 7.8 vs. 18.1 ± 7.8) (p < 0.05). Table 1 shows patient-related risk factors found to be independent predictors for developing SIR in the multivariate analysis.

Characteristic	
Age, years	56
Female sex, N (%)	40(48 %)
Height, m, mean	1.67
Weight, kg, mean	72
BMI, kg/m ²	27
APACHE II score, mean	27
Allogeneic stem cell transplant, N (%)	22(27 %)
ICU length of stay, days	10
ICU mortality, N (%)	31(37 %)

[Table 1. Characteristics of 84 study patients]

Table 1. Patient-related risk factors	RIS (-) patients n = 4064 n (%)	RIS (+) patients n = 2652 n (%)	OR (IC95 %)
Emergency Surgical admission	691 (17)	653 (24.6)	2.55 (1.95-3.34)
Urological surgery <30 days before ICU admission	555 (13.7)	594 (22.4)	2.14 (1.46-3.13)
Emergency surgery during ICU stay	743 (18.3)	662 (23.5)	1.25 (1.07-1.46)
Antibiotics <48 h previous ICU admission	1,612 (39.7)	1,463 (55.2)	1.43 (1.28-1.60)
Renal replacement technics	360 (8.9)	487 (18.4)	1.69 (1.43-2.01)
Immunosuppression	483 (11.9)	452 (17.0)	1.20 (1.01-1.42)
Neoplasm	556 (13.7)	539 (20.3)	1.20 (1.03-1.40)

[Patient related risk factors. Multivariate analysis]

CONCLUSIONS. SIR is associated to 36 % of infections in ICU patients. There are patient-related factors independently associated with the most severe forms of systemic inflammatory response to infection.

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0288 PROCALCITONIN CLEARANCE CORRELATES WITH MAJOR COMPLICATIONS IN POSTOPERATIVE PERITONITIS

A. Benítez-Cano¹, E. Samsó¹, M. Sadurní¹, S. Beltrán de Heredia¹, I. Ramos¹, L. Aguilera¹, L. Molto¹, J.C. Alvarez¹, C. García Bernedo¹

¹Parc de Salut Mar, Anaesthesiology and Critical Care, Barcelona, Spain

INTRODUCTION. Biochemical biomarkers as procalcitonin (PCT) and C-reactive protein (CRP) are helpful as diagnostic tools in septic patients. They're commonly used to monitor septic process in the critical patient although their usefulness as prognosis markers are not so clear and dynamic changes rather than concentration itself seems to correlate better¹. Surgical population shows higher cut-off values for both biomarkers and there's no clear correlation between absolute values and severity in the surgical patient². CRP seems to be more sensitive than PCT as an early biomarker predicting anastomotic leakage after elective colorectal surgery.

OBJECTIVES. The aim of this study was to assess the prognostic value of PCT and CRP in the clinical setting of secondary postoperative peritonitis to predict major complications. Usefulness of these biomarkers to predict the adequacy of empiric antibiotherapy was also assessed.

METHODS. This was a single centre, retrospective study in the postoperative intensive care unit of Hospital del Mar, Barcelona, Spain. Between January 2011 and September 2013 patients with secondary postoperative peritonitis and positive peritoneal cultures were included. Daily PCT and CRP were measured for 5 postoperative days (POD). Major complications included re-operation for infection, percutaneous drainage of intraabdominal abscess and in-hospital mortality. Empiric antibiotic therapy was deemed as adequate if at least one antibiotic molecule was effective against each positive peritoneal culture bacteria.

RESULTS. A Total of 68 patients with diagnosis of postoperative peritonitis and positive peritoneal cultures were included. 44.1 % of patients presented a major complication. No significant differences in demographic data and comorbidities were found. Severe sepsis and septic shock were associated with increased likelihood of death. Dynamic changes in CRP nor antibiotic adequacy didn't correlate with major complications. 40 % clearance of PCT on POD 2 compared to baseline was associated with a low risk of major complications ($p = 0.015$) and a PCT increase higher than 150 % on POD 2 relative to baseline was associated with an increased likelihood of death ($p = 0.009$).

CONCLUSIONS. 40 % clearance of PCT values on POD 2 from baseline is associated with a low risk of developing major complications while an increase above 150 % correlates with high risk of mortality.

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0289 MONOCYTE SUBSET DISTRIBUTION IS ASSOCIATED WITH MORTALITY OF CRITICALLY ILL PATIENTS

W.S. Speidl¹, K.A. Kryciuk^{1,2}, M. Lenz¹, L. Wutzlhofer¹, G. Maurer¹, G. Heinz¹, J. Wojta¹

¹Medical University of Vienna, Department of Internal Medicine II, Vienna, Austria, ²Ludwig Boltzmann Cluster for Cardiovascular Research, Vienna, Austria, ³Medical University of Vienna, Core Facilities, Vienna, Austria

INTRODUCTION. Patients admitted to a medical ICU suffer from various pathologies. Despite that, many patients develop a systemic inflammatory response syndrome (SIRS) often in the absence of microbial pathogens. As key regulators of innate immunity, monocytes may be crucially involved in SIRS development. Monocytes can be distinguished into three subsets according to their surface expression of CD14 and CD16: Classical monocytes (CD14+CD16-; CM), non-classical monocytes (CD14+CD16+; NCM) and intermediate monocytes (CD14+CD16+; IM), the latter shown to be particularly pro-inflammatory.

OBJECTIVES. To analyze whether monocyte subset distribution at admission or 72 h after admission in critically ill patients is associated with 30-day survival.

METHODS. In this prospective, observational cohort study, 195 consecutive patients admitted to a cardiac ICU at a tertiary care center were enrolled. Blood was taken at admission to the ICU and after 72 h. Distribution of monocyte subsets was analyzed by flow-cytometry.

RESULTS. Mean Apache II score was 19.5 ± 8.1 and 30-day mortality was 25.4 %. At admission, NCM were significantly lower in non-survivors as compared to survivors [2.65 (0.42-5.53) vs. 4.36 (0.67-7.66) %; $p = 0.010$] whereas CM and IM did not differ according to 30-day survival. In contrast, 72 h after admission, monocyte subset distribution shifted towards an increased proportion of IM [9.4 (3.8-13.1) vs. 4.3 (2.3-8.1); $p = 0.005$] with a concomitant decrease of CM [86.8 (78.5-89.3) vs. 89.6 (84.9-93.1); $p = 0.009$] in non-survivors versus survivors, respectively. NCM at day 3 were not associated with death at 30 days. Kaplan-Meier analysis revealed that NCM at admission below the median predicted early mortality (day 0 to day 10; $p < 0.001$) but not late mortality (day 10 to day 30; $p = 0.24$), whereas CM and IM at day 3 were associated with late mortality (CM: $p = 0.036$; IM: $p = 0.003$) but not early mortality (CM: $p = 0.97$; IM: $p = 0.22$).

CONCLUSIONS. Circulating monocyte subsets are associated with 30-day mortality in critically ill patients. NCM at admission predict early and monocyte subset distribution at day 3 predicts late mortality. Despite underlying pathologies leading to ICU admittance, the innate immune system as reflected by monocyte subset distribution plays a major role in ICU outcome.

0290 PROGNOSTIC VALUE OF PENTRAXIN-3 LEVELS IN PATIENTS WITH SEVERE SEPSIS

S. Hamed¹, M. Behnes¹, S. Lang¹, D. Lepiorz¹, D. Pauly¹, F. Trinkmann¹, M. Borggreffe¹, U. Hoffmann¹

¹Medical Faculty Mannheim, University of Heidelberg, 1st Medical Department, Mannheim, Germany

INTRODUCTION. Severe sepsis represents a life-threatening inflammatory process caused by a systemic infection and is regarded as a major healthcare concern. Long pentraxin 3 (PTX-3) is an acute-phase protein and is secreted by numerous cells in response to pro-inflammatory stimuli such as interleukin-1 (IL-1) and tumor necrosis factor α (TNF- α). This study assesses the diagnostic and prognostic value of PTX-3 in patients with severe sepsis or septic shock being admitted to a medical intensive care unit (ICU).

METHODS. 108 patients with clinical criteria of severe sepsis and septic shock were enrolled after admission to the ICU. Diagnosis of sepsis was based on the ACCP/SCCM consensus statement criteria. Blood samples were drawn on day 1, 3 and 8. PTX-3 was measured by ELISA (Quantikine® ELISA) in plasma. Additionally, procalcitonin (PCT) and interleukin-6 (IL-6) were measured. All-cause mortality was followed up to 30 days and 6 months. Statistical analyses were performed with ANOVA, Mann-Whitney or Welch's corrected t-test and Spearman's rank correlation.

RESULTS. PTX-3 levels measured on day one significantly correlated with IL-6 ($r = 0.386$, $p = 0.0001$), PCT ($r = 0.385$, $p = 0.0001$), CRP ($r = 0.356$, $p = 0.0002$) and creatinine ($r = 0.276$, $p = 0.004$). At day 1, PTX-3 levels were significantly higher in patients with septic shock ($n = 70$, median = 105.4 ng/ml, IQR 36.4 - 250.6 ng/ml) compared to patients with severe sepsis ($n = 24$, median = 41.1 ng/ml, IQR 17.1 - 57.0 ng/ml) ($p = 0.002$). In patients with severe sepsis and septic shock, PTX-3 levels significantly decreased during the first week of ICU treatment (day 1: median = 60.77 ng/ml, IQR 29.45 - 213.43 ng/ml; day 3: median = 35.19 ng/ml, IQR 13.9 - 66.5 ng/ml; day 8: median = 25.85 ng/ml, IQR 10.35 - 53.21 ng/ml; test for linear decreasing trend, $p = 0.008$). Baseline PTX-3 levels were significantly higher in non-survivors (NS) compared to survivors (S) with respect to all-cause mortality after 30 days and 6 months (30 days: NS, median = 69.5 ng/ml, IQR 44.0 - 376.3 ng/ml; S, median = 42.3 ng/ml, IQR 17.4 - 139.5 ng/ml, $p = 0.002$; 6 months: NS, median = 69.3 ng/ml, IQR 31.8-250.6 ng/ml; S, median = 42.4 ng/ml, IQR 17.8 - 119.3 ng/ml, $p = 0.006$).

CONCLUSIONS. PTX-3 correlates significantly with established inflammatory biomarkers. PTX-3 was significantly increased in patients with septic shock compared to patients with severe sepsis. Increased levels of PTX-3 at day one of ICU treatment might indicate short- and long-term all-cause mortality.

0291 FIBRINOGEN AT ADMISSION IS AN INDEPENDENT PREDICTOR OF MORTALITY IN SEVERE SEPSIS AND SEPTICSHOCK IN INTENSIVE CARE UNIT

M.F. Azfar¹, M.F. Khan², S.M. Khurshid²

¹King Saud University, Critical Care, Riyadh, Saudi Arabia, ²King Khalid University Hospital, Critical Care, Riyadh, Saudi Arabia

INTRODUCTION. Coagulation abnormalities are common in patient with sepsis and septic shock. Various studies¹ has shown its association with poor prognosis in ICU. In severe sepsis there is an intense stimulation of fibrinolytic mechanism causing a decline in fibrinogen level and activation of DIC. The prognostic relationship of hypofibrinogenemia in severe and septic shock still need further studies.

OBJECTIVES. The aim of this study is to determine the correlation of coagulation factors with the outcome in patients with sepsis and septic shock on admission in ICU. **METHODS.** Study design: Prospective observational cohort study. >Sample Size: 100 cohort of severe sepsis and septic shock patients. Setting : University based tertiary care hospital. Methodology : The study was started after approval from hospital ethical committee. Informed consent were taken. The previous history of any coagulation disorders were excluded.

Data were collected on a pre-designed proforma. Data included age, gender, comorbidities, APACHE II, duration of mechanical ventilation, source of infection, vasopressors.

First blood sample collected at admission were analyzed which included hemoglobin, platelets, WBC, PT, aPTT, Fibrinogen, INR and D-dimer.

Outcome was measured in terms of ICU mortality.

STATISTICAL ANALYSIS. Data were analyzed using SPSS PC plus version 21.0 (statistical software). Chi square test and relative risk were used to test and measure the association between categorical study variable and outcome variables (dead/survived). Logistic regression was used to identify the independent risk factors for mortality. P value < 0.05 and 95 % confidence interval were used to assess the statistical significance and precision of estimates.

RESULTS. The results (Table 1) showed patients above 65 had high mortality in severe sepsis and septic shock. There was no significant difference in gender between two groups. Univariate analysis showed significant correlation of APACHE II, platelet, PT, APTT, fibrinogen and d-dimer with mortality in patients with severe sepsis and septic shock. Multivariate analysis showed APACHE II score of more than 20 ($p = 0.001$), fibrinogen < 2 ($p = 0.019$) and d-dimer > 1 ($p = 0.06$) are independent predictors of mortality in severe sepsis and septic shock.

Variables	Died(N = 65)	Survived (N = 35)	ARR	95 %CI of ARR	p value
Platelet < 150	33(50.8)	10(28.6)	1.37	.03,1.84	.03
PT > 16	41(63.1)	14(40)	1.40	1.02,1.91	.027
APTT > 40	41(63.1)	14(40)	1.40	1.02,1.91	.027
Fibrinogen < 2	40(61.5)	15(42.9)	1.31	.96,1.70	.07
d-dimer > 1	64(98.5)	31(88.6)	3.37	.48,19.5	.03
APACHE-II > 20	53(81.5)	18(51.4)	1.80	1.15,2.84	.002
Age > 65	27(41.5)	8(22.9)	1.60	1.04,2.46	.02

[Table 1]

CONCLUSIONS. Fibrinogen level at admission is an independent predictor of mortality in patients with sepsis and septic shock. It also confirms correlation with other coagulation abnormalities and the outcome.

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0292
CHANGES OF MONOCYTE TREM-1 EXPRESSION AND OUTCOME IN HUMAN SEPSIS

I. Tsangaris¹, A. Marioli², D. Konstantonis¹, M. Koupetori², M. Raftogiannis³, S. Apollonatos¹, N. Antonakos³, E. Vrigkou¹, K. Ouranos¹, D. Elaiopoulos¹, A. Strilakou¹, A. Armaganidis¹, Hellenic Sepsis Study Group

¹2nd Department of Critical Care Medicine, University of Athens, Medical School, Athens, Greece, ²2nd Department of Internal Medicine, Sismanogleion General Hospital, Athens, Greece, ³4th Department of Internal Medicine, University of Athens, Medical School, Athens, Greece

INTRODUCTION. TREM-1 (triggering receptor expressed on myeloid cells), a receptor expressed on neutrophils and monocytes, is upregulated in sepsis and seems to tune the inflammatory response.

OBJECTIVES. To gain more insight on the precise mechanism by which TREM-1 modulates this response in human sepsis, we investigated the gene and superficial expression of TREM-1 on monocytes as well the plasma levels of sTREM-1 in relation with the clinical outcome.

METHODS. Peripheral venous blood was sampled from 75 septic patients (39 patients with sepsis, 25 with severe sepsis and 11 with septic shock) on sepsis day 1 and 3. Blood monocytes were isolated. Flow cytometry was used to estimate the TREM-1 superficial expression and Real Time PCR was used to estimate the TREM-1 gene expression. sTREM-1 was measured in serum by ELISA.

RESULTS. Survivors and non survivors had no difference in TREM-1 mRNA both on day 1 and day 3 of sepsis, but non survivors demonstrated a significant decrease from day 1 to day 3 compared to survivors (p:0.016). The same change for non survivors was evident for the percentage of monocytes expressing TREM-1 (p: 0.019). No relation of statistical importance between TREM-1 gene expression and serum sTREM-1 was found.

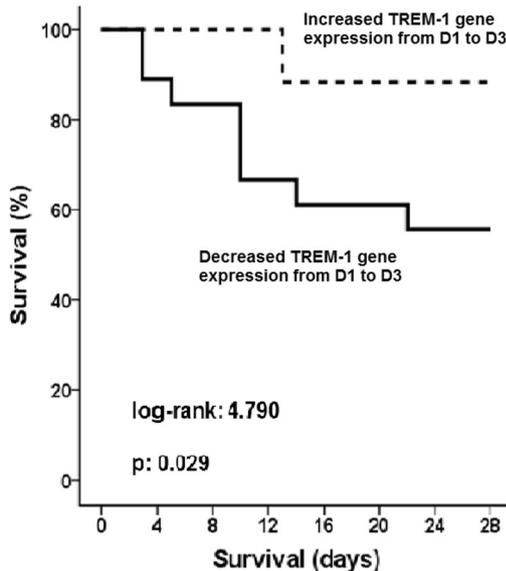


Fig. 1 [TREM-1 gene expression and survival]

CONCLUSIONS. Decreases of TREM-1 mRNA and the expression of TREM-1 on monocytes during the septic process are associated with poor outcome.

0293
ASSOCIATION OF TNFA, NOD2/CARD15 AND LBP GENE POLYMORPHISMS WITH SEPSIS IN CROATIAN POPULATION

G. Cavrić¹, T. Catela Ivković², M. Jokić², S. Kapitanović²

¹University Hospital Merkur, Internal Medicine, Zagreb, Croatia, ²Laboratory for Personalized Medicine, Division of Molecular Medicine, Ruđer Bošković Institute, Zagreb, Croatia

INTRODUCTION. Sepsis is a complex syndrome caused by an overwhelming and complex immunologic response of the body to infection. The incidence of sepsis is increasing, and is accompanied with high mortality rate. Genetic epidemiological studies indicate a strong genetic influence on the outcome of sepsis.

OBJECTIVES. Aim of this study was to examine the association between TNF α (-238 G/A, -308 G/A), NOD2/CARD15 (SNP8, SNP12, SNP13) and LBP (292 T/G, 1306 T/C) single nucleotide polymorphisms (SNPs) with risk of sepsis, severity of disease and survival in patients admitted to a medical intensive care unit.

METHODS. Genomics DNAs were isolated from peripheral blood of 167 patients with suspected sepsis. TNF α , NOD2/CARD15 and LBP polymorphisms were examined using "real-time" PCR-SNP and PCR-RFLP analysis. The results of genotyping were correlated with risk of sepsis development, disease severity according to APACHE II score and sepsis severity (sepsis, severe sepsis and septic shock).

RESULTS. We found no association of TNF α and NOD2/CARD15 polymorphisms with the risk of sepsis development, the disease severity and survival. We also demonstrated no association of LBP 292T/G and LBP 1306T/C gene polymorphisms with a risk of sepsis development or with the disease severity. The combination of genotypes LBP 292/1306 TG/TT in the total population of patients were more frequent in patients who died (p = 0.065). Variant LBP 292G allele (p = 0.052), 1306CC genotype (p = 0.053) and combination of genotypes LBP 292/1306 TG/TT (p = 0.0238) and LBP 292/1306 GG/CC (p = 0.0343) were more frequent in the group of the deceased patients with sepsis.

CONCLUSIONS. Our results suggest the association of LBP 292T/G and 1306T/C gene polymorphisms with pathogenesis of sepsis, its severity and survival.

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GRANT ACKNOWLEDGMENT. This study was supported by grant number 098-0982464-2508 from the Ministry of Science, Republic of Croatia.

0294
FREE IMMUNOGLOBULIN LIGHT CHAIN CONCENTRATIONS, RATIOS AND OUTCOMES IN CRITICALLY ILL ADULTS WITH SEPSIS: A COHORT STUDY

M. Shankar-Hari^{1,2}, L. Assi³, R. Beale², J. Spencer¹, M. Singer^{4,5}

¹King's College London, Peter Gorer Department of Immunobiology, London, United Kingdom, ²Guy's and St Thomas' NHS Foundation Trust, Intensive Care Medicine, London, United Kingdom, ³The Binding Site Group Ltd, Birmingham, United Kingdom, ⁴University College London Hospital NHS Foundation Trust, Intensive Care Medicine, London, United Kingdom, ⁵Bloomsbury Institute of Intensive Care Medicine, Research Department of Clinical Physiology, London, United Kingdom

INTRODUCTION. In the general population without plasma cell disorders, elevated polyclonal kappa [κ] and lambda [λ] immunoglobulin free light chain [FLC] concentrations are associated with reduced survival [1,2]. FLC concentrations are increased in patients with sepsis[3].

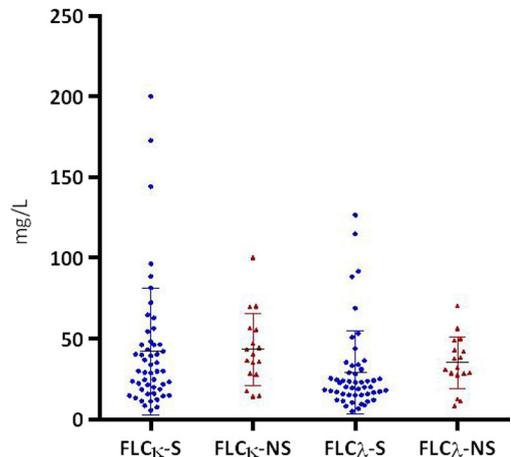
OBJECTIVES. To evaluate the prevalence of raised FLC and abnormal FLC ratios, and their relationship to ICU admission day APACHE II score and hospital mortality in adult critically ill patients with sepsis without a prior history of immunological disorders.

METHODS. After informed consent, consecutive admissions to a general mixed medical-surgical intensive care unit (ICU) with sepsis were included. Serum FLC were measured in the first 12 h following admission. We excluded patients with a history of chemotherapy, immunosuppression or immune deficiency states, or excessive blood loss. Septic shock was defined as a need for inotropes and lactate >2 mmol/L.

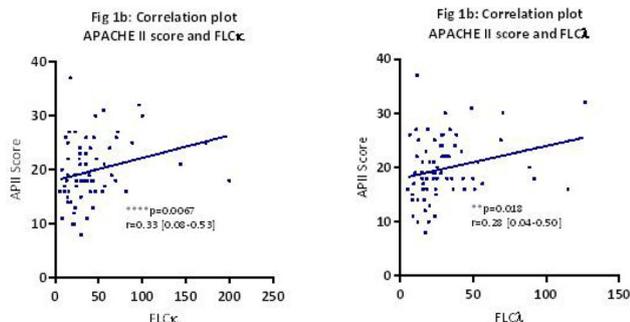
The upper limit of normal for FLC [FLCλ = 26.3 mg/L; FLCκ = 19.4 mg/L] and normal range for FLC ratio [FLCR] 0.26-1.65 were used as cut-offs to create binary variables defining abnormal results. Unless specified, data are presented as mean [SD].

RESULTS. We recruited 68 patients with an age of 65.2 [14.3] years; 60 % were male with an APACHE II score of 19.8 [5.8]. 62 % of patients had septic shock and 60 % had a respiratory tract infection as the source. Hospital mortality was 25.5 %. FLCκ was abnormal in 75 %, but this did not differ by survival status. FLCλ was abnormal in 56 % and more commonly seen in non survivors [p = 0.0002]. FLC distribution by survival status is shown in Figure 1a.

Fig 1a: Distribution plot FLC by survival status



36.8 % of the study cohort had an abnormal FLCR, which was more commonly seen in survivors [p < 0.0001]. A significant linear correlation was seen between APACHE II Score and FLC [Figure 1b].



CONCLUSIONS. Abnormal FLC concentrations and FLC κ are common in ICU patients presenting with severe sepsis. The FLC on ICU admission correlates with severity of illness, while an abnormal FLC κ is associated with an increased risk of hospital mortality.

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GRANT ACKNOWLEDGMENT. MSH, JS and MS acknowledge the support of the NIHR BRC

0296

NEUTROPHILIC CD64 AND MONOCYTIC HLA-DR IN DIAGNOSIS, MONITORING AND PROGNOSTICATION OF NEONATAL SEPSIS

R. Pradhan¹, P. Jain², A. Paria³, N. Warner⁴, A.K. Singh³, M. Chatterjee¹

¹Institute of Postgraduate Medical Education & Research, Pharmacology, Kolkata, India, ²BD Biosciences, Gurgaon, India, ³Institute of Postgraduate Medical Education & Research, Neonatology, Kolkata, India, ⁴BD Biosciences, San Jose, United States

INTRODUCTION. Sepsis is an important cause of mortality in the neonatal period; ¹ low sensitivity of the available diagnostic tests emphasizes the need for identification of efficient biomarkers.

OBJECTIVES. This study evaluated the potential of neutrophilic CD64 (nCD64)³ combined with monocytic HLA-DR (mHLA-DR)⁴ in diagnosis, monitoring and prognostication of neonatal sepsis.

METHODS. Blood from 100 neonates suspected of sepsis (eventually classified as 63 septic and 37 non-septic) and 29 healthy controls was collected at day 1 (on clinical suspicion of sepsis), and day 2, to flow cytometrically evaluate the expression of nCD64, mHLA-DR and thereby a derived parameter 'Sepsis index' (SI = nCD64/mHLA-DR X100). For the purpose of therapeutic monitoring, blood was collected at day 4/5/6 (sample 3) in 46 sepsis cases and post-treatment (PT) in 21 sepsis cases.

RESULTS. At day 1, sensitivity and specificity to detect sepsis for nCD64 were 73.01 % and 89.18 % respectively while those for SI were 73.01 % and 72.22 % respectively. In sepsis cases, where sample 3 > cut-off, the odds ratios (OR) for change of antimicrobials on/beyond day 4 for nCD64 and SI were 5.92 (p = 0.021, 95 % CI: 1.22-32.22), and 6.33 (p = 0.007, 95 % CI: 1.52-26.34) respectively, both being greater than the association of antimicrobial change with sample 3 CRP > 15 mg/L (OR = 2.06, p = 0.227, 95 % CI: 0.63-6.73). Levels of SI at day 1, 2 and 4-6 correlated best with the clinical course of the sepsis episodes. nCD64 dropped below cut-off in 77.7 % of PT samples. On Kaplan-Meier analysis, neonates with SI > cut-off (Day1) showed a significantly higher 30 day-mortality than those with low SI (p = 0.002).

CONCLUSIONS. nCD64 and SI are sepsis markers of moderate sensitivity wherein both fared better than the traditional monitoring tool CRP to monitor antimicrobial therapy in the course of sepsis treatment. SI correlated best with prognosis in terms of 30-day mortality.

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0297

LYMPHOCYTE SUBSETS COUNT IN BLOOD AS TOOL FOR DIAGNOSIS OF SEVERE SEPSIS

L. Nogales¹, A. Avila², F. Bobillo¹, V. Iglesias^{3,4}, N.F. Villanueva¹, R. Cicuendez¹, A. Bueno¹, L. Parra¹, F. Gandía¹, M.F. Muñoz², R. Almansa^{3,4}, L. Rico^{3,4}, M. Nocito², J.F. Bermejo^{3,4}, D. Andaluz^{1,4}

¹Hospital Clínico Universitario de Valladolid, Servicio de Medicina Intensiva, Valladolid, Spain, ²Hospital Clínico Universitario de Valladolid, Servicio de Microbiología e Inmunología, Valladolid, Spain, ³Hospital Clínico Universitario de Valladolid, Unidad de Investigación Biomedica, Valladolid, Spain, ⁴Immunity Research in Infection and Sepsis (IRIS), Valladolid, Spain

INTRODUCTION. Although clinical and analytical criteria are well defined in severe sepsis, differential diagnosis of this condition with other clinical entities that show similar symptoms can result difficult.

OBJECTIVES. To compare cell immunological response between two critical clinical conditions: sepsis and Systemic Inflammatory Response Syndrome (SIRS) employing lymphocyte subsets count. Secondly we tested the diagnosis value of this probe to improve accuracy on diagnosis of severe sepsis.

METHODS. Prospective and observational study. We monitored lymphocyte subsets, T lymphocytes (CD3+), B lymph (CD19+), helper T lymph (CD3+/CD4+), cytotoxic T lymph (CD3+/CD8+) and natural killer cells (CD3-CD16+CD56+) in the blood of 144 patients with severe sepsis/septic shock or SIRS non infectious etiology at admission to the ICU by

using flow cytometer. Statistics: for demographic and clinical characteristics of patients differences between groups were assessed using the χ^2 test; continuous variables with Mann-Whitney U test. Area under ROC curve and Binary logistic Regression (BLR) adjusted by age, APACHE II and cardiovascular medical history were employed to test clinical accuracy and association between biological parameters respectively. p < 0.05 was considered significant.

RESULTS. Patients: severe sepsis (n = 54, 37.5 %) vs SIRS (n = 90, 62.5 %). When compared clinical characteristics of both groups we observed differences in age [69.5 vs 60; p = 0.012], APACHE II [20 vs 16; p = 0.002], cardiovascular medical history [35.2 % vs 15.5 %, p = 0.007]; ICU mortality [35 % vs 22.2 %; ns, p = 0.09] and lymphocyte subsets [expressed as medians (IQR)]: LCD3 + 436.4 (631) vs 784 (706), p = 0.012; LCD4 + 292(461) vs 482(398), p = 0.035; LCD8 + 216(225) vs 278(243), p = 0.01; LB 122.5(192) vs 166.5(206.5), ns; NK 71(114) vs 121.5(121.5), p = 0.012.

AUROC curves [AUC, p]: LCD3 + [0.69, p < 0.001], LCD4 + [0.67, p < 0.001], LCD8 + [0.68, p < 0.001], NK [0.66, p = 0.002]. BLR [OR, (CI), p value] showed that LCD3 + < 668 cell/ml, LCD4 + < 328 cell/ml, LCD8 + < 225 cell/ml, NK < 133.4 cell/ml levels increase risk of severe sepsis presence with OR 3.35 (CI 95 % 1.64-6.86), p < 0.001; OR 2.24 (CI 95 % 1.06-4.70), p = 0.03; OR 2.25 (CI 95 % 1.07-4.77), p = 0.03 and OR 3.2 (CI 95 % 1.43-7.12), p = 0.005 respectively.

CONCLUSIONS. Our results support the presence of cell immunosuppression in severe sepsis. Septic patients had significantly lower LCD4+, LCD8+ and NK cells count in blood than patients with other pathologies developing SIRS at admission to the ICU. Low levels of lymphocyte subsets increase significantly risk of presence of sepsis and it could be a helpful tool to improve differential diagnosis of severe sepsis.

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0298

IS PRESEPSIN A NEW RELIABLE BIOMARKER FOR INFECTION IN TRAUMA PATIENTS? OUR EXPERIENCE

E. Russo¹, S. Vitali², G. Gambale³, R. Dorizzi⁴, G. Scognamiglio¹, G. Amadori², M.F. Pedna⁵, M. Sparacino⁶, L. Portolani⁶, A. Rasi⁶, V. Sambri⁵

¹AUSL Romagna, Emergenza-Anestesia Rianimazione, Cesena, Italy, ²Università di Ferrara, Ferrara, Italy, ³Emergenza - Anestesia e Rianimazione, Cesena, Italy, ⁴AUSL Romagna, UO CORELAB, Cesena, Italy, ⁵AUSL Romagna, UO Microbiologia, Cesena, Italy, ⁶AUSL Romagna, Cesena, Italy

BACKGROUND. Fever and Systemic Inflammatory Response Syndrome (SIRS) are common in major trauma patients especially in the first days hampering the diagnosis of infection and sepsis in these patients since fever and SIRS are frequently not related to infection.

Therefore, it could be very helpful in everyday clinical practice to identify a biomarker not influenced by post traumatic SIRS that can predict or facilitate early diagnosis of sepsis.

OBJECTIVES. Aims of the study are to evaluate plasma presepsin concentration in trauma patients during ICU staying and to assess its relationship with infection.

METHODS. We retrospectively analysed data from 30 consecutive trauma patients admitted to our ICU from July to November 2013. We collected ISS score, daily SOFA score, and investigated the presence or absence of both SIRS and infection. Blood samples were obtained on 1st, 3rd, 5th, 8th day after ICU admission, and plasma presepsin concentration was measured using an automated analyzer (PATHFAST; Mitsubishi Chemical Medience Corporation, Japan).

RESULTS. 20 out of 30 patients (66.6 %) had at least an infection episode during the Study time and 28 (93.3 %) met SIRS criteria.

Presepsin mean concentration of the investigated patients in each day is shown in figure 1 and that in Infected and Non-Infected patient subgroups is shown in figure 2. Mean presepsin concentration in infected subgroup was 1061.1 (Standard Deviation, SD, 802.28) while in Non-Infected subgroup mean value was 624.1 (466.4) (p < 0.05). Patients SIRS had a presepsin mean of 809.6 (664.0) and non SIRS patients 671.2 (534.3) (p = 0.219).

No significant correlation (Spearman's Rho Test) was found between Presepsin and arterial Lactate (Rho=0.071), Serum Creatinine (Rho 0.228), SOFA score (Rho 0.151) and body temperature (°C) (Rho 0.187).

We could not establish a diagnostic cut-off value.

CONCLUSIONS. In this study, plasma presepsin was significantly higher in infected patients. Further studies with larger sample size are needed to clarify the diagnostic value of presepsin in major trauma patients.

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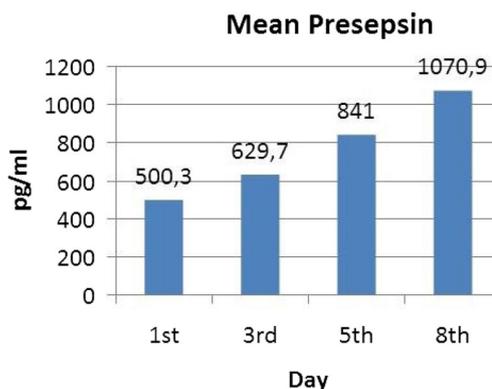


Fig. 1

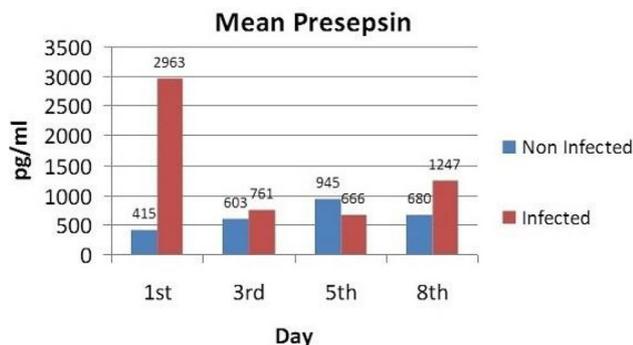


Fig. 2

0299

B CELLS WITH BOTH SURFACE KAPPA AND LAMBDA LIGHT CHAINS ARE PRESENT IN THE CIRCULATION IN ICU PATIENTS WITH SEPSIS AND THEIR FREQUENCY CORRELATES WITH FREE LIGHT CHAIN CONCENTRATIONS IN SERUM

M. Shankar-Hari^{1,2}, R. Tahir¹, L. Assi³, R. Beale², M. Singer^{4,5}, J. Spencer¹

¹King's College London, Peter Gorer Department of Immunobiology, London, United Kingdom, ²Guy's and St Thomas' NHS Foundation Trust, Intensive Care Medicine, London, United Kingdom, ³The Binding Site Group Ltd, Birmingham, United Kingdom, ⁴Bloomsbury Institute of Intensive Care Medicine, Research Department of Clinical Physiology, London, United Kingdom, ⁵University College London Hospital NHS Foundation Trust, Intensive Care Medicine, London, United Kingdom

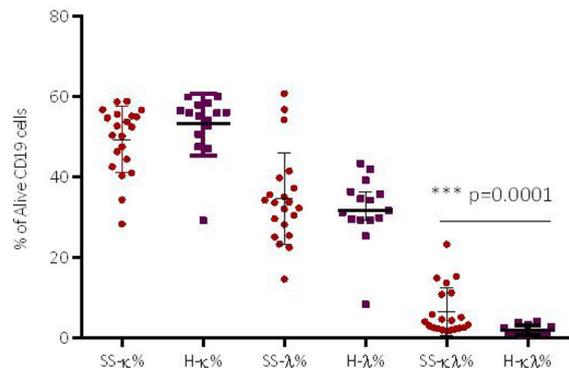
INTRODUCTION. Concentrations of free light chains (FLC) of both kappa [κ] and lambda [λ] isotypes are increased in septic patient serum [1], however the underlying mechanism remains unclear. As autoimmune diseases share many similar final common inflammatory pathways to sepsis, B cells with surface expression of both κ and λ light chains [CD19^{Dual}] [2] may result in non-stoichiometric secretion of light chains, thereby generating high circulating FLC.

OBJECTIVES. To explore the distribution of surface light chains on circulating CD19 B cells and their relationship to FLC levels in septic ICU patients with no prior history of immunological disorders.

METHODS. After gaining informed consent, consecutive septic admissions to a medical-surgical ICU were enrolled. We excluded patients with history of chemotherapy, immunosuppression or immune deficiency states, or with excessive blood loss.

Blood samples for serum FLC measurements were taken in the first 12 h following admission and samples for isolation of circulating mononuclear cells (PBMC) were obtained within 48 h of ICU admission. PBMCs were isolated within 12 h by Ficoll density centrifugation. Cell surface staining was performed using anti-CD19-PerCpCy5.5, anti-κ-APC H7 and anti-λ-Pacific Blue [all BD Biosciences], and live dead stain amcyan [Invitrogen]. FACS analyses were performed on a FACScalibur flow cytometer (BD Biosciences) using Tree Star FlowJo software. Data are presented as median [IQR].

RESULTS. We included 21 patients (age 62 [45-71] years, 58 % male, APACHE II score 18 [16-24]). The respiratory tract was the source of sepsis in 62 %. Hospital mortality was 19.0 %. FLCκ and FLCλ concentrations were 29.0 [21.5-62.8] and 16.9 [11.4-35.2] mg/L respectively. Compared to healthy controls, patients with sepsis has significantly higher CD19^{Dual} expressing B cells [Figure 1a].



Mann Whitney Test used for comparison with healthy controls

Fig. 1a

There was a linear and statistically significant correlation between CD19^{Dual} expressing B cells with FLCκ and FLCλ [Figure 1b].

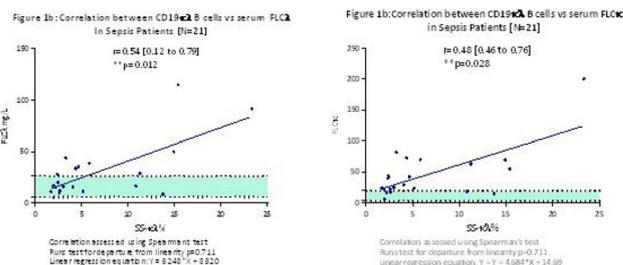


Fig. 1b

CONCLUSIONS. Abnormal FLC concentrations in patients with sepsis correlate with higher levels of circulating CD19 B cells with dual surface expression of κ and λ light chains. Future research will determine the normal counterparts of CD19^{Dual} and if the light chains are simultaneously expressed by B cells.

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GRANT ACKNOWLEDGEMENT: MSH, MS and JS acknowledge the support of the NIHR BRC. FLC measurements were done at The Binding Site UK Limited.

0300

RELATIONSHIP BETWEEN CATECHOLAMINE DOSE, TACHYCARDIA AND OUTCOME IN SEPTIC SHOCK: A MULTICENTRE EVALUATION

R. Domizi^{1,2}, S. Calcinari^{1,2}, C. Beilstein³, C. Boerma⁴, J.-D. Chiche⁵, A. D'Egidio⁶, E. Damiani⁷, A. Donati², M.P. Madden⁷, D. McAuley⁷, A. Morelli⁶, P. Royer⁵, M. Shankar-Hari⁸, N. Wickboldt³, P. Zolfaghari³, M. Singer¹

¹University College London Hospital NHS Foundation Trust, London, United Kingdom, ²Ospedali Riuniti Umberto I Salesi - Lancisi di Ancona, Ancona, Italy, ³Royal London Hospital, Barts Health, London, United Kingdom, ⁴Medisch Centrum Leeuwarden, Leeuwarden, New Caledonia, ⁵Hopital Cochin, Paris, France, ⁶Policlinico Umberto I 'Sapienza', Rome, Italy, ⁷Royal Victoria Hospital, Belfast, Ireland, ⁸St Thomas' Hospital, London, United Kingdom

INTRODUCTION. Catecholamines are currently recommended as first-line agents for fluid-unresponsive septic shock. In severe cases, high doses may be needed to correct hypotension and these high doses may directly induce multiple deleterious effects (1). Persistence of tachycardia also represents a poor prognostic sign and beta-blockade has been proposed for resistant shock with tachycardia (HR > 95 bpm) (2).

OBJECTIVES. To evaluate the relationship between norepinephrine (NE) dose, heart rate (HR) and 28 day mortality in consecutive septic shock patients in multiple European ICUs. **METHODS.** Data were retrospectively collected from the records of 711 consecutive septic shock patients in 8 European ICUs (in the Netherlands, UK, France and Italy). NE requirements were divided into low (≤0.1 mcg/kg/min), moderate (0.1-0.3) or high (>0.3) groups.

RESULTS. NE was administered to 705 patients, on whom low/mid/high dose NE was given to 186/287/253 patients at 1 h, and 247/157/258 at 24 h (64 having died). An association was seen between 28-day mortality and increasing dose requirement of NE measured at both 1 h and 24 h after commencement (p < 0.01). Mortality was higher in patients with heart rates ≥95 bpm, significant differences being seen at Hour 1 for both mid-range (p < 0.01) and high-range (p < 0.05) NE, Chi square (Fisher exact) test.

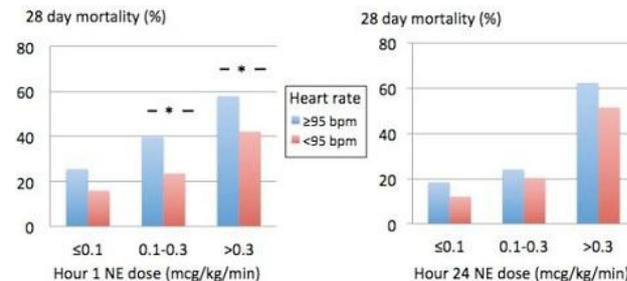


Fig. 1 28 day Mortality (%)

CONCLUSIONS. Mortality risk is higher in septic shock patients with increasing catecholamine dose requirements and with tachycardia. The contributions of exogenously delivered catecholamine and excess sympathetic drive to mortality merit further investigation.

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Clinical evaluation in acute respiratory failure: 0301-0314

0301

PHYSIOLOGICAL SCORE SIPP (SHOCK INDEX AND HYPOXEMIA) AN ACCURATE PREDICTOR OF ICU ADMISSION IN COMMUNITY-ACQUIRED PNEUMONIA

L. Palacios Gamir¹, F. Sanz², A. Vargas Atehortua¹, D. Aguillon¹, R. Huerta Bravo¹, J. Blanquer Olivás¹, Capavant

¹Clinic Hospital of Valencia, ICU, Valencia, Spain, ²Dr. Peset Aleixandre University Hospital, Pneumology, Valencia, Spain

OBJECTIVES. To assess the accuracy of a new physiological score SIPP (shock index and hypoxemia) as a predictor of ICU admission and mortality in community-acquired pneumonia.

METHODS. We designed a qualitative SIPP score as the combination of shock index (heart rate/systolic blood pressure) >0.7 (1 point) plus PaO₂/F_iO₂ < 250 (1 point), scoring 0-2 points. We analyzed the accuracy of SIPP score comparing to PSI, CURB-65 and ATS/IDSA minor criteria to predict ICU admission and mortality. Qualitative data were compared with χ^2 test, and we performed ROC curves to compare severity scores and outcomes. **RESULTS.** We analyzed 1090 CAP patients of which 54 % (589 cases) showed PSI IV-V, 462 (42.4 %) were CURB-65 equal or more than 2, 149 (13.7 %) scored 3 or more ATS/IDSA minor criteria, and 16.9 % (184) rated 2 points in SIPP score. Complications were developed in 90 cases (8.3 %), and 75 patients (6.9 %) required ICU admission. Overall 30-day mortality was 5.4 % (59 patients). Mortality according to SIPP score was: 0 points (11.9 %), 1 point (40.7 %), and 2 points (47.5 %). Multivariate analysis of the factors associated with ICU admission were ATS/IDSA minor criteria (OR 4.04; 95 %CI 1.91-8.54), and SIPP score (OR 2.33; 95 %CI 1.29-4.20). The ability to predict ICU admission was higher for SIPP score comparing to PSI (AUC SIPP 0.735 vs PSI 0.618; $p < 0.01$) and CURB-65 (AUC SIPP 0.735 vs 0.573; $p < 0.01$) and similar to ATS/IDSA minor criteria (AUC SIPP 0.735 vs 0.720; 0.636). Factors associated with mortality in multivariate analysis were: PSI IV-V (OR 7.75; 95 %CI 2.23-29.96), ATS/IDSA minor criteria (OR 2.54; 95 %CI 1.38-4.70), and SIPP score (OR 2.40; 95 %CI 1.03-5.58). No differences were found regarding the ability to predict mortality between the 4 different scores (AUC: PSI 0.716; CURB-65 0.679, ATS/IDSA minor criteria 0.670, SIPP score 0.707; $p > 0.05$).

CONCLUSIONS.

1-The ability of SIPP score to predict ICU admission in CAP is similar as ATS/IDSA minor criteria and higher than PSI and CURB-65. 2-SIPP score is as accurate as ATS/IDSA minor criteria, PSI and CURB in predict mortality in CAP. 3- The simple SIPP score (Shock index and hypoxemia) could be a useful tool to predict ICU admission and mortality in community-acquired pneumonia.

0302

ACUTE RESPIRATORY DISTRESS SYNDROME IN ADMITTED PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

J. Moises¹, J.R. Badia¹, M. Ferrer¹, A. Gabarrus¹, E. Polverino¹, J. Sellares¹, R. Amaro¹, A. Torres¹

¹Hospital Clinic de Barcelona, RICU Servei de Pneumologia, Institut del Tòrax, Barcelona, Spain

INTRODUCTION. Community-acquired pneumonia (CAP) is a known and frequent risk factor for respiratory distress syndrome (ARDS).

OBJECTIVES. To assess the characteristics, outcomes and specific risk factors of patients with CAP that develop ARDS.

METHODS. We have prospectively collected in a large systematic database all hospital admissions for CAP from 1997 to 2012. In this population, those who met the Berlin 2012 ARDS definition criteria were identified. Risk factors, differences between patients with and without ARDS and outcomes were studied.

RESULTS. 4831 CAP patients requiring hospital admission during the study period were included. Among these, 139 met the current ARDS definition criteria (2.9 %). ARDS was severe in 12.2 % and moderate in 42.9 % of the cases.

CAP patients developing ARDS were younger (59 ± 17 vs. 65 ± 19 yrs; $p < 0.025$) than those without ARDS and 66 % of them were male. Significantly higher C-reactive protein serum levels were also found in this group (22 ± 12 vs. 18 ± 11 mg/dL; $p < 0.001$). Pneumonia severity index score (PSI) on admission was also higher (63 % in classes Fine IV-V) and 100 % met ATS criteria for severe CAP. The percentage of microbiological diagnosis was higher in patients with ARDS (59 vs 41 %, $p < 0.001$) but no differences were found regarding microbiological aetiology. *S. pneumoniae* was by large the most common isolation (43 %). Regarding ICU clinical outcomes 73 % of the patients required mechanical ventilation and 26 % non-invasive ventilation. Mortality at 30 days was significantly higher among patients with ARDS 40/139 (29 %) vs 243/4831 (5 %), $p < 0.001$. A multivariate analysis disclosed dyspnea at the time of admission (OR 2.44, CI 2.2-6, 1, $p = 0.009$) and a CRP ≥ 12 mg/dL (OR 2.59, 1.5-4.6, $p = 0.001$) as independent factors associated with the development of ARDS. The presence of ARDS was associated with a higher risk of mortality (OR: 5.9, CI :3.4-10, 2, $p < 0.001$).

CONCLUSIONS. Less than 3 % of patients with CAP met the current ARDS definition. This complication is more common in patients presenting with severe CAP, intense dyspnea on admission and CRP above a threshold of 12 mg/dL. Patients with community-acquired pneumonia and ARDS had a 6-fold increase in mortality over those not developing this complication.

0303

DIFFERENTIAL CHARACTERISTICS OF PATIENTS WITH MILD ACUTE RESPIRATORY DISTRESS SYNDROME DUE TO COMMUNITY-ACQUIRED PNEUMONIA ADMITTED TO ICU

A. Vargas Atehortua¹, F. Sanz², L. Palacios Gamir¹, R. Huerta Bravo¹

¹Hospital Clinico Universitario de Valencia, Valencia, Spain, ²Hospital Dr Peset, Valencia, Spain

AIMS. To determine the characteristics of patients with community-acquired pneumonia and mild acute respiratory distress syndrome (CAP-mild ARDS) who require ICU admission.

METHODS. Analysis of demographic characteristics, comorbidities, etiology and outcomes of patients with CAP-mild ARDS admitted to ICU comparing to those who did not. χ^2 , t student and logistic regression were used to compare both groups.

RESULTS. In a series of 1314 CAP patients, 164 (12.5 %) showed mild ARDS at admission, of whom 25 % (41 cases) were admitted to ICU. CAP-mild ARDS patients admitted to the ICU were younger [57.5 (16) vs. 68.7 (15.4) years, $p < 0.01$], and had a lower duration of symptoms [3.4 (1.9) vs. 6.5 (6) days, $p < 0.01$] than no ICU patients. Pneumonia severity was higher in ICU group (PSI V: 39 % vs. 17.1 %; $p = 0.004$). Multivariate analysis showed that age <65 years (OR 9.79, 95 %CI 3.13-30.68), septic shock (OR 7.76, 95 %CI 2.36-25.50), and pneumonia severity (PSI V) (OR 7.28, 95 %CI 2.16-24.56) were associated with ICU admission in CAP-mild ARDS patients; these patients showed a longer length of stay (LOS) [27 (28.6) vs. 10.6 (6) days, $p < 0.01$] and more complications compared to those that were treated in a general ward (100 % vs. 4.9 %, $p < 0.01$). There were no differences between the rate of etiologic diagnosis (58.8 % vs. 43.1 %, $p = 0.086$). Mortality was similar in both groups (17.1 % vs. 7.3 %, $p = 0.068$).

CONCLUSIONS.

1-In our series, 25 % of patients with CAP-mild ARDS required ICU admission.

2-Age < 65 years, the presence of septic shock, and pneumonia severity were factors that determine ICU admission of CAP-mild ARDS patients in our series.

3-Patients with CAP-mild ARDS and ICU admission showed more complications and longer LOS without differences in mortality.

0304

MORTALITY ANALYSIS IN ICU COMMUNITY ACQUIRED PNEUMONIA

E. Trujillo-García¹, G. Gómez-Gallego¹, C. Joya-Montosa¹, E. Curriel-Balsera¹, M.C. Martínez-González¹, H. Molina-Díaz¹, V. Olea-Jimenez¹

¹H. R. U. Carlos Haya, Málaga, Spain

OBJECTIVES. Analysing results regarding hospital and ICU mortality rate in ICU admitted patients with severe community acquired pneumonia (CAP).

METHODS. Observational, retrospective study of patients with community acquired pneumonia admitted in ICU from January 2008 to October 2013. Quantitative variables are expressed as mean and standard deviation, while qualitative variables are expressed as ratios and absolute value. The Mann-Whitney's test and Fischer's exact test were used when necessary; alpha error was set at 5 %.

RESULTS. A total number of 111 patients were analysed from January 2008 to October 2013 (63.1 % being males); average APACHE II was 19.8 ± 17.7 . ICU mortality rate was 29.7 % (33 cases) and hospital was 32.4 % (36 cases). CURB-65 and Pneumonia Severity Index were calculated upon admission, and both presented a good correlation with mortality rate.

Out of these, 10 % of our series presented criteria of health-care associated pneumonia (HCAP), but no differences between CAP and HCAP were observed in mortality rate ($p = 0.075$). Patients who had a chronic immunosuppressive treatment presented higher mortality rate relative to other patients (47.8 vs. 28.4 %, $p = 0.07$).

Non invasive mechanical ventilation (NIVM) failure showed worse mortality rate results (42.9 vs. 17.6 %, $p = 0.09$). High mortality rates were observed in patients who needed intubation and mechanical ventilation within the first 24 h (47.2 vs. 19 %, $p = 0.002$).

Regarding etiology, 11 out of these series were confirmed viral infection (Influenza A in 10 patients and CMV in 1), with a low mortality rate relative to bacterial infection (3.6 vs. 35.3 %, $p = 0.06$). Correct antibiotic prescription upon admission was correlated with a lower mortality rate ($p = 0.0001$).

CONCLUSIONS. ICU admitted patients with a severe community acquired pneumonia with immunosuppressive treatment have higher mortality rate. No differences were found regarding HCAP and CAP. Intubation delay, NIVM failure, bacterial infection and incorrect initial antibiotic treatment were factors leading to increased mortality rates.

0305

INCIDENCE, RISK FACTORS AND OUTCOME OF TRANSFUSION-RELATED ACUTE LUNG INJURY IN CRITICALLY ILL CHILDREN: A RETROSPECTIVE STUDY

H.D. Mulder¹, Q.J. Augustijn¹, J.B.M. van Woensel¹, A.P. Bos¹, N.P. Juffermans², R.M. Wosten-van Asperen¹

¹Academic Medical Centre, Pediatric Intensive Care, Amsterdam, Netherlands, ²Academic Medical Centre, Intensive Care, Amsterdam, Netherlands

INTRODUCTION. Acute lung injury (ALI) that develops 6 h after transfusion (TRALI) is the leading cause of transfusion-related morbidity and mortality. Incidence, patient and transfusion risk factors are well studied in the adult critically ill patient population. Clinical data on TRALI in the paediatric population are sparse and mainly limited to case reports and hemovigilance reporting systems.

OBJECTIVES. To determine the incidence, risk factors and outcome of transfusion-related acute lung injury in critically ill children.

METHODS. In a retrospective cohort study, all first-admitted PICU patients from January 1, 2009, until December 31, 2012 were screened for onset of transfusion-related acute lung injury (TRALI) using the consensus criteria.

RESULTS. Of 2294 admitted patients, 304 were transfused, of whom 21 (6.9 %) developed TRALI. Compared with transfused control subjects, risk factors for TRALI were mechanical ventilation (odds ratio, 18.94 [2.38-245.56]), sepsis (odds ratio, 7.20 [2.69-19.69]), and high Pediatric Risk of Mortality III score (odds ratio, 1.05 [1.01-1.10]). Patients with TRALI had a higher mortality compared to transfused control subjects (76.2 % vs. 11.3 %, $p < 0.0001$) and a longer duration of mechanical ventilation (183 [52-282] vs. 25 [0-139] hrs, $p = 0.008$).

CONCLUSIONS. TRALI is common in critically ill children. Mechanical ventilation was present in all TRALI cases in this cohort, thereby presenting as a strong risk factor. Also sepsis and disease severity increased the risk of TRALI. Results may aid in assessing the risks and benefits of transfusion in critically ill patients.

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0306**COPD: NEW TOOLS...NEW RULES? PILOT STUDY OF NEW BODE INDEX AND ITS IMPORTANCE ON COPD ADMISSION IN THE ICU**C.L. Sanz Sanz¹, R. Carreño Ponfili², V. Benitez Ferreiro¹, J.L. Flordelis Lasiera¹, J. Alvarez Rodríguez², J. Rebollo Ferreiro¹¹Hospital Universitario Severo Ochoa, Medicina Intensiva, Leganés, Spain, ²Hospital de Fuenlabrada, Medicina Intensiva, Fuenlabrada, Spain

INTRODUCTION. COPD is a very prevalent condition in the ICU. Its severity may result on different management and outcomes and its classification still sets a challenge for intensivists. First presented by Celli et al. in NEJM and most recently recommended by the Spanish Society of Pulmonology (SEPAR). BODE index classifies COPD severity based on objective drivers furthermore than only FEV1 parameter, such as dyspnea, exercise capacity, body mass index and airway obstruction. The novelty consists of a new group among the most severe group, TERMINAL COPD, those who wouldn't benefit from an ICU admission.

OBJECTIVES. To describe the use of BODE index on admission of COPD patients to the ICU and to analyse its impact on the outcomes of these patients.

METHODS. Retrospective multicenter pilot study. All patients admitted more than 72 h on the ICU of two secondary care hospitals between October 2013 and March 2014 were studied (172). BODE index was applied on all the COPD patients(37). In addition, 29 descriptive, prognostic and evolutive variables were studied. Statistics: descriptive (average \pm standard deviation) and analytic (t test or χ^2 /Fisher Test). $p < 0,05$ was considered significant.

RESULTS. BODE index classified COPD patients as MILD 8.1 %, MODERATE 18.9 %, SEVERE 40.5 % and VERY SEVERE 13.5 % (all with COPD TERMINAL stage positive criteria). While all mild/moderate survived ICU admission, 20 % of the severe and up to 40 % of the very severe-terminal died in the ICU ($p = 0.08$). The most relevant issue was the application of the tool, as 18.91 % of the COPD patients couldn't be classified lacking FEV1 and/or walking 6 min test. Not significant differences were shown among success of non invasive mechanical ventilation, mortality after ICU and after 6 months, length of stay or readmissions, most probably due to the size of the sample.

CONCLUSIONS. - COPD severe patients still set a challenge on ICU management. Bode Index seems a helpful tool on the identification of the COPD patients on ICU admission, specially on terminal stages. - BODE index shows a clear trend to a higher mortality on terminal COPD group, which wouldn't benefit from ICU admission. However, the lack of the spirometry on all COPD patients or the 6 min walk test are not always performed. - As BODE seems an easy applicable tool, further prospective studies should be performed to validate statistical significance of the shown trends and potentially identify new ones.

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0307**CRITICAL ASTHMA SYNDROME: IDENTIFY TO TREAT!**M. Seidi¹, C. Guimarães¹, F. Barros¹, V. Fonseca¹, M. Irimia¹, A. Ramos¹¹Hospital Jose de Almeida, Cascais, Portugal

INTRODUCTION. Critical asthma syndrome (CAS) needs emergency care, usually in intensive/intermediate care unit (ICU/ITCU)

OBJECTIVES. Characterization of patients admitted to the ICU/ITCU with the diagnosis of CAS between February 2010 and 2014

METHODS. Retrospective review of clinical files. The data collected included: demographics, comorbidities, severe asthma criteria, length of stay, provenance, severity and mortality scores, etiology, blood gas changes, cardiopulmonary arrest (CPA), endotracheal intubation (ETE), mechanical ventilation (MV), therapy, complications and outcome.

RESULTS. 18 patients (9 women) were admitted, with a mean age of 51.4 ± 15.6 years, 8 patients (44.4 %) with comorbidities and 9 (50 %) with severe asthma. One patient (5.6 %) was steroid dependent. The average length of stay was of 8.7 ± 8.8 days; 88.9 % of patients were admitted through the emergency department. Of the 11 patients admitted to the ICU the SAPS II score was 35.5 ± 20.9 , APACHE was 17.5 ± 9.2 and mortality was $30.2 \% \pm 34.8$. The causes of decompensation were: poor adherence to therapy in 4 patients (22.2 %), respiratory infection in 5 patients (27.8 %), allergic reaction to NSAIDs in 2 patients (11.1 %), and unknown cause in 7 patients (38.9 %). Blood gas at admission: pH 7.19 ± 0.17 , pCO₂ 78.6 ± 33.7 , pO₂ 91.7 ± 60.8 . At hospital discharge, there was a statistically significant increase in pH (7.42 ± 0.06 , $p = 0.001$) and a statistically significant decrease in pCO₂ (41.3 ± 6.2 , $p = 0.001$). CPR occurred in 4 patients (22.2 %), ETE in 12 patients (83.3 %) intubated in the 1st 24 h). The average length of MV was 5.9 ± 7.5 days. NIV was used in 4 patients (22.2 %). All patients underwent therapy with bronchodilators and corticosteroids. Propofol was the most commonly used sedative (11 patients); 2 patients were sedated with sevoflurane and ketamine. Three patients were curarized [longer length of stay ($p = 0.027$) and more days under MV ($p = 0.009$)]. Eight patients (44.4 %) had complications but we only had one death (5.6 %).

CONCLUSION. Half patients had severe asthma criteria, which supports the need for hospitalization in ICU/ITCU. Although most patients required MV, the outcome was favorable, with significant blood gas improvement and low mortality.

0308**MECHANICAL VENTILATION IN CRITICALLY ILL PREGNANT WOMEN**S.E. Lapinsky^{1,2}, K. Austin¹, S. Mehta^{1,2}¹Mount Sinai Hospital, Intensive Care Unit, Toronto, Canada, ²University of Toronto, Interdepartmental Division of Critical Care Medicine, Toronto, Canada

INTRODUCTION. Approximately 0.2 % of pregnancies are complicated by respiratory failure requiring mechanical ventilatory support. Although intubation and brief mechanical ventilation are not uncommon for operative delivery, very little data exist to direct the management of the critically ill pregnant patient requiring longer term ventilatory support.

OBJECTIVES. To describe mechanical ventilation in a cohort of critically ill pregnant women, and to identify the effect of delivery on respiratory function.

METHODS. We retrospectively reviewed charts of pregnant women who received mechanical ventilation in our ICU for greater than 24 h, between 2003 and 2013. Data collected included demographics, details of the pregnancy, ventilatory and blood gas measurements, and maternal and neonatal outcomes. Tidal volume and an estimate of

respiratory system compliance (Vt/plateau pressure) were calculated for days 1 and 2 of ventilation. In women who delivered while on mechanical ventilation, maternal respiratory parameters were evaluated pre-delivery and 2-5 h and 12-15 h post delivery. Data are presented as median (IQR).

RESULTS. Data were collected from 13 patients: median age was 32 (28-37) yr and gestation at ICU admission was 26.6 (23.6-30.6) weeks. Duration of ventilation was 3 (2-4) days. Sedation and analgesia used included midazolam (76 % of patients), propofol (31 %), fentanyl (54 %) and morphine (31 %). One patient received neuromuscular blockers and 4 patients (31 %) received vasopressors. Analysis of tidal volumes by predicted body weight showed a median of 7.1 (6.5-8.3) ml/kg and 7.6 (6.9-9.7) ml/kg on days 1 and 2 respectively. By actual body weight these volumes appeared smaller at 5.3 (5.1-5.5) ml/kg and 5.6 (4.5-7) ml/kg. Compliance estimates were 15.7 (14-22) ml/cmH₂O and 19.5 (15-21) ml/cmH₂O on days 1 and 2 respectively. Two women, ventilated with normal lungs (i.e. for neurological conditions), had a higher compliance at 36 ml/cmH₂O. The median lowest oxygen saturation on day 1-2 was 93 % (range 83-98 %) and highest PaCO₂ was median 36 mmHg (range 31-56). Four patients delivered during the period of mechanical ventilation: 1 spontaneous stillborn delivery at 26 weeks and 3 cesarean sections (2 for preeclampsia, one for cardiomyopathy). Maternal respiratory parameters pre and post-delivery for these 4 patients are shown in the table below:

	Pre-delivery	2-5 h post	12-15 h post
PaO ₂ /FiO ₂ ratio	269	239	290
Oxygenation Index	6.0	6.1	5.3
Compliance (ml/cmH ₂ O)	22.3	22.2	32.8
PEEP (cmH ₂ O)	13	11	8

[Effect of Delivery]

There was no maternal mortality in this cohort and one neonatal death.

CONCLUSIONS. This case series is unique in evaluating ventilatory measurements in a cohort of pregnant women. We demonstrate a good maternal and neonatal outcome, utilizing conventional ventilatory volumes, pressure limits and drug therapy. Delivery during mechanical ventilation had a modest effect on maternal respiratory mechanics and oxygenation.

0309**ANALYSIS OF THE MORTALITY IN UCI OF THE PATIENTS AFTER CARDIAC SURGERY WITH NEED OF MECHANICAL VENTILATION MORE THAN 24 HOURS**M. Fernández-Zamora¹, M. Martínez-González¹, J. Barrueco-Francioni¹, A. Herruzo-Avilés², A. Sánchez-Rodríguez³, R. Rivera-Fernández¹, G. Quesada¹, ARIAM ANDALUCIA¹H. R. U. Carlos Haya, Critical Care, Málaga, Spain, ²H. R. U. Virgen del Rocío, Critical Care, Sevilla, Spain, ³Hospital Universitario Puerta del Mar, Critical Care, Cádiz, Spain

INTRODUCTION. Undergone cardiac surgery patients are a UCI group with a not very high mortality. The reading of the literature and the experience of the authors of the present study indicates that in these patients, those to which it is necessary to administer prolonged mechanical ventilation constitute a not very numerous group of patients with a high mortality.

OBJECTIVES. To analyze the characteristics of patients who died in ICU after cardiac surgery requiring mechanical ventilation (IPPV) for more than 24 h.

METHODS. Study ARIAM record between 2008 and 2012, in three Hospitals. We studied demographic and clinical variables as severity, type of surgery, complications and mortality. We used t-Student, χ^2 and logistic Regression.

RESULTS. We studied 3588 patients, in C. Haya of Málaga (23.3 %), P. del Mar of Cádiz (33.3 %) and V. del Rocío of Sevilla (43.4 %). Age was 63.46 ± 12.8 years, EuroSCORE 5.56 ± 3.02 and the SAPS-3 42.08 ± 10.52 . Of 3588 patients, 415 (11.6 %) required more than 24 h IPPV. In these 415 the mortality in ICU was 44.3 % ($N = 184$, 5.1 % of 3588 patients) and of the 3173 without IPPV more than 24 h died 3.1 % ($N = 99$, 2.8 % of 3588 patients), ($p < 0.001$). Patients with IPPV superior to 24 h were more severe in EuroSCORE 7.64 ± 3.34 vs 5.29 ± 2.87 points ($p < 0.001$) and SAPS-3 $50.31 \pm 9.76 \pm 12.3$ vs 41 ($p < 0.001$), they have presented higher bleeding, reintervention (23.6 %), pneumonia (24.1 %), renal failure (72.8 %) and multiple organ failure (30.6 %). With logistic Regression was observed that to equal gravity, time of Bypass and type of surgery (elective not elective) the mortality in UCI of the patients with IPPV superior to 24 h is superior to those who do not need it, OR 15.19 (11.56-22.09). We repeat multivariable adding as independent variables complications in UCI and it showed that the IPPV superior to 24 h has relation e.s. with the mortality but the OR is low on having introduced these variables spending from 15.19 to 3.07 (1.9-4.94); indicating that the mechanism for which the patients die in UCI with long IPPV is for the new variable included (shock cardiogénico, renal failure, multiorgan failure, sepsis and cardiac arrest).

CONCLUSIONS. Two-thirds of patients who died in the ICU after cardiac surgery have required IPPV more than 24 h. In them the mortality is associated with multiorgan failure and sepsis. In this group of patients appropriate treatment can improve survival.

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0310**EVALUATING THE EFFECTIVENESS OF VAP TREATMENT BASED ON DYNAMIC ASSESSMENT OF THE SCALE AND CPIS C-REACTIVE PROTEIN IN PATIENTS WITH STROKE**A. Gritsan¹, N. Dovbysh², G. Gritsan³, A. Gazenkamp⁴, D. Kurnosov²¹Krasnoyarsk State Medical University, Krasnoyarsk Regional Hospital, Anaesthesiology and Intensive Care, Krasnoyarsk, Russian Federation, ²Krasnoyarsk Regional Hospital, Anaesthesiology and Intensive Care, Krasnoyarsk, Russian Federation, ³Krasnoyarsk State Medical University, Anaesthesiology and Intensive Care, Krasnoyarsk, Russian Federation

INTRODUCTION. Development of ventilator-associated pneumonia (VAP) causes an increase in stroke mortality. Question for treatment prognosis in these patients is not fully resolved.

OBJECTIVES. To determine the prognostic value of the dynamics on a scale CPIS, C-reactive protein (CRP) in patients with stroke in the development of late VAP.

METHODS. We examined 43 patients with stroke with mechanical ventilation (MV) who developed late VAP (5 days from the beginning of mechanical ventilation). Assessing the level of neurological deficit was assessed by the Glasgow Coma Scale (GCS). Patients were divided into 2 groups : group 1 - 35 (81.4 %) of the surviving patients and group 2 - 8 (18.6 %) patients who died. Diagnosis of VAP was conducted based on the criteria proposed by the intensive care unit, when translated into the MV, ATS-IDA. Rating on a scale CPIS and determination of CRP were performed in translation on mechanical ventilation (Stage 1), the development of VAP (Stage 2) on the third (3rd stage), seventh (Stage 4) and 10 days (5 days) from the time of the pneumonia development.

RESULTS. Based on GCS at the 2nd stage in group 1 was 10.0 ± 3.0 points, and in Step 2 - 8.2 ± 2.3 points; in group 2 - 9.4 ± 4.0 points and 8.0 ± 3.4 points respectively. With the development of VAP (Stage 2), as in the first, and in group 2, there was an increase in scores on the CPIS (compared with stage 1) 3.7 times and 4.2 times; CRP - 3.1 times and 2.7 times, respectively (Table 1).

Groups	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
CPIS, points, M \pm SD					
1 group	1.8 \pm 1.2	6.6 \pm 1.1	5.2 \pm 1.9	4.0 \pm 2.1	2.5 \pm 1.9
2 group	1.7 \pm 1.1	7.1 \pm 1.6	5.7 \pm 1.2	5.4 \pm 0.9	4.1 \pm 1.6
CRP, mg/l, M \pm SD					
1 group	59.4 \pm 38.3	180.8 \pm 96.9	166.3 \pm 69.9	104.2 \pm 56.2	82.8 \pm 35.2
2 group	53.6 \pm 32.3	142.9 \pm 77.6	181.9 \pm 50.2	113.0 \pm 18.8	108.3 \pm 26.3

[Table 1]

In the first group rating scale CPIS (compared with 2 stage) 5 phase of the study was reduced by an average of 62.1 %, and in the 2nd group - only 42.3 %; CRP as an average of 54.2 % and 24.2 % respectively.

CONCLUSIONS. Development of VAP in patients with stroke accompanied by a significant (more than 2-fold) increase in scores on the CPIS and CRP levels.

In patients with stroke rating scale CPIS on average more than 4 points and CRP levels more than 100 on the 10th day from the moment of VAP are markers of death.

Further research is needed in this area.

0311

INCIDENCE AND USE OF PREVENTION STRATEGIES FOR VENTILATOR ASSOCIATED PNEUMONIA IN A TERTIARY CARE INTENSIVE CARE UNIT IN INDIA

S. Dixit¹, K. Borawake¹, K. Khatib¹, R. Raikar¹

¹Manohar Joshi Memorial Hospital, Critical Care Medicine, Pune, India

INTRODUCTION. Ventilator associated pneumonia (VAP) is defined as pneumonia occurring more than 48 h after endotracheal intubation and initiation of mechanical ventilation, including pneumonia developing after extubation. Here we present a prospective observational study which highlights the incidence of VAP & importance of VAP preventing strategies.

OBJECTIVES. The aim of this study is to highlight practical recommendations designed to assist acute care hospitals in implementing and prioritizing their ventilator-associated pneumonia (VAP) prevention efforts & to highlight the importance of 0.5 micron hepafilters in prevention of VAP.

METHODS. This is prospective observational study from period of August 2012 to August 2013 at Manohar Joshi Memorial Hospital Intensive care unit, Pune. We included all the patients who required mechanical ventilation for more than 48 h. Patients who required mechanical ventilation for less than 48 h were excluded from the study. VAP was defined by clinical pulmonary infection score system (CPIS) greater or equal to six during the period of intubation. VAP rate is calculated based on the number of cases of VAP per 1000 ventilator days, which is the standard criterion for its evaluation presented by the Center for Disease Control and Prevention. (Total no. of VAP Cases/Ventilator Days) \times 1000 = VAP Rate.

RESULTS. Total no of patients - 22. Male: Female - 15:7. Age wise distribution - 20-94 years. Indication for Mechanical Ventilation- cardiac-6; respiratory (non-infectious) - 1; infection/sepsis - 10 (respiratory focus - 4; others - 6); others - 3. Invasive Ventilation (IV) vs Non invasive Ventilation (NIV) - 18: 2 (3 patients started on NIV and then converted to IV. 1 patient started on IV and then converted to NIV). Maximum ventilation duration in days - 24 days, Shortest ventilation duration in days - 2 days. Average ventilation duration - 5.15 days. Total ventilator days - 103. Suspected VAP case number-3. Confirmed VAP case- Nil.

CONCLUSIONS. The precise & planned implementations of evidence-based guidelines for prevention of VAP is very effective in reducing the incidence of ventilator associated pneumonia. The use of 0.5 micron hepafilters, recognized by Centre for disease control (CDC) also might had influence on zero incidence of VAP in our study.

This hypothesis requires further validation in a larger study.

REFERENCE(S). 1. American Thoracic Society, Infectious Diseases Society of America. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med 2005; 171:388-416. 2. Edwards JR, Peterson KD, Andrus ML, et al. National Healthcare Safety Network (NHSN) report, data summary for 2006, issued June 2007. Am J Infect Control 2007; 35:290-301. 3. Chastre J, Fagon JY. Ventilator-associated pneumonia. Am J Respir Crit Care Med 2002; 165:867-903.

0312

HIGH FREQUENCY OSCILLATORY VENTILATION IN SEVERE ACUTE RESPIRATORY DISTRESS SYNDROME: OUTCOME PREDICTORS FROM ANALYSIS OF TEN YEARS OF TREATMENT

P. Carmona Sanchez¹, R. Diaz Pernalet¹, M. Echeverria Leon¹, M.D. Bautista Rodriguez¹, I. Durban Garcia¹, J.M. Serrano Simon¹

¹Hospital Universitario Reina Sofia, Intensive Care Unit, Cordoba, Spain

INTRODUCTION. High Frequency Oscillatory Ventilation (HFOV) is a rescue ventilation strategy used in severe acute respiratory distress syndrome (ARDS). Majors

concerns both the safety and efficacy persist after randomized controlled trials OSCAR(1) and Oscillate(2).

OBJECTIVES. To evaluate the effectiveness and safety of HFOV in adults with ARDS, whose the conventional mechanical ventilation (CMV) fails; and analysing risk factors of mortality.

METHODS. Analysis of prospective data collection. Setting 34 bedded multidisciplinary ICU of Tertiary Care Hospital in Cordoba, Spain. Between 08/2003 and 12/2013 we include 109 patients (112 episodes) (75 males, 34 females) with ARDS when failed CMV, defined by one of the following criteria: $FiO_2 \geq 0.7$ with $PaO_2 \leq 60$ mmHg, Plateau pressure ≥ 33 cmH₂O or $Peep \geq 10$ cmH₂O. We evaluated patient demographics, admission diagnosis, presence of multi organ failure (MOF), gasometrical, hemodynamic and oscillator parameters during transition from CMV to HFOV, and 30 min, 4, 12, 24, 48 and 72 h after starting HFOV, and duration of CMV. Co-interventions and hospital mortality were also recorded. We analysed the risk factors of mortality.

Statistical Analysis: Categorical variables are expressed as frequencies or percentages, continuous variables as mean and SD or medians and interquartile (25-75th percentile) range. The percentages were compared using the Chi square test, the mean by t-test and the medians by the Wilcoxon's test. Binary Logistic Regression model was used to predict survival as successful response to HFOV, 95 % Confidence Interval for Odds ratio.

RESULTS. Preliminary results are shown on the table 1 and Figure 1.

	Survivors, N = 50(44,6 %)	Non Survivors, N = 62(55,4 %)	p	Odds Ratio
APACHE II score > 20	25 (22,5 %)	45 (40,2 %)	0,019	4,717
CMV duration > 48 h	26 (23,2 %)	41 (36,6 %)	0,941	1,047
Presence of Multiorganic Failure	26 (23,2 %)	60 (53,6 %)	<0,001	32,548
Pulmonary ARDS	25 (22,5 %)	51 (45,9 %)	<0,001	13,442
O.I (Oxygenation index)in CMV	37,31 (33,31 %)	31,28 (27,93 %)	0,050	0,964
Plateau Pressure in CMV(cmH2O)	47 (41,96 %)	58 (51,78 %)	0,002	1,222
HFOV duration > 72 h	29 (25,9 %)	37 (33 %)	0,169	2,098
PCO ₂ 24 h after HFOV (mmHg)	47,41 \pm 14,27	54,79 \pm 16,89	0,186	1,022
25 % reduction in O.I. 24 h after HFOV	33 (35,8 %)	19 (22,4 %)	0,003	0,219

[Table 1. Outcome variables used in the model.]

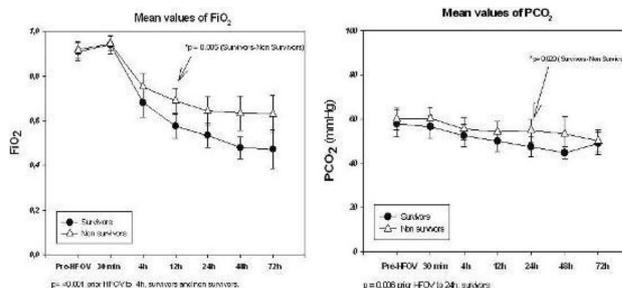


Fig. 1

CONCLUSIONS. Our results suggest that HFOV proves to be effective in reducing FiO_2 and CO_2 clearance after CMV failure in patients with ARDS. APACHE II score >20, presence of multiorgan failure, pulmonary ARDS, Oxygenation index (O.I.) HFOV prior starting could predict failure response to HFOV. Reduction of O.I. at least 25 % 24 h after initiation of HFOV could predict successful response to HFOV.

REFERENCES. 1) Duncan Young et al. NEJM 2013;368:806-813. 2) Niall D. Ferguson et al. NEJM 2013; 368(9):795-805.

0313

VARIATION IN NEUROMUSCULAR BLOCKER USE IN A RANDOMIZED CONTROLLED TRIAL OF HIGH-FREQUENCY OSCILLATION

S. Mehta^{1,2}, M. Meade³, J.O. Friedrich^{2,4}, Q. Zhou³, T.J. Iwashyna⁵, F. Lamontagne⁶, K. Bosma⁷, L. Burry^{1,2}, P. Park⁵, A. Arroliga⁸, J. Dionne⁹, G. Dominguez-Cherit¹⁰, D. Foster¹¹, R. Hall¹², S. Hanna³, A. Matte¹³, Y. Skrobik¹⁴, O. Smith¹, R. Taneja⁷, N.D. Ferguson^{1,2,13}, OSCILLATE Investigators and the Canadian Critical Care Trials Group

¹Mount Sinai Hospital, Toronto, Canada, ²University of Toronto, Toronto, Canada, ³McMaster University, Hamilton, Canada, ⁴St. Michael's Hospital, Toronto, Canada, ⁵University of Michigan, Ann Arbor, United States, ⁶Centre Hospitalier Universitaire de Sherbrooke, Sherbrooke, Canada, ⁷The University of Western Ontario, London, Canada, ⁸Texas A&M, College Station, United States, ⁹St. Joseph's Hospital, Toronto, Canada, ¹⁰Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Mexico, Mexico, ¹¹Vancouver General Hospital, Vancouver, Canada, ¹²Dalhousie University, Halifax, Canada, ¹³University Health Network, Toronto, Canada, ¹⁴Hôpital Maisonneuve-Rosemont, Montreal, Canada

INTRODUCTION. Early neuromuscular blocker (NMB) use is associated with lower mortality in patients with Acute Respiratory Distress Syndrome (ARDS). NMBs were used frequently in the OSCILLATE trial at physicians' discretion, more often in the high-frequency oscillation (HFO) group than the control group (1).

OBJECTIVES. We sought to compare demographics and outcomes of patients who received and did not receive NMB; and to evaluate patient and center variables associated with more rapid initiation of NMB (for oxygenation or ventilation, excluding procedural use) in OSCILLATE.

METHODS. Using descriptive statistics we compared demographic variables and outcomes of all patients who received versus did not receive NMB. To obtain hazard ratios (HR) for time to NMB use, we performed Cox regression analysis and used the shared frailty model

approach to account for the within-cluster correlation. The independent baseline variables included age, APACHE II score, randomization group, and sepsis. Site variables included number of ICU beds, and participation or not in the OSCILLATE pilot study. Daily time-dependent variables included mean airway pressure, PaO₂/FiO₂ ratio, and pH.

RESULTS. Of 548 patients enrolled in OSCILLATE, 414 (75 %) received NMB during the trial (228 in HFO group and 186 in control group). At enrollment, patients who received NMB had more severe ARDS, as indicated by higher APACHE II (29 vs 27, *p* = .006), plateau pressure (30 vs 27, *p* < .0001), mean airway pressure (20 vs 18, *p* < .0001), PEEP (13.5 vs 12.5, *p* = .003), and PaCO₂ (48 vs 44, *p* = .005); and lower PaO₂/FiO₂ (111 vs 124, *p* = .002) and pH (7.30 vs 7.33, *p* = .002). Over the first 7 study days, patients who received NMB received higher doses of benzodiazepines and opioids. Overall, they had worse outcomes, with more vasopressor use (92 vs 80 %, *p* = .0002), more barotrauma (17 vs 8 %, *p* = .005), longer durations of ventilation and hospital stay, and higher ICU mortality (40 vs 30 %, *p* = .03). On multivariable analysis NMB use was independently associated with randomization group and higher mean airway pressure, but inversely associated with number of ICU beds (Tables). Sites varied significantly in their time to NMB use after adjusting for clinical factors (*p* = 0.0003). Daily PaO₂/FiO₂ and pH were not statistically associated with NMB use, although the association was imprecisely measured in the extreme groups.

CONCLUSIONS. Patients receiving NMBs in the OSCILLATE trial were sicker and had worse outcomes. Assignment to the HFO group and higher mean airway pressure predicted NMB use, with substantial variations between sites in their use after controlling for clinical situation.

REFERENCE(S). 1. Ferguson ND, et al., for the OSCILLATE Trial Investigators. High-frequency oscillation in early acute respiratory distress syndrome. *N Engl J Med* 2013;368:795-805.

GRANT ACKNOWLEDGMENT. Canadian Institutes of Health Research

Baseline variables	Adjusted HR (95 % CI)	p-value
Age		
≤ 44 vs. ≥ 66	0.83 (0.56, 1.24)	0.37
45-56 vs. ≥ 66	0.68 (0.46, 1.01)	0.06
57-65 vs. ≥ 66	0.73 (0.51, 1.05)	0.09
Apache II		
≤ 24 vs. ≥ 34	0.88 (0.55, 1.39)	0.58
25-29 vs. ≥ 34	0.98 (0.65, 1.47)	0.92
30-33 vs. ≥ 34	0.96 (0.63, 1.46)	0.84
HFOV versus control	1.82 (1.36, 2.42)	<0.0001
Sepsis	0.84 (0.63, 1.11)	0.22

[Baseline Variables]

Site variables	Adjusted HR (95 % CI)	p-value
ICU beds		
≤ 20 vs. ≥ 31	0.71 (0.50, 1.02)	0.06
21-24 vs. ≥ 31	0.51 (0.35, 0.74)	0.0004
25-30 vs. ≥ 31	0.65 (0.43, 0.99)	0.04
Pilot participation	0.70 (0.46, 1.06)	0.09

[Site Variables]

Time Dependent Variables	Adjusted HR (95 % CI)	p-value
Mean airway pressure		
≤ 14 vs. ≥ 24	0.52 (0.32, 0.84)	0.01
15-19 vs. ≥ 24	0.53 (0.35, 0.81)	0.003
20-23 vs. ≥ 24	0.62 (0.42, 0.90)	0.01
PaO ₂ /FiO ₂		
≤ 118 vs. ≥ 205	1.30 (0.71, 2.36)	0.39
119-160 vs. ≥ 205	1.09 (0.60, 1.95)	0.78
161-204 vs. ≥ 205	1.13 (0.63, 2.04)	0.69
pH		
≤ 7.29 vs. ≥ 7.43	1.48 (0.86, 2.53)	0.15
7.30-7.36 vs. ≥ 7.43	1.18 (0.69, 2.01)	0.54
7.37-7.42 vs. ≥ 7.43	1.07 (0.63, 1.83)	0.81

[Time Dependent Variables]

0314
OUTCOME OF CRITICALLY ILL PATIENTS MANAGED WITH HIGH FREQUENCY OSCILLATORY VENTILATION

A. Sugiura^{1,2}, Z. Laksman³, S. Lapinsky^{1,4}, S. Mehta^{1,4}

¹University of Toronto, Interdepartmental Division of Critical Care, Toronto, Canada, ²The Hospital for Sick Children, Neurosciences and Mental Health, Toronto, Canada, ³University of Toronto, Toronto, Canada, ⁴Mount Sinai Hospital, Toronto, Canada

INTRODUCTION. In patients with Acute Respiratory Distress Syndrome (ARDS), High Frequency Oscillatory Ventilation (HFOV) is associated with improvements in oxygenation. However, the recent studies showed that HFOV was associated with increased in-hospital mortality in adults with moderate-to-severe ARDS compared to conventional mechanical ventilation (CMV).

AIM. To evaluate the outcomes of patients managed with HFOV, and to identify possible predictors of outcome.

METHODS. A retrospective chart review. 157 patients were identified from the Mount Sinai Hospital HFOV log, from March 2003 to December 2012. One chart was unavailable. For 156 patients, we recorded demographics and outcomes. In addition, 4 h before and after HFOV, and for 96 h after HFOV initiation, we collected vital signs, arterial blood gases, ventilator settings, and use of other life supports including renal replacement. We compared characteristics of patients who were successfully weaned from HFOV and those who died on HFOV, and compared patients who received continuous renal replacement therapy (CRRT) for more than 72 h during HFOV and those who did not require CRRT.

RESULTS. Patients underwent HFOV for a median of 68 h (IQR, 24-145). 74 % were successfully weaned from HFOV, overall ICU mortality rate was 64 %, and 1 month mortality was 65 %. At 1 month, 19 % of them were alive without respiratory support. Respiratory failure was due to sepsis in 52 % (65 % had pneumonia as the source), and their ICU mortality rate was 73 %. 13 % had pneumonia without sepsis syndrome, 9 % aspiration, and few had pulmonary hemorrhage, drug induced, and pancreatitis. Pneumonia without sepsis patients had lower ICU mortality of 56 % despite higher immunocompromised rate of 68 % compared to 38 % in overall patients. Aspiration patient had the highest 1 month survival without respiratory support (38 %). Compared with patients who were successfully weaned from HFOV, those who died on HFOV had lower PaO₂/FiO₂ (P/F) ratio at each time point throughout the observation period. 4 h pre HFOV 88 ± 44 vs. 66 ± 18, *p* = 0.005; HFOV at 3 h 105 ± 60 vs. 76 ± 33, *p* = 0.001; HFOV at 48 h 148 ± 47 vs. 93 ± 33, *p* < 0.001. In early phase of HFOV, patients who required CRRT had significantly lower pH (HFOV at 1 h 7.1 ± 0.1 vs. 7.3 ± 0.1, *p* < 0.001; at 12 h 7.2 ± 0.1 vs. 7.3 ± 0.1, *p* < 0.001), and frequency (HFOV at 1 h 4.2 ± 0.8 vs. 5.2 ± 1.1, *p* < 0.001; at 48 h 5.6 ± 1.5 vs. 7.0 ± 2.0, *p* < 0.01 Hz), however there were no differences between groups in P/F ratio and PaCO₂.

CONCLUSIONS. In our HFOV patient population, sepsis was the major cause of respiratory failure and these patients had the highest mortality. Patients with pneumonia without sepsis, and aspiration, had the highest survival rates. Patients who died on HFOV had lower P/F ratio compared to who successfully weaned from HFOV throughout the HFOV course. Patients on CRRT had lower pH and were ventilated at lower frequency but oxygenation and PaCO₂ were similar to those who did not require CRRT.

Trauma management: 0315–0328

0315
RISK FACTORS FOR TRAUMA-INDUCED ACUTE KIDNEY INJURY

M. Eriksson¹, O. Brattström¹, J. Mårtensson¹, E. Larsson¹, A. Oldner¹

¹Karolinska Institutet, Section of Anaesthesiology and Intensive Care Medicine, Department of Physiology and Pharmacology, Stockholm, Sweden

INTRODUCTION. Acute kidney injury (AKI) is common in critically ill patients and strongly associated with poor outcome in general [1]. The trauma patient sustaining numerous potentially harmful insults has a notable risk of AKI. Direct lesions to the kidneys, shock, ischemia-reperfusion, rhabdomyolysis, exposure to nephrotoxic substances, abdominal compartment syndrome and sepsis are all common findings in the severely injured and may contribute to AKI development.

OBJECTIVES. The aim of this study was to identify risk factors for AKI according to the Kidney Disease Improving Global Outcome criteria [2] in severely injured trauma patients admitted to the intensive care unit (ICU).

METHODS. The study was performed at a level-one trauma centre at the Karolinska University Hospital, Stockholm, Sweden in the format of a retrospective cohort study of severely injured trauma patients treated at the ICU for >24 h. Only patients without pre-injury kidney disease were included. The outcome measure was AKI diagnosed between day 2 and 7 of ICU-treatment. Uni- and multivariable logistic regression analyses were performed in order to identify factors associated with AKI-development.

RESULTS. A quarter of the patients (103/413) developed AKI within the first week of ICU-treatment. 59, 13 and 28 % were noted in stage 1, 2 and 3 respectively. AKI was associated with 30-day (17.5 % vs. 5.8 %) and 1-year (26.2 % vs. 7.1 %) mortality. Independent risk factors for development of AKI were male gender, age, non-diabetic co-morbidity, diabetes mellitus, injury severity score >40, massive transfusion and volume-loading with hydroxyethyl starch (HES) within the first 24 h, where injury severity, diabetes and male gender were the most influential. Unexpectedly, sepsis prior to AKI onset, admission hypotension and extensive contrast loading (>150 mL) were not significantly associated with AKI-development in the multivariable model. None of the surviving AKI-patients had developed end-stage renal disease one year post-injury.

CONCLUSIONS. AKI in ICU-treated trauma patients is a common complication with substantial mortality. Age, gender, severe injury and HES administration were associated with AKI-development whereas sepsis and shock on arrival were not. Awareness of risk factors for AKI-development may guide the clinician when managing the severely injured patient.

REFERENCE(S). 1. Ostermann, M. et al., Acute kidney injury in the intensive care unit according to RIFLE. *Crit Care Med*, 2007. 35(8): p. 1837-43; quiz 1852. 2. The Kidney Disease Improving Global Outcomes (KDIGO) Working Group. Definition and classification of acute kidney injury. *Kidney Int* 2012, 2012. suppl 2: p. 19-36.

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0316
THE THROMBOELASTOGRAPHY IN ACUTE TRAUMATIC COAGULOPATHY

A. Spasiano¹, C. Barbarino¹, C. Artico¹, F. Stefani¹, C. Benedetti¹, D. Rufolo¹, T. Dogareschi¹, E. Carchietti², G. Della Rocca¹

¹Udine University, AOUD, Anesthesia and Intensive Care, Udine, Italy, ²118 Hems, Udine University Hospital, Udine, Italy

INTRODUCTION. Major brain injury and uncontrolled blood loss remain the primary causes of early trauma-related mortality. 25 % to 33 % of trauma patients exhibit trauma-induced coagulopathy (TIC), associated with increased rates of massive transfusion (MT), multiple organ failure (MOF) and a four-fold increasing in mortality. TIC was conventionally considered as depletion, dysfunction and/or dilution of clotting factors^(1,2). Recently, the pathophysiological mechanisms recognized an imbalance of the dynamic equilibrium between procoagulant factors, anticoagulant factors, platelets, endothelium function and fibrinolysis^(3,4).

OBJECTIVES. The aim of study is to evaluate the thromboelastographic profile and the incidence of fibrinolysis (defined as Ly 30 > 15 %) in the pre-hospital trauma patients.

METHODS. This is a prospective observational cohort study of severe trauma patients, older than 18 years old, HEMS assisted and admitted to Level I Trauma Centre. Standard of care included the possibility to give tranexamic acid according to current guidelines. A blood sample in citrate (for TEG: thromboelastography) was collected for each patient at the scene of trauma (T₀) and at hospital arrival (T₁).

RESULTS. 39 patients were enrolled. The main results are reported in table 1, table 2 and in figure 1.

N° Male sex (%)	28 (72)
Age median±DS (range)	50±19.7 (18-87) years
Median NISS	67 (IQR 27-41)
Mean time from trauma to T ₀ (range)	24±7 (13-52) min
Mean time from T ₀ to T ₁ (range)	60±15 (32-100) min
N° patients with AP <90 mmHg	6 (15%)

Table 1 Clinical characteristics

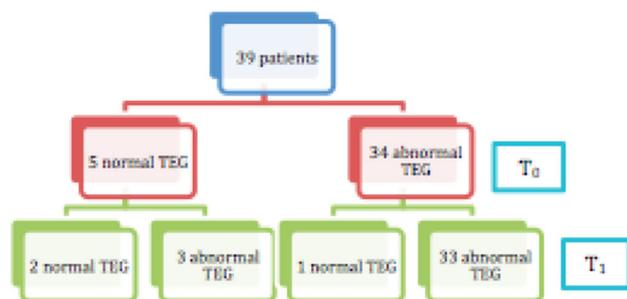


Fig. 1 TEG characteristics at T0 and T1

TEG T ₀ abnormalities	
R < 8 min	32
MA < 44 mm	6
MA > 64 mm	7
Ly 30 > 15%	2
TEG T ₁ abnormalities	
R < 8 min	34
MA < 44 mm	1
MA > 64 mm	10
Ly 30 > 15%	2

Table 2 TEG abnormalities

In 12 cases (31 %) was given 1 g tranexamic acid in T₀-T₁ interval. Patients treated with tranexamic acid had mean G value (index of clot strength) higher than not treated even if not statistically significant ($p = 0.3$).

Only two patients (5 %) presented fibrinolysis. Fibrinolysis percentage was reduced between T₀ and T₁ but no one received tranexamic acid.

CONCLUSIONS. As Ostrowski⁽⁵⁾ et al., using thromboelastography in our trauma patients, coagulation is modified in a procoagulant pattern and fibrinolysis appears to be a very rare event in pre-hospital setting.

REFERENCES. 1. Schöchl H. et al. *SJTREM* 2012; 20:15. 2. Theusinger O. et al. *Anesth Analg* 2011; 113:1003-12. 3. Faraoni D. et al. *Curr Opin Anesthesiol* 2013; 26. 4. Cohen M. *J Trauma* 2011; 70:5. 5. Ostrowski SR et al. *SJTREM* 2011;19:64.

0317 ANTICOAGULATION AND ANTIPLATELET AGENTS DO NOT WORSEN TRAUMATIC BRAIN INJURY OUTCOMES AFTER LOW LEVEL FALLS IN THE ELDERLY

C. Kavanagh¹, J. Bander¹, W.L. Wahl¹

¹Saint Joseph Mercy Ann Arbor, Surgery Critical Care, Ann Arbor, United States

INTRODUCTION. Falls are increasingly common as patients age. Anticoagulant (AC) and antiplatelet (AP) medication use is prevalent in older populations.

OBJECTIVES. We hypothesized that older patients with low level falls while taking AC or AP drugs have higher mortality and worse outcomes than patients not on these medications.

METHODS. We studied all patients ≥60 years with low-level falls admitted to our trauma center during 2012-2013. Use of AC or AP medications, labs, outcomes, type of fall, and injuries were extracted from the electronic record and trauma registry. Fischer exact and Student t-tests were applied, where significance was $p \leq 0.05$.

RESULTS. There were 900 patients admitted after low level falls of which 54 % were on AC or AP medications. Patients on AC or AP drugs were older (83 ± 9 compared to 80 ± 10 years, $p < 0.001$). 94 patients had a positive head CT for bleeding or contusion. For the head-injured patients, AC/AP mortality was the same as for those not taking these medications ($p = 0.45$). The mean brain injury score (AIS) was higher for those who died compared to survivors, 4.5 versus 3.3, $p < 0.001$. For those with head injuries, there were no differences in mortality whether on AC, AP or no medication (see table). The severity of head injury was significantly worse for AC compared to AP patients, and the mean INR was also higher for AC patients. There were no differences in age, Injury Severity Score (ISS), hospital length of stay or costs among the groups. Our hospital severity of illness measure (PRISM score), which scores premorbid medical conditions, was worse for patients who

died whether in the AC/AP or no medication group ($p < 0.0001$), but no different across the AC, AP, or no medication brain injured groups.

Group (N)	Age years	INR	PRISM score	ISS	Brain AIS	Hospital LOS days	Mortality N (%)	Cost USD
AC			(16)	83	3.8*	2.6	16	3.8*
3.4	2		(13)		12,800			
AP			(45)	83	1.0	2.6	16	3.3
4.0	5		(11)		10,900			
No			med (33)	80	1.1	2.6	16	3.5
4.1	4		(12)		11,500			
P					value	NS	<0.001	NS
NS					* $p < 0.05$	NS	NS	NS

[Patients with positive head CT]

CONCLUSIONS. Despite our clinical bias that elderly patients who take AC/AP agents are more likely to sustain more severe traumatic brain injuries after low level falls, AC/AP brain-injured patients had the same mortality as their non-AC/AP peers. Mortality was associated with severity of underlying medical comorbidities at the time of admission.

0318 CHEST WALL TRAUMA IN A UK MAJOR TRAUMA CENTRE

P.J. Gillen¹, K. Sharpe¹

¹Derriford Hospital, ICU, Plymouth, United Kingdom

INTRODUCTION. Chest wall trauma is a common feature of life-threatening injury within the patient population of a Major Trauma Centres (MTC). There is some evidence that the appropriate early intervention, particularly the use of NIV, optimal analgesia and clinical input of these trauma victims has important mortality and morbidity improvements [1].

By its nature, severe clinical sequelae of chest wall trauma often develop later with contusions etc. 'blossoming' many days post injury. This injury pattern may be associated with mechanical or atelectatic lung injury, which requires careful assessment and regular review. **OBJECTIVES.** We aimed to assess whether the designation of our institution as a MTC had an impact of the number and severity of patients with chest wall trauma. A secondary objective was to determine the quality and efficacy of care these patients received and whether a better clinical pathway was required.

METHODS. Retrospective analysis of chest wall trauma (both isolated and poly-trauma) from local TARN and ICNARC datasets for 12 months both immediately prior to, and immediately after, the establishment of our hospital as a MTC (April 2012.) We also reviewed internal audit data examining the levels of care to which patients were admitted, the timeliness and use of invasive therapies and interventions.

RESULTS.

2011-12	Ward	ICU	Total
No of pts isolated chest	50	20	70
No of pts (poly-trauma)	18	32	50
2012-13			
No of pts isolated chest	55	25	80
No of pts (poly-trauma)	22	64	86

[Chest wall trauma by admissions]

2011-12	Ward	ICU	Total
Median ISS (isolated chest)	13	14	13
Median ISS (poly-trauma)	33	36	33
2012-13			
Median ISS (isolated chest)	13	16	14
Median ISS (poly-trauma)	25	33	28

[Chest wall trauma by ISS]

The data reveal that chest wall trauma, either isolated or as an element of poly-trauma, is a common presentation. Whilst the majority of patients are admitted for ward based care, the numbers of patients with chest wall trauma have increased, with a significant increase in the proportion of those patients admitted to ICU.

On review of our internal audits, we found there to be no coherent pathway for the management of their care. This has highlighted the requirement for a chest trauma care pathway within our institution.

We believe that significant chest wall trauma mandates appropriate analgesia (including the consideration of neuraxial blockade,) physiotherapy and clinical support which are often best achieved within a critical care environment [2].

CONCLUSIONS. Chest wall trauma is important as it is a significant amount of the trauma workload within our institution, which has increased in patient numbers since our establishment as a MTC. Our management of these patients is changing with the development of a care pathway to triage and treat those patients who are more severely injured. The aim is to provide timely interventions, including analgesia and physiotherapy, to achieve the greatest benefit. This will have a significant impact on our ICU practice.

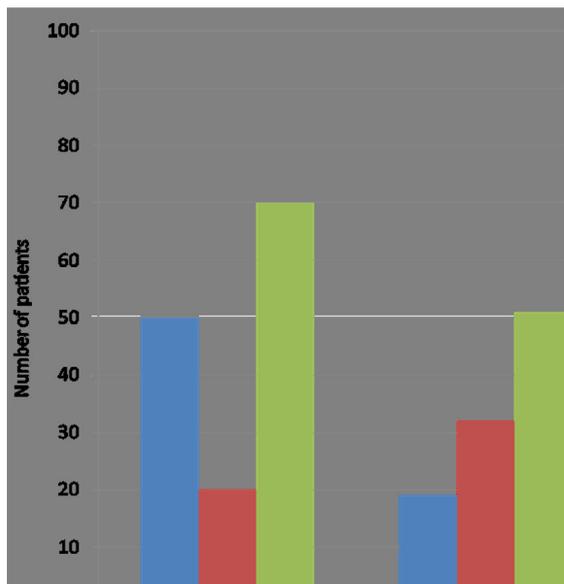


Fig. 1 Chest Wall Trauma admissions

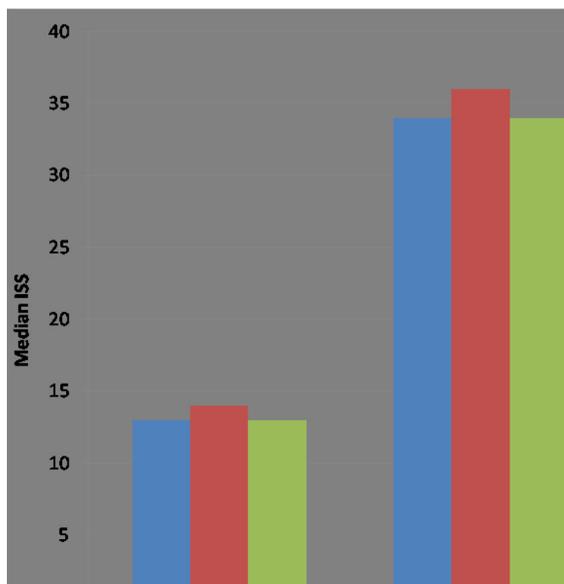


Fig. 2 Chest Wall Trauma by ISS

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0319 RESOURCES UTILIZATION AND OUTCOMES OF SEVERE TRAUMA IN SPANISH ICUS. RETRAUCI PROJECT. PILOT PHASE

M. Chico Fernández¹, J.J. Egea Guerrero², J.F. Fernández Ortega³, M.D. Mayor García⁴, J.A. Llompard Pou⁵, A. Bueno González⁶, M. Sánchez Casado⁷, J. Roldán Ramírez⁸, F. Guerrero López⁹, F. Alberdi Odriozola¹⁰, L. Servià Goixart¹¹, J. González Robledo¹², Grupo de Trabajo de Trauma y Neurocríticos de la SEMICYUC

¹Hospital Universitario '12 de Octubre', Madrid, Spain, ²Hospital Virgen del Rocío, Sevilla, Spain, ³HRU Carlos Haya, Málaga, Spain, ⁴Hospital Torrecárdenas, Almería, Spain, ⁵Hospital Universitario Son Espases, Palma de Mallorca, Spain, ⁶Hospital General Universitario de Ciudad Real, Ciudad Real, Spain, ⁷Hospital Virgen de la Salud, Toledo, Spain, ⁸Complejo Hospitalario de Navarra, Pamplona, Spain, ⁹Hospital Virgen de las Nieves, Granada, Spain, ¹⁰Hospital Universitario de Donostia, San Sebastián, Spain, ¹¹Hospital Universitario Arnau de Vilanova, Lleida, Spain, ¹²CHU Salamanca, Salamanca, Spain

INTRODUCTION. Trauma registries constitute a useful tool to evaluate the quality of attention received by trauma patients.

OBJECTIVES. To describe resources utilization and outcomes of trauma patients admitted to different types of intensive care units (ICUs) in Spain.

METHODS. National multicenter prospective trauma registry conducted in 11 ICUs. Data were collected during 15 months. Ethics committee in each hospital gave approval. Data

presented correspond to the pilot phase prior to the development of a web-based tool to register data. We report resources utilization and outcomes of trauma in Spanish ICUs. Statistics analysis was performed as appropriate.

RESULTS. We included 1378 patients (78.8 % male). Mean age was 47.8 ± 19.5 years. Mean ISS was 22.4 ± 12.4 . At ICU admission, 63.6 % were hemodynamically stable, 15.9 % were stable with volemia, and 20.5 % needed different amounts of vasoactive agents. Overall, 524 patients (38.2 %) required urgent surgery (<24 h), being a neurosurgical procedure the most common (16.7 % of the patients). During hospital admission, 203 patients required additional surgical procedures (range 1-10). Up to 34 % of the patients received blood transfusion in the initial 6 h (mean 1483 ± 2123 ml). Fifty-eight patients (4.8 %) underwent angiography for bleeding control. Overall, 810 (59.1 %) of trauma patients received mechanical ventilation, a mean of 8.1 ± 9.7 days. Later, 158 patients underwent percutaneous tracheostomy and 57 patients surgical tracheostomy. In 258 patients (20.4 %) intracranial pressure was monitored. Brain tissue O₂ catheter was placed in 51 patients (4 %). Complications presented included: trauma induced coagulopathy: 305 patients (22.2 %), rhabdomyolysis 140 patients (10.4 %), intracranial hypertension in 179 patients (13.0 %), ALI/ARDS 288 patients (23.0 %), renal dysfunction in different degrees 179 patients (14.3 %), nosocomial infections 263 patients (20.2 %) and multiorgan failure (MOF) in 171 patients (12.8 %), predominantly early MOF. ICU length of stay was 8.7 ± 11.4 days and ICU mortality was 13.7 % (184 patients). The cause of death was refractory intracranial hypertension in 48.7 %, exsanguination in 14.8 %, MOF in 13.2 % and others in 23.3 %, considering different types of limitation of life support in 108 patients (18.2 %).

CONCLUSIONS. This pilot phase allowed us to adequately study resources utilization and outcomes of trauma ICU patients.

REFERENCE(S). Chico Fernández M, García Fuentes C, Guerrero López F. Trauma registries: a health priority, a strategic project for the SEMICYUC. *Med Intensiva*. 2013; 37:284-9.

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0320 INTENTIONAL INJURY DEATHS ARE INCREASING WHEREAS UNINTENTIONAL ARE DECREASING IN SWEDISH CHILDREN

D.K. Bäckström¹

¹Linköping University, IKE, Norrköping, Sweden

INTRODUCTION. In high-income countries child injury deaths have been reduced during the last three decades, nevertheless they still remain a major health problem (Peden 2008). Sweden has one of the world's lowest child injury death rates but injury is still the leading cause of death among children (Hasselberg 2006). Scandinavia has an injury pattern where blunt injuries and male gender dominate injury mortality (Soreide, Kruger et al. 2007, Soreide, Kruger et al. 2009). Injury death has been declining the last couple of decades but the decline seems to have levelled of the last couple of years (Hasselberg 2006).

OBJECTIVES. The objective of this study was to analyse child injury mortality development over several years and to evaluate if there was a difference between unintentional and intentional injuries.

METHODS. This is a study including all injury deaths in individuals under the age of eighteen during 1999-2012. The study includes all injury deaths in Sweden during these years. All Swedish citizens are after death included in the Swedish registry of cause of death. Included individuals were identified in the Swedish registry of cause of death.

RESULTS. During the study period, 1213 children under the age of 18 died because of injury in Sweden. Injury death among children was 62.8 deaths per 100 000 children. The incidence has declined during this period, $r = -0.606$, $p = 0.02$.

Unintentional injury death was most common $p < 0.0001$ and had an incidence of 42.5 deaths per 100 000 children. There was a decrease in unintentional injuries during the study period, $r = -0.757$, $p = 0.03$. The most common cause of death among them was brain injury (41 %), followed by drowning (13 %), while asphyxia was one of the least common causes of death (5 %).

Intentional injury death has increased between 1999 and 2012, $r = 0.585$, $p = 0.03$ and had an overall incidence of 20.2 deaths per 100 000 children. The most common cause of death among them was asphyxia (45 %), followed by brain injury (19 %), while drowning was one of the least common causes of death (3 %).

CONCLUSIONS. We did find that although child injury mortality is low in Sweden it is still declining. A new and interesting finding in this study is that unintentional injury death is declining among Swedish children sadly this is not the case among the intentional injuries that are rising.

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0321 APPROPRIATE USE OF LARGE ENDOTRACHEAL TUBES IN PATIENTS WITH MAJOR BURNS: A TERTIARY REFERRAL CENTRE'S EXPERIENCE

C.E. Isitt¹, J.M. Handy¹

¹Chelsea and Westminster NHS Foundation Trust, Intensive Care, London, United Kingdom

INTRODUCTION. Inhalational injury is the primary cause of death amongst burns patients [1]. The gold standard is accurate diagnosis and lavage via fiberoptic bronchoscopy [2]. To bronchoscope and ventilate patients simultaneously, a minimum size 8.0 mm internal diameter endotracheal tube (ETT) is required.

We are a tertiary referral centre with a Burns Intensive Care Unit (BICU) admitting patients with major burns from other centres, usually within a few hours of injury. Patients are often intubated prior to arrival at our unit. Recently we have noticed a trend towards the use of small ETTs (<8.0 mm internal diameter).

OBJECTIVES. To audit the number of patients in whom small ETTs were used and to look at how many of these patients required re-intubation with larger ETTs.

METHODS. A retrospective notes audit of all patients admitted to BICU at Chelsea and Westminster Hospital between January 2012 and March 2014. Forty patients were admitted with burns. These were divided according to whether they were intubated or not. Those who were intubated were further divided according to the size of ETT: small (≤ 7.5 mm) or large (≥ 8.0 mm). Data collected included date and time of injury, %TBSA, time to transfer, requirement and timing of re-intubation and bronchoscopy findings.

RESULTS. Twenty-eight patients from 11 different referring centres were intubated prior to arrival. Twelve were intubated pre-hospital by the air ambulance service. Ten patients were intubated with a small ETT (35.7 %). Five in the pre-hospital setting, three by London Trauma centres, one by an out-of-London Teaching Hospital and one was an out-of-London District Hospital. 7 patients intubated with a small ETT required ETT change. Three did not have ETT change as they died on or shortly after admission. Three ETTs were changed on admission, one the day after, one at 5 days and two at 6 days. In all but one of these patients, considerable swelling was noted at the time of change.

CONCLUSIONS. There was very little difference in patient characteristics in the small and large ETT groups aside from sex. Women were more likely to be intubated with a small ETT than a large ETT.

35.7 % of our intubated patients were intubated with small ETTs unsuitable for bronchoscopy. All but one patient intubated with a small ETT undergoing bronchoscopy had evidence of inhalational injury. Overall 80 % of intubated patients who underwent bronchoscopy had evidence of inhalational injury. Seven patients intubated with small ETTs required tube change after arrival at our BICU on average 5 h and 50 min after initial A&E admission by which time gross oedema is usually present. Three of the patients requiring change had to wait 5-6 days after admission for the oedema to subside which delayed therapeutic bronchoscopy.

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0322

MORTALITY RATE AND PREDICTORS OF MORTALITY OF TRAUMA PATIENTS ADMITTED IN THE INTENSIVE CARE UNIT DURING TWO PERIODS (1996-1997 VERSUS 2010-2011)

F. Fligou¹, M. Papadimitriou-Oliveris², E. Panteli¹, M. Boulovan¹, A. Zotou¹, M. Marangos², K.S. Filos¹

¹School of Medicine, University of Patras, Anaesthesiology and Critical Care Medicine, Patras, Greece, ²School of Medicine, University of Patras, Division of Infectious Diseases, Patras, Greece

INTRODUCTION. Trauma is a leading cause of death worldwide, while severe traumatic injuries are life threatening and require admission in the Intensive Care Unit (ICU).

OBJECTIVES. The aim of this study was to estimate the mortality rate of severely injured trauma patients requiring ICU admission during two distinct periods of time (Period A: May 1996-April 1997, Period B: January 2010-December 2011), before and after the establishment of the training program in prehospital trauma life support for doctors and paramedics. Furthermore, we tried to identify the predictors of mortality for these groups of patients.

METHODS. This retrospective study was conducted in the general ICU of the University Hospital of Patras, Greece. Epidemiologic data were collected from the ICU computerized database and patients' chart reviews.

RESULTS. 202 trauma patients were included in the present study (107 in Period A and 95 in Period B). Mortality rate was 46 % and 13 % for Periods A and B, respectively ($P < 0.001$). During Period B, less victims of traffic accidents were admitted in the ICU, whereas more trauma patients received the appropriate pre-hospital treatment as compared to patients of Period A. Period B patients exhibited a higher incidence of cervical spine trauma and multiple pulmonary contusions, required longer ICU stay, but eventually had better outcome in terms of survival.

The multivariate analysis of trauma patients admitted in the ICU during Period A concluded that SAPS II score and Injury Severity Score (ISS) upon admission, number of insufficient organs, GCS < 9 upon admission, brain trauma and administration of dopamine were all significantly associated with mortality. The multivariate analysis of Period B trauma patients revealed that the SAPS II score upon admission, brain edema, administration of dopamine and development of septic shock were all independently associated with mortality. Receiver operating characteristic curve analysis revealed that SAPS II had the best accuracy in predicting overall mortality (both Periods) as compared to APACHE II, SOFA and ISS.

CONCLUSIONS. The reduction in mortality of ICU trauma patients shown in this study could be due to the improvement of the prehospital care of these patients as a result of the training program in prehospital trauma life support, minimizing the 'secondary injury' to the already traumatized organs. In an attempt to determine the predictors of mortality in this patient population, SAPS II had the best accuracy compared to the other scoring systems tested.

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0323

THE CONTROL OF HYPOTHERMIA, IN PRE-HOSPITAL SEVERELY INJURED TRAUMA PATIENTS: COULD IT REDUCE THE GENESIS OF THE LETHAL TRIAD?

M. Croci¹, M. Bianchi¹, D. Mornati¹, C. Gamberoni¹, S. Greco¹

¹Hospital of Busto Arsizio, Department of Anesthesiology and Intensive Care, Busto Arsizio, Italy

INTRODUCTION. Hypothermia with acidosis and coagulopathy has been recognized as the lethal triad¹. During the first aid outside hospital is difficult to recognize and treat coagulopathy and acidosis while is easy with hypothermia.

OBJECTIVES. We studied whether the prevention of hypothermia is also able to reduce the acidosis and coagulopathy, in pre-hospital severely injured trauma patients, using a simple system to reduce hypothermia during a pre-hospital management of trauma patient.

METHODS. We enrolled 180 patients from 11/2006 to 02/2011, during winter season (outside temperature of less 10° degrees C) with severe trauma. To define the severity of the trauma has been used the ISS and has been measured the tympanic temperature, average of 4 measurements, 2 for each ear, at the start and arrival in hospital. The blood pH, prothrombin time (PT) and activated partial thromboplastin time (aPTT) were measured in hospital. The P values for categorical variables were derived from the Chi square or t test (Student). All patients received infusion of IV liquid preheated to a temperature of 36 degree C, according to their clinical needs. We excluded from the study patients under 18 years of age, patients with severe head injury, GCS < 9 , and cardiac arrest. 16 patients were excluded from the study because it was not possible to correctly measure the temperature according to the protocol approved. 164 patients were studied, in 84 of them (group A) has been used a self-heating system (Ready-Heat II, Techtrade Llc, New York, USA) in order to prevent

hypothermia, in the remaining 80 (B) only an emergency blanket (Boscarol, Bolzen, Italy) with a metallic reflecting agent.

RESULTS. We did not find statistical differences for sex (31 female in A, 26 in B), age (mean age 50 \pm 14 in A, 47 \pm 12 B), ISS (35.9 \pm 9.1 vs 36 \pm 8.2) and MAP (92 \pm 23 vs 86 \pm 15) between patients enrolled in the two groups, the mean temperature was 33.82 \pm 0.63 in group A and 33.79 \pm 0.74 in B at the start. The average air temperature during the rescue procedures was 1.33 \pm 4.40 degrees C in group A and 1.14 \pm 4.79 in B ($p = 0.24$). The mean time between the beginning of the emergency procedures and the arrival in hospital was 42 \pm 12 min in group A and 38 \pm 10 in the B. Upon arrival at the hospital, the mean temperature was 35.42 \pm 0.58 in group A and 33.99 \pm 0.67 in B ($p < 0.01$), the pH of blood was of 7.33 \pm 0.08 in A and 7.16 \pm 0.07 in B ($p < 0.01$). The measurement of PT and aPTT showed no significant differences between the two groups ($p = 0.86$).

CONCLUSIONS. The self-heating system has proven a valuable method for reducing the deterioration of hypothermia in trauma patients exposed to weather conditions favoring hypothermia. From our data, the control of hypothermia may also improve the pH of the blood and it could reduce the genesis of the lethal triad.

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0324

EPIDEMIOLOGY OF SEVERE TRAUMA IN SPANISH ICUS. RETRAUCI PROJECT. PILOT PHASE

J.A. Llompart Pou¹, L. Servià Goixart², J. González Robledo³, J.J. Egea Guerrero⁴, M. Chico Fernández⁵, F. Alberdi Odriozola⁶, F. Guerrero López⁷, M.D. Mayor García⁸, M. Sánchez Casado⁹, J.F. Fernández Ortega¹⁰, A. Bueno González¹¹, J. Roldán Ramírez¹², Grupo de Trabajo de Trauma y Neurocríticos de la SEMICYUC

¹Hospital Universitario Son Espases, Palma de Mallorca, Spain, ²Hospital Universitario Arnau de Vilanova, Lleida, Spain, ³CHU Salamanca, Salamanca, Spain, ⁴Hospital Virgen del Rocío, Sevilla, Spain, ⁵Hospital Universitario '12 de Octubre', Madrid, Spain, ⁶Hospital Universitario de Donostia, San Sebastián, Spain, ⁷Hospital Virgen de las Nieves, Granada, Spain, ⁸Hospital Torrecárdenas, Almería, Spain, ⁹Hospital Virgen de la Salud, Toledo, Spain, ¹⁰HRU Carlos Haya, Málaga, Spain, ¹¹Hospital General Universitario de Ciudad Real, Ciudad Real, Spain, ¹²Complejo Hospitalario de Navarra, Pamplona, Spain

INTRODUCTION. Trauma registries constitute a useful tool to evaluate the quality of attention received by trauma patients.

OBJECTIVES. To describe the epidemiological characteristics of trauma patients admitted to different types of intensive care units (ICUs) in Spain.

METHODS. National multicenter prospective trauma registry conducted in 11 ICUs. Data were collected during 15 months. Ethics committee in each hospital gave approval. Data presented correspond to the pilot phase prior to the development of a web-based tool to register data. We report epidemiological variables, types and severity of injuries evaluated by different scales. Statistics analysis was performed as appropriate.

RESULTS. We included 1372 patients (78.8 % male). Mean age was 47.8 \pm 19.5 years. In 36.5 % of the cases, patients were admitted in the ICU from the scene, in 35.7 % from the emergency department, in 7.8 % from the operating room and in 20.0 % from another hospital. Blunt trauma occurred in 94.3 % of the cases. Overall, 22.2 % of the patients were taking antiplatelets or anticoagulants. Road traffic accidents were the most common cause of trauma (42.2 %), followed by pedestrian falls (26.8 %). Up to 77.4 % of the cases in the pre-hospital setting were attended by advanced life support teams. In 29.1 % of the cases, intoxication by alcohol or drugs was confirmed in the hospital. At the scene, median GCS 14 (8-15), respiratory rate mean 18.0 \pm 7.1 and systolic blood pressure 114.8 \pm 42.8 mmHg. Mean ISS was 22.4 \pm 12.4. Incidence of trauma distributed by the Abbreviated Injury Scale was as follows: head (74.7 %), face (36.0 %), neck (13.4 %), thorax (60.4 %), abdomen (32.1 %), spine (29.6 %), upper extremities (34.9 %), lower extremities (41.4 %) and external (27.1 %). Most common injuries documented were 450203.3: ≥ 3 ribs fractures without flail; 140695.3: subarachnoid hemorrhage with coma > 6 h, and 650620.2: fracture of transverse process in lumbar spine.

CONCLUSIONS. This pilot phase allowed us to monitor the early care of trauma and to determine the baseline characteristics and the types and severity of injury in trauma ICU patients.

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0325

SEDATION IN PATIENTS WITH TRAUMATIC BRAIN INJURY, PROPOFOL VS DEXMEDETOMIDINE

O. Tarabrin¹, S. Shcherbakov¹, D. Gavrichenko¹, G. Mazurenko¹

¹Odessa National Medical University, Anesthesiology and Intensive Care, Odessa, Ukraine

INTRODUCTION. It's known that propofol and dexmedetomidine decrease systemic blood pressure, heart rate, and cardiac output in a dose-dependent manner. The aim of this study was to compare their safety and efficacy for intravenous sedation during mechanical ventilation.

METHODS. We studied 84 patients with traumatic brain injury (Glasgow scale 7-8), with average age being 44 \pm 13.37 years old. All patients underwent mechanical lung ventilation. Patients were divided into 2 groups depending on the type of intravenous sedation. In the 1st group (n = 42) sedation was carried out by intravenous infusion of dexmedetomidine at a dose of 0.2-1.4 mg/kg/h. With patients of the 2nd group (n = 42) sedation was performed by intravenous propofol infusion in a dose of 4-12 mg/kg/h. The level of sedation was assessed by bispectral index (BIS) monitoring, targeting index 70. The main criteria were the following: heart rate, blood pressure and SpO₂. They were evaluated during 30, 90, 180 min after the start of sedation. Both groups were matched by sex, age and comorbidity.

RESULTS. 30 min after the start of sedation in patients of the first group HR - 83 \pm 11,31 beats per minute, BP - 127 \pm 12,87/64 \pm 8,54 mm Hg, SpO₂ - 97 \pm 3,01 %. At patients of the second group 30 min after the beginning of sedation was HR - 87 \pm 10,01 beats per minute, blood pressure - 131 \pm 11,67/68 \pm 8,19 mmHg, SpO₂ - 97 \pm 2,98 %. After 90 min, at the first group of patients, we observed HR - 81 \pm 6,27 beats per minute, blood pressure - 119 \pm 11,46/59 \pm 4,29 mmHg, SpO₂ - 98 \pm 2,35 %. In the second group HR - 82 \pm 7,31 beats per minute, blood pressure - 94 \pm 13,62/55 \pm 7,81 mmHg, SpO₂ - 97 \pm 2,76 %. In the first group, 180 min after the start of sedation, HR - 86 \pm 6,19 beats per minute, blood pressure - 105 \pm 10,34/54 \pm 4,28 mmHg, SpO₂ - 98 \pm 1,32 %. In the

second group HR - 75 ± 6.27 beats per minute, blood pressure - $92 \pm 12.54/51 \pm 6.91$ mmHg, SpO₂ - 96 ± 2.91 %.

CONCLUSIONS. Taking into account our study, we consider dexmedetomidine a better choice compared to propofol. Using dexmedetomidine at a dose of 0.2-1.4 mg/kg/h for intravenous sedation is safe in terms of hemodynamics stability and blood oxygenation for sedation during mechanical lung ventilation in traumatic brain injury patients.

0326

TEMPORARY CLOSURE OF THE OPEN ABDOMEN

J.M. Mora Ordoñez¹, V. Olea-Jimenez¹, E. Banderas Bravo¹, A. Gonzalez¹

¹Carlos Haya University Hospital, Malaga, Spain

INTRODUCTION. The temporary closure of abdomen negative pressure therapy (TCANP) is the treatment of choice for abdominal compartment syndrome (ACS) and is part of the damage control surgery (DCS).

OBJECTIVE. We present the results of patients treated by this technique in our Unit Trauma and Emergency Surgery (UTES).

METHODS. Prospective observational study of patients who "Temporary Closure of abdomen" was performed (Carlos Haya Hospital Malaga) from October 2011 to March 2014. After performing laparotomy all underwent temporary abdominal closure with the standard dressing and complimentary KCI VAC system, or KCI ABThera system was used. The data have been exploited using SPSS 15, accepted as statistically significant those results with significance level $p < 0.05$.

RESULTS. 28 patients underwent TCANP, excluding 4. Of the 24 patients, 18 were male and 6 female, mean age 54.2 years (15-80). Six procedures (25 %) were performed by ACS, all men, 4 broken abdominal aortic aneurysm, 1 for acute pancreatitis and 1 after liver transplantation. One of them, in addition to decompressive laparotomy is associated sigmoidectomy for sigmoid necrosis. Before the procedure, the mean intra-abdominal pressure was 27.3 mmHg (20-40). 18 patients were operated in the context of DCS (12 men and 6 women), 2 polytrauma, 2 after the surgery of mesenteric infarction and 14 severe abdominal sepsis. The mean SOFA for the ACS group was 11.3 (7-14) and the DCS group was 10.5 (3-14) (n.s). The APACHE II medium for the ACS group was 29.1 (22-38) for the DCS group and 23.5 (4-34) (ns). The average stay in the ICU was 21.13 days (0-127). 8 patients died (33.3 %), 3 in the ACS group and 5 in the DCS group (50 % vs 27.8 %, ns). The closure of the abdominal wall was achieved in 20 patients, one of them was achieved by a synthetic mesh bridge. Of the four cases in which there was not achieved, 3 patients died while only 5 died which were achieved the closure (75 vs. 25 %, ns). The average number of changes was 2.58 (1-7 changes). 16 meshes fascial traction (MFT), 9 were placed during performance of the first procedure, 6 on the first pass and one during the second. No significant differences in the rate of primary fascial closure were found when mesh is placed face when not placed (81 % vs 75 %, ns). 2 patients had enterotomospheric fistula, both died.

CONCLUSIONS. The TCANP was performed in critically ill patients and is associated with high mortality, increased by the ACS. Its was possible in most situations, but its failure caused higher mortality. Placing a MFT was not associated with a higher rate of the closure of the abdominal wall with primary suture. In our series all patients with enterotomospheric fistula died. Given the clear percentage differences, we can attribute the small sample size of the absence of significance in exitus rates between the groups analyzed.

0327

'IS ITU ATTENDANCE TO ALL TRAUMA ALERTS ESSENTIAL?' A NON-MAJOR TRAUMA CENTRE PERSPECTIVE

C. Bonham¹, L. May¹, N. Arora¹

¹Heartlands Hospital, Intensive Care Department, Birmingham, United Kingdom

OBJECTIVES. The aim of this local audit was to assess the necessity of ITU registrar attendance at 'trauma alert' bleeps at a non-Major Trauma centre in the west midlands. It is designed to objectively look at the number of actual 'trauma alerts' seen in one month, and how many times ITU registrars are actually required as part of the Trauma team for additional airway support.

METHODS. A prospective, anonymous audit was conducted between 1st January-31st January 2014 at an 800 bed hospital in the West Midlands. The audit was an anonymous, survey based one, and was completed by senior ITU registrars (ST6+), following a 'Trauma bleep' request to attend the emergency department.

RESULTS. During the month of January there were a total of 25 Emergency department 'trauma alerts', requesting attendance of ITU. This was confirmed by the hospital's switchboard. We had a 68 % (n = 17) return of surveys, with one discounted.

31 % (n = 5/16) of trauma alerts had an estimated time of arrival.

68.7 % (n = 11/16) met local trauma activation guidelines.

50 % (n = 8/16) had a full trauma team in attendance.

At those trauma alerts that fulfilled the local trauma activation guidelines, only 54.5 % (6/11) of cases had a full trauma team in attendance.

C-spine was immobilised in 68.7 % (n = 11/16) of trauma alert patients.

The number of 'trauma' patients requiring additional airway support was 0.

CONCLUSIONS. The Major Trauma protocol in the west midlands is a well established network of air and land ambulances, trauma units, local emergency hospitals and other resources. Non-MTC's need to be prepared for 'unannounced trauma' landing on its doorstep. In this event, prompt activation of a full trauma team is essential to maximise patient survival. Our audit has shown that gaps in the alert system, namely the ETA, would maximise team effectiveness, and minimise the amount of time ITU registrars are absent from ITU.

The majority of incoming trauma occurred during the hours of 1801-0000. This period of time coincides with evening hand over and patient review on ITU. An unnecessary trauma alert during this period currently means that ITU patients are not reviewed with the potential for harm.

As evident, airway assessment and management can be conducted by another appropriately trained member of the trauma team, and does not necessarily denote the need for ITU attendance. Removal of an ITU registrar from ITU is detrimental for those critically unwell patients on ITU and whom require senior input. We have proposed the following changes to local guidelines:

- ITU to remain included in the 'trauma alert' bleeps in the event of trauma

- ITU to only attend when patient appropriately assessed by an ED senior as needing ITU support. In this case a separate "ITU to attend ED trauma alert" should be requested. This will allow sufficient time for the ITU registrar to safely finish his or her task with the acutely unwell ITU patients before appropriately coming down to the emergency department.

0328

PICCO MONITORING IN PATIENTS WITH SEVERE TRAUMA

A. Konkayev¹, E. Gurbanova², N. Bekmagambetova²

¹Astana Medical University, Anaesthesiology and Intensive Care, Astana, Kazakhstan,

²Institution of Traumatology and Orthopaedics, Astana, Kazakhstan

INTRODUCTION. Daily volume of infusion therapy was formed on the basis of volumetric monitoring indicators.

OBJECTIVES. Analysis of volumetric hemodynamic data to change fluid therapy in patients with severe concomitant injury.

METHODS. After obtaining written informed consent and local ethic committee approval 38 adults patients with severe concomitant trauma were examined. Daily volume of infusion therapy, cases of ARDS and mortality were studied in patients with PICCO (P group) and usual (U group) monitoring at the first week after trauma. Patients in P group were examined by transpulmonary thermodilution technique implemented in module PICCO of the Infinity Delta monitor (Draeger, Germany). Data were processed unpaired t-test with Statistica 6.0 (StatSoft Inc., Tulsa, OK, USA); $p < 0.05$ significant. Data are mean \pm SD.

RESULTS. Daily volume of infusion therapy in the first day of hospital stay amounted 2732 ml \pm 468.4 and 2863 \pm 487.2 mL ($p = 0.856$), during the second day P group patients was obtained infusion volume of 2032 \pm 354.1 ml, the U group - 1254 \pm 65.8 ml ($p = 0.003$), in the third day - 1878 \pm 204.2 ml and 1439 \pm 117.9 ml ($p = 0.008$) respectively. In the P group ARDS was in 2 cases, in the U group 3 cases of ARDS and 1 case of acute renal failure. Mortality in the study groups was 5 % and 21 % respectively ($p = 0.431$).

CONCLUSIONS. Volumetric monitoring by PICCO allowed to optimize fluid therapy in patients with severe concomitant trauma and reduced the incidence of complications.

Multi-drug resistant bacteria: 0330-0342

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CHANGES IN THE CLINICAL AND MOLECULAR EPIDEMIOLOGY OF ACINETOBACTER BAUMANNII IN UCI PATIENTS OVER A 10-YEAR PERIOD

J. Garnacho-Montero¹, A. Gutiérrez-Pizarra², J.A. Márquez-Vácaro¹, J.M. Cisneros-Herreros², M. Cano³, E. Gato⁴, C. Ruiz-Alegria⁵, F. Fernández-Cuenca⁶, J. Vila⁷, L. Martínez-Martínez², M. Tomás⁸, A. Pascual⁹, J. Pachón-Díaz⁷, J. Rodríguez-Baño³, GEIH/GEMARA/REIPI-Ab2010 Group

¹Hospital Universitario Virgen del Rocío, Critical Care and Emergency Department, Seville, Spain, ²Hospital Universitario Virgen del Rocío, Infectious Diseases and Microbiology, Seville, Spain, ³Hospital Marqués de Valdecilla, Microbiology Department, Santander, Spain, ⁴Complejo Hospitalario Universitario A Coruña, Microbiology Department, A Coruña, Spain, ⁵Hospital Universitario Marqués de Valdecilla, Microbiology Department, Santander, Spain, ⁶Hospital Universitario Virgen Macarena, Infectious Diseases, Seville, Spain, ⁷Hospital Clinic, Barcelona, Spain, ⁸Hospital Universitario Virgen Macarena, Infectious Diseases and Microbiology, Seville, Spain

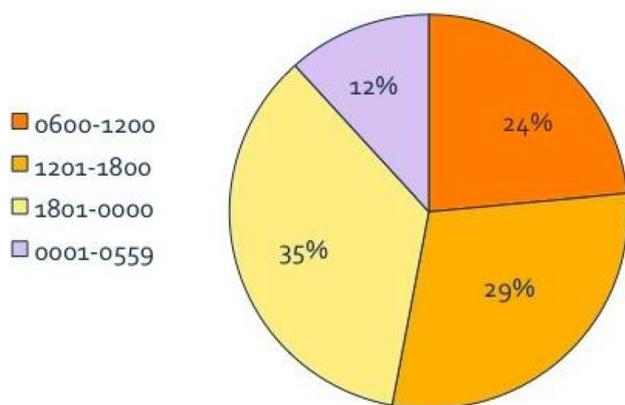
Introduction. Acinetobacter baumannii is one of the most important nosocomial pathogens in many ICUs, causing particularly ventilator-associated pneumonia and bacteremia.

Objectives. To know changes in the molecular epidemiology, clinical presentation, and risk factors for mortality of A. baumannii infection over a 10 year period.

Methods. Prospective, multicenter, hospital-based cohort studies including all new patients infected or colonized by A. baumannii using the same methodology. The first period ("2000 study") was performed in 27 Spanish hospitals (one month) and the second ("2010 study") was performed in 38 Spanish hospitals (two months). Molecular typing was performed by REP-PCR, PFGE and MSLT. Chi square or Fisher tests were used for comparison of continuous variables and Student t or Mann-Whitney U tests for categorical. Logistic regression analysis was carried out to determine independent predictors of mortality.

Results. In 2000 and 2010, 103 and 108 ICU patients were included, respectively. Overall, the incidence density rates of A. baumannii colonization/infection decreased in 2010 compared to 2000 (4.35 vs. 1.23 cases/1,000 patient-days). We found no differences in the rates of colonized (46 % vs. 54 %) or infected (40.3 % vs. 59.7 %) patients in both periods. The number of pneumonia increased from 46.2 % to 64.8 % ($p < 0.001$). Previous exposure to piperacillin-tazobactam (36.4 vs. 18.4 %, $p = 0.004$) and fluoroquinolones (28 vs. 11.7 %, $p = 0.003$) increased in 2010. The antimicrobials most frequently used for definitive treatment of patients with infections were carbapenems in 2000 (53 %) and colistin in 2010 (70.4 %). Crude mortality at 30 days was similar in both periods (46.2 % vs. 42.3 %). By MSLT, ST2 clonal group was predominant and increased in 2010. It was more frequently

Breakdown of trauma times



Break down of incoming Trauma by time of day

resistant to imipenem and associated with a prior aminoglycosides use. In patients with *A. baumannii* infection, appropriate antimicrobial therapy (OR 0.11, 95 %CI 0.02-0.51) and ST9 clonal group (OR 0.08, 95 %CI 0.008-0.76) were protective factors for mortality.

CONCLUSIONS. At 10 years of the first analysis, there have been observed some changes in the epidemiology of *A. baumannii* in the ICU without changes in mortality. Epidemic ST9 clones seem to be associated with better prognosis and adequate treatment is crucial in terms of survival.

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PSEUDOMONAS AERUGINOSA: RISK RELATED TO ICU WATER SUPPLY? A PROSPECTIVE OBSERVATIONAL STUDY

D.H. Conway¹, M.M. Mahmoud^{1,2}, J. Moore¹, K. McGregor¹, M. Nirmalan¹

¹Manchester Royal Infirmary, Manchester Academic Health Science Centre, Manchester, United Kingdom, ²Tanta University Hospitals, Anaesthesia & Surgical Intensive Care, Tanta, Egypt

INTRODUCTION. Ventilation-associated pneumonia (VAP) is the most frequent ICU infection. VAP increases duration of ventilation, hospital length of stay, cost and probably mortality (1). *Pseudomonas* species are environmental bacteria with *Pseudomonas aeruginosa* (PA) causing infections in humans, especially in augmented care areas. PA can be spread on the hands of healthcare workers, water systems or contaminated equipment (2). **OBJECTIVES.** We aimed to observe the relationship between VAP & PA contamination of water outlets on the 14-bed level 3 ICU.

METHODS. Between 1 Sep 2011 & 29 Jun 2012 on a daily basis we screened every patient ventilated for more than 48 h for VAP. This was diagnosed by Clinical Pulmonary Index Score [CPIS] and the clinical decision to start antibiotics. Environmental surveillance of the water supply to the entire ICU took place between 3 May & 25 Jun 2012. These outlets included all taps at bedsides, treatment room & sluice. Samples were taken between 6 & 7am over a 2 day period at weekly intervals, by a trained environmental scientist using a standard technique collecting pre-flush (first catch) 50 % cold water & 50 % blended water (from thermostatic taps) plus swabs from tap outlets & plug-holes. These samples were analysed for PA contamination at a purpose built, accredited laboratory. Positive water sampling was defined as any Colony Forming Units more than or equal to 1/ml.

RESULTS. We screened 180 ventilated patients between 1 Sep 2011 & 29 Jun 2012 with a total of 2654 ventilation days. We identified 28 episodes of VAP, of which 11(39 %) were attributed to PA, in 9 women & 2 men. The VAP rate was 10.6 per 1000 ventilated days. A further 11 patients sputum were colonised with PA.

	1st Sep 2011-2nd May 2012	3rd May 2012 -29th June 2012	Total
Ventilated Patients	151	29	180
VAP Total	24	4	28
VAP due to PA	10	1	11
Colonisation of sputum with PA	10	1	11

[Number of ventilated patients; total VAP]

From 3 May to 25 Jun 2012, 121 water samples and 121 swabs were taken from water outlets for detection of PA. 23 positive results were detected from water samples and there were 10 positive swab results

Date	3rd- 8th May 2012	3rd- 8th May 2012	16th May 19th June	16th May 19th June	25th June 2012	25th June 2012
Sample type from outlet	Water	Swab	Water	Swab	Water	Swab
Total Number	44	44	132	132	22	22
Positive PA sample	6	5	13	5	1	0
% Positive PA sample	13.6	11.4	9.8	3.8	4.5	0

[Water outlet surveillance for PA]

During that period, there were 4 episodes of VAP of which one was attributed to PA. We disinfected the outlets on 8th May & 19th Jun.

CONCLUSIONS. 39 % of VAPs over 9 months were attributable to PA. Environmental sampling of water outlets over 8 weeks at the end of this period revealed 10 % contamination of water samples & swabs from water outlets with PA. This fell to 5 % following disinfection of water outlets. Genetic typing of the PA species from both clinical and environmental isolates could identify a causal relationship. In response to these data, we installed water filters onto ICU water outlets.

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EXTENDED SPECTRUM BETA-LACTAMASE PRODUCING ENTEROBACTERIACEAE (ESBL-PE) INFECTIONS IN ICU: SITE OF INFECTION, TREATMENT AND OUTCOME

A. Kouatchet¹, E. Weiss², D. Schnell³, A. Mercat⁴, J.R. Zahar⁵, BLSEREA Study Group

¹CHU Angers, Service de Réanimation médicale et médecine hyper, Angers, France, ²CHU Beaujon, Département d'Anesthésie et Réanimation, Clichy, France, ³CHU de Strasbourg - Hôpital Civil, Service de Réanimation Médicale, Strasbourg, France, ⁴CHU Angers, Service de Réanimation Médicale et Médecine Hyperbare, Angers, France, ⁵CHU Angers, UPLIN, Angers, France

INTRODUCTION. The ESBL-PE spread has a major consequence in term of antibiotic choices. Carbapenems antibiotics are regarded as the most effective treatment. However, number of authors suggests that alternatives antibiotics (i.e., non carbapenems) could be

used in ESBL-PE infections. There are some conflicting data regarding the use of alternatives in case of ESBL-PE. Moreover as far as we know, there is no data in ICU.

OBJECTIVES. The aim of this study was to describe ESBL-PE infections in ICU and therapeutic options chosen in this specific situation.

METHODS. Prospective multicentric observational cohort study conducted in 38 volunteer French ICUs. All consecutive patients hospitalized in ICU with ESBL-PE infection according to CDC definitions were included. Severity of illness was defined according to Bonés criteria. Demographic data, empirical (ET) and definitive antibiotic therapy (DT), clinical evolution and outcome were recorded. In vitro antimicrobial susceptibility testing was performed by the disk diffusion method or the Vitek 2 system according to the guidelines of the Antibiogram Committee of the French Microbiological Society.

RESULTS. 97 ICU patients with ESBL-PE infections were included with respectively a median age and SAPS II score of 65 (53-74) and 55 (39-70). The median SOFA Score at first day of antibiotic therapy and ICU admission were 8 (4-11) and 8 (6-11) respectively. The most frequent site of infection were respiratory tract (43 %), urinary tract (20 %) and abdominal (18 %). The most frequent isolated species were: *Escherichia coli* (44 %), *Klebsiella sp* (46 %) and *Enterobacter sp* (18 %). Respectively 52, 23 and 25 % patients had septic shock, severe sepsis and sepsis according to Bone criteria. Among the whole population, 47 (48 %) patients received a carbapenem as ET. 66 (68 %) received a DT with carbapenem and 31 (32 %) patients received an alternative DT. The most frequent reasons for maintaining carbapenem as DT were: Antibiotic susceptibility tests (38 % of cases), severity level (33 % of cases) immunosuppression (8 % of cases). The ICU mortality was 33 % for patients with carbapenem DT and 14 % for patients with alternatives (p = 0.02). The Median length of ICU stay after infection was respectively 12 (6-27) and 11 (7-16) days for carbapenem and alternatives DT (p = 0.1) Surprisingly, there were no differences between the 2 groups (carbapenem vs alternatives) in term of severity.

CONCLUSIONS. Alternatives are frequently used for ESBL-PE infections in ICU. In our cohort 31 (32 %) patients received antibiotics other than carbapenem regardless of the severity. A multivariate analysis will be done to identify factors associated with mortality.

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CLINICAL AND MICROBIOLOGICAL CHARACTERIZATION OF LOWER RESPIRATORY TRACT INFECTION BY STAPHYLOCOCCUS AUREUS IN AN INTENSIVE CARE UNIT

M. Gomes-Fernandes^{1,2}, F. Arméstar-Rodríguez³, E. Mesalles⁴, E. Benveniste-Pérez⁴, I. Martínez-de la Gran³, A. Lacomá^{5,6}, S. Molinos⁷, M. Gimenez⁷, N. Pagan⁷, J. Klamburg³, C. Prat^{3,6}

¹CAPES Foundation, Ministry of Education of Brazil, CAPES Foundation, Brasília, Brazil, ²Hospital Universitario Germans Trias i Pujol/Institut d'Investigació Germans Trias i Pujol, Microbiology, Badalona, Spain, ³Hospital Universitario Germans Trias i Pujol, Intensive Care, Barcelona, Spain, ⁴Hospital Universitario Germans Trias i Pujol, Intensive Care, Badalona, Spain, ⁵Hospital Universitario Germans Trias i Pujol/Institut d'Investigació Germans Trias i Pujol, Microbiology, Barcelona, Spain, ⁶CIBER, Badalona, Spain, ⁷Hospital Universitario Germans Trias i Pujol, Microbiology, Barcelona, Spain

INTRODUCTION. A better knowledge of clinical and molecular features of *Staphylococcus aureus* causing lower respiratory tract infections in ICU may help to improve clinical management.

OBJECTIVES. To report:

- the clinical characteristics of lower respiratory tract infections by *S. aureus*;
- the persistent isolation of the microorganism despite adjusted antibiotic treatment;
- molecular features of the isolated strains.

METHODS. Patients admitted to ICU during 2012-2013 and from whom *S. aureus* was isolated in tracheal aspirates were selected. They were classified into pneumonia, tracheo-bronchitis or bronchial colonization. Data was recorded for epidemiological features, reasons for ICU admission and clinical outcome. APACHE, Glasgow and CPIS scores were calculated. Clinical strains were phenotypically characterized and genotypically analyzed with a commercial array that identifies clonal complex (CC) and the presence of genes encoding Chemotaxis Inhibitory Protein of *S. aureus* (CHIPS), Toxic shock syndrome toxin-1 (TSST-1) and Panton-Valentine leukocidin (PVL).

RESULTS. In this 2 years period 1171 patients were admitted. The incidence of respiratory tract infection was 15.6 %. *S. aureus* was isolated in a total of 45 patients (24.6 % of the infections), all of them undergoing mechanical ventilation (MV): 23(51.1 %) were considered tracheo-bronchitis and 22(48.9 %) pneumonia. Median age was 66 years (IQR 21.5) and 71.1 % were male. Reasons for ICU admission were medical in 71.1 % of the cases, scheduled surgery in 17.8 % and trauma in 11.1 %. Median APACHE was 16(9). Brain injury was present in 53.3 % of the cases. Median ICU stay and MV days were 22(24.5) and 20(20.5), respectively. Only 4 patients had positive blood culture by *S. aureus*. In 18 cases (40 %) there was persistent *S. aureus* isolation [13.5 days (14)] despite adjusted antibiotic treatment, being 7 strains MRSA. Fourteen patients (31.1 %) died, and 2 were related to infection. Regarding molecular characterization, ten different CC were detected, being the more frequent CC5(33.3 %). CHIPS was detected in 61.8 % of the strains, TSST-1 in 17.9 % and PVL in one case. No statistical significance was found between the presence of these virulence factors and the severity of the infection.

CONCLUSIONS.

- The incidence of staphylococcal respiratory tract infection was frequent in patients undergoing MV after brain injury.
 - The isolation of *S. aureus* was often persistent despite treatment adjusted to susceptibility pattern.
 - There was an important diversity of CC, indicating a low rate of nosocomial transmission.
 - The presence of genes encoding the selected virulence factors does not correlate with the severity of infection, although gene expression studies would be probably more adequate.
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PROLONGED CRITICAL CARE ELIZABETHKINGIA MENINGOSEPTICA OUTBROK IN A UK TEACHING HOSPITAL

D.S. Owens¹, L.S. Moore^{1,2}, C. Johnstone¹, J.F. Turton², H. Donaldson¹, A. Jepson^{1,3}, A.H. Holmes^{1,2}

¹Imperial College Healthcare NHS Trust, Department of Microbiology, London, United Kingdom, ²Imperial College London, Centre for Infection Prevention & Management, London, United Kingdom, ³Homerton University Hospital NHS Foundation Trust, Department of Microbiology, London, United Kingdom

INTRODUCTION. Elizabethkingia meningoseptica is a non-fermenting Gram negative organism with intrinsic drug resistance associated with respiratory tract colonisation in ventilated patients; however causality in ventilator-associated pneumonia is unclear. Outbreaks have been reported in limited numbers however a recent review article by Jean et al. shows an increase in incidence over the last decade.

OBJECTIVES. We report a prolonged outbreak of E.meningoseptica in a 16-bedded ICU, from a 418-bed London teaching hospital. We analysed the clinico-pathological course of patients, molecular epidemiology, and interventions needed to bring this outbreak under control.

METHODS. To identify E.meningoseptica, isolates initially identified as non-lactose fermenting organisms were processed through matrix assisted laser desorption/ionisation time-of-flight (MALDI-TOF). Once patients with positive samples had been found clinico-pathological parameters were collected for patients in whom no other pathogen was identified 7 days prior- or post-E.meningoseptica isolation. Patient admissions were geotemporally plotted with environmental water sampling results. Isolates were compared by pulsed-field gel electrophoresis (PFGE) of XbaI-digested genomic DNA.

RESULTS. E.meningoseptica isolates were identified from 29 patients admitted between December 2011 and October 2013. Of the 22 patients who had E.meningoseptica isolated 13 had no evidence of any other pathogen within a 7 day period. Of those 13, in the 48 h period around the isolation of the E.meningoseptica: 7 had new-onset fever (>38 °C), 4 increasing oxygen requirements (change >0.1FiO₂), 8 new tachycardia (>100 bpm), 7 new white cell count change (to <4 or >12×10⁹/L) and 7 new CRP rise (to >100 mg/L). PFGE typing showed that of the 12 patient isolates, 7 shared a common PFGE pattern. Environmental sampling found 7 different E.meningoseptica strains, one (from clinical tap units) indistinguishable from the PFGE pattern shared by the 7 patients. Interventions to terminate the outbreak included: water course remodelling with removal of flexible tubing, hyper-chlorination of the system, cleaning of traps, and use of alcohol-gel post hand washing. These steps, along with instigation of three times daily auto-flushing of the clinical tap units resulted in repeat water testing being clear of organisms in December 2013.

CONCLUSIONS. We find E.meningoseptica acquisition is associated with a systemic clinico-pathological response in over half those from whom no other attributable microbiological cause was identified. We demonstrate a water-associated point source for this outbreak and detail interventions necessary to achieve termination.

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0335
NEGATIVIZATION OF COLISTIN AND CARBEPENEMASE RESISTANT MICROORGANISMS RECTAL COLONIZATION BY ENTERAL PARAMOMYCIN: PRELIMINARY FINDINGS

C. Sánchez Ramírez¹, L. Caipe Barcábal¹, A. Hernández Viera¹, S. Hípola Escalada¹, M. Cabrera Santana¹, N. Sangil Monroy², A. Bordes Benítez³, P. Saavedra Santana⁴, M.A. De la Cal López⁵, S. Ruiz Santana¹

¹University Hospital of Gran Canaria Dr Negrín, Intensive Care Unit, Las Palmas de Gran Canaria, Spain, ²University Hospital of Gran Canaria Dr Negrín, Pharmacy Department, Las Palmas de Gran Canaria, Spain, ³University Hospital of Gran Canaria Dr Negrín, Microbiology Department, Las Palmas de Gran Canaria, Spain, ⁴Las Palmas de Gran Canaria University, Mathematics and Informatic Department, Las Palmas de Gran Canaria, Spain, ⁵University Hospital of Getafe, Intensive Care Unit, Las Palmas de Gran Canaria, Spain

INTRODUCTION. Emergence of carbapenemases and their worldwide distribution have changed the clinical scenario of antibiotic resistance in Gram-negative bacteria (1). Selective Digestive Decontamination (SDD) has been used to prevent development of nosocomial colonization and infections in ICU patients. However, rectal colonization with multiresistant bacteria is a concern with SDD. Effective enteral antimicrobial treatment in this scenario is lacking and might contribute to prevent systemic infections.

OBJECTIVE. To assess the value of enteral paramomycin to decontaminate patients with rectal colistin and/or carbapenemase resistant microorganisms colonization to prevent the development of ICU nosocomial infections.

METHODS. All consecutive patients admitted to the ICU from October 2011 expected to require tracheal intubation for longer than 48 h were given SDD with a 4-day course of intravenous cefotaxime, plus enteral polymixin E, tobramycin, amphotericin. B in an oropharyngeal paste and in a digestive solution. Oropharyngeal and rectal swabs were obtained on admission and once weekly. Rectal swabs colonized by colistin and/or carbapenemase resistant microorganisms were treated with enteral paramomycin 1 gr every 6 h. in order to negativize it and prevent nosocomial infections. Categorical variables were summarized as frequencies and percentages and the continuous ones as medians and interquartile ranges (IQR). Statistical significance was set at p ≤ 0.05.

RESULTS. We applied paramomycin treatment to 11 colonized patients with rectal colistin resistant microorganisms. All of them had colonization by Extended Spectrum Beta-lactamases (ESBLs) Klebsiella pneumoniae. Median (IQR) Demographic data and type of admission are shown in table.

Age, years	61 (24, 80)
APACHE II on admission	23 (15,45)
SOFA on admission	9 (8,14)
APACHE II beginning treatment paramomicine	21 (19,27)
SOFA beginning treatment paramomicine	8 (3,10)
ICU stay, days	98 (18,215)
Renal replacement therapy, number(n)	6
Emergency surgery,n	4
Medical diagnosis on admission,n	6
Parenteral nutrition,n	4

[Table I. Demographic data]

McCabe score was 1 in 9 patients. All the patients were on mechanical ventilation for more than 7 days. Paramomycin treatment was applied for 21,9 (8,40) days. Nine out of 11 of the studied patients negativized the rectal swab. Three of them were colonized by carbapenemases producing microorganisms and one of them died with persistent multiresistant rectal colonization. Only two out of the 11 patients that negativized the colonization received concurrent susceptible IV antibiotics. The patient that died without negativize the

colonization received concurrent imipenem which was susceptible to it. None of the patients developed any infection due to the paramomycin treated microorganisms. Finally, four patients died in the ICU.

CONCLUSION. Our preliminary data show that enteral paramomycin is effective in treating rectal colistin and/or carbapenemase resistant microorganisms colonization to prevent the development of ICU nosocomial infections.

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0336
VENTILATOR-ASSOCIATED PNEUMONIA CAUSED BY CARBAPENEM-RESISTANT GRAM-NEGATIVE BACTERIA IN 13 GREEK ADULTS ICUS: EPIDEMIOLOGY AND IMPACT ON ICU MORTALITY

E. Mouloudi¹, S. Papanikolaou¹, M. Karyouniaris¹, T. Aslanidis¹, A. Sakagianni¹, S. Michelidou¹, K. Pontikis¹, A. Gavala¹, I. Chouris¹, G. Rempelakos¹, C. Nikolaou¹, E. Antipa¹, E. Papadomichelakis¹, K. Arvaniti¹, P. Myrianthefs¹

¹Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine, Athens, Greece

INTRODUCTION. Despite microbiologically directed antibiotic therapy, Ventilator-Associated Pneumonia (VAP) causes numerous deaths in ICU patients. Carbapenem-resistant gram-negative bacteria (CR-GNB) are considered endemic in Greek ICUs.

OBJECTIVES. The aim of the study was to determine risk factors for CR-GNB VAP and for death in this group of patients.

METHODS. Prospective 2-month study conducted in 13 adult ICUs in Greece (148 ICU beds, 7620 hospital beds in total). Patients with CR-GNB VAP were allocated in 3 groups according to pathogen isolated. Groups were compared to identify risk factors for the development of VAP and the impact of pathogen type on ICU outcome.

RESULTS. Out of 496 admitted patients, 32 VAP were attributed to CR-GNB (6.4 %, 7 cases/1000 mechanical ventilation-days), with 40.6 % mortality. Isolated CR-GNB were A. baumannii (59 %), P. aeruginosa (22 %), K. pneumoniae (19 %). All isolates (except one A. baumannii strain resistant to colistin) were susceptible to colistin and all A. baumannii and K. pneumoniae to tigecycline. Average age for the 3 pathogen groups were 52.6 (A. baumannii), 58.7 (P. aeruginosa), and 68.5 (K. pneumoniae). The characteristics of patients regarding the 3 pathogen groups are shown in Table 1.

Table 1. Patients characteristics according to the pathogen isolated, * = p < 0.05 (statistically significant).

	A. baumannii	P. aeruginosa	K. pneumoniae
Male Sex (%)	59.9	85.7*	66.6
APACHE II score	18	19	28*
Mortality (%)	15.6*	57	67
Secondary Bacteremia (%)	26.3	28.5	33.3
MV days before VAP	13.5	28.7	21.6
Antibiotic therapy total days	12.4	12.5	18.6*
CPIS 48 h before VAP	3	5	6
CPIS 24 h after	8	7	9
CPIS 48 h after	6	6	8

[Characteristics of patients]

CONCLUSIONS. There were significant differences in VAP cases related to the causal pathogen, especially for K. pneumoniae (older age, higher APACHE II score, higher mortality, longer treatment). Rapid diagnosis of CR-GNB VAP is mandatory for therapeutic regime adjustments, including both empirical and guided antibiotic therapy.

0337
PLACEBO-CONTROLLED TRIAL ABOUT THE EFFECT OF THYME WATER MOUTHWASH ON CONTROLLING SORE THROAT, HOARSENESS, ORAL MALODOR AND INFECTION, REGARDING THE PATIENTS, WHO HAD UNDERGONE CORONARY ARTERY BYPASS SURGERY

A. Koyuncu¹, Ü. Karabacak², F. Eti Aslan², O. Bedir³, S. Kılıç⁴, U. Demirkılıç¹

¹Gulhane Military Medical Academy Department of Cardiovascular Surgery, Ankara, Turkey, ²Acibadem University Faculty of Medical Sciences Department of Nursing, Istanbul, Turkey, ³Gulhane Military Medical Academy Department of Microbiology, Ankara, Turkey, ⁴Gulhane Military Medical Academy Department of Public Health, Ankara, Turkey

OBJECTIVES. It was intended to determine the effect of thyme water mouthwash, which has been applied after extubation, on controlling infection and sore throat, hoarseness, oral malodor due to extubation, regarding the patients, who had undergone coronary artery bypass grafting surgery.

STUDY PLAN. The study is a randomized controlled one center double-blind clinical trial, which has been made between 15 February - 15 September 2013. Among 284 patients, who had undergone coronary artery bypass surgery, 95 voluntary patients, who met the sample criteria, formed the research sample as study group n = 48 and control group n = 47. Mouth swap sample was taken from the patients in both groups after extubation. In the first hour after extubation, patients in the study group were made gargling with 30 ml thyme water and patients in the control group were made gargling with placebo (30 ml boiled and cooled water). In the first minute after gargling, mouth swap sample was repeated. Microbiological examination was made by microbiology specialist without knowing which group the microbiological culture belonged to and statistical analysis was made by public health specialist without knowing which group the patients belonged to. Data before and after gargling was compared statistically by using SPSS 17.0 Windows program.

FINDINGS. There was no statistically significant difference between the patients in study and control groups, when introductory information and laboratory findings were compared. When the patients, who made gargling with thyme water, were compared with the patients, who made gargling with placebo (boiled and cooled water), there was no statistically significant difference with regards to sore throat, hoarseness, oral malodor before gargling, but there was found statistically significant difference after gargling (p < 0.05). Although

there was numerical superiority on behalf of the study group regarding normal throat flora, staphylococcus, gram negative bacteria, fungal infections, the difference in between was not statistically significant ($p > 0.05$).

CONCLUSION. The study findings showed that, thyme water gargling can be a strong alternative against antiseptic solutions for controlling infection and increasing the patients' convenience.

0338

INCIDENCE OF PSEUDOMONAS AERUGINOSA IN A BURN CENTER: EPIDEMIOLOGICAL STUDY IN 2013

S. Wiramus¹, V. Bernini¹, P. Ainaud¹, M. Poirier¹, J. Albanèse¹, J. Textoris¹

¹APHM CHU Conception, Centre des Brûlés de Méditerranée, Marseille, France

INTRODUCTION. Infections are a major cause of morbidity and mortality in intensive care units. In burn patients, the risk of infection is increased by disruption of the skin barrier. The main identified organisms are *Staphylococcus aureus* and *Pseudomonas aeruginosa* (PA). This bacteria colonizes burns in 10 days with a declined incidence in recent years (25-45 %). Colonization or infection of skin by PA delays healing, compromised skin grafts and increases the length of stay. Balneotherapy or cleaning wounds with antiseptic are the two most widely used techniques. After stopping balneotherapy, we assessed the epidemiology of PA in our burn center.

METHODS. Retrospective single-center study whose primary objective was to assess the incidence of PA in 2013. Secondary objectives were to describe the time of occurrence and risk factors of this bacteria in burns. This study included patients admitted more than 24 h with at least one microbiological sampling (MS) and then focused on skin biopsies (SB). Only patients with at least one MS positive for PA were analyzed and classified into three groups (skin infection or colonization with PA, and a group with positive PA in another MS). The "skin infection" was defined on clinical appearance and $SB \geq 10^5$ CFU; it was a colonization if $<10^5$ CFU. Data were analyzed with the statistical software R: quantitative data as median and interquartile ranges and qualitative data as a percentage and absolute counts.

RESULTS. 102 files in one year were analysed with MS 8549: 103 (1.2 %) with PA found in culture (32 patients (31.4 %)). The median length of stay was 50 days [25-77] and mechanical ventilation 30 days [21-43]. We analysed 2034 SB, 82 (4 %) with PA. Fourteen patients had a skin infection and 9 colonization with PA. The three groups were similar apart from a lower BMI, total area burned and severity scores higher in infected patients. Skin infections with PA were associated with a higher ICU length of stay compared to the control group (73 [59-97] vs 21 days [10-39], $p < 0.009$). Time of colonization (28 days [16-49]) and infection of the skin (26 days [15-39]) were significant and similar ($p = 0.54$). Interestingly, we found 45 % resistance of PA isolates to ticarcillin, 7 % to ceftazidime, and 29 % to imipenem.

CONCLUSIONS. The incidence of PA in our burn unit is the same as the other ICU but the delay until colonization or infection is three times longer than described in the literature in patients with burns. Colonizations and infections with PA are significantly associated with an increased ICU length of stay. Resistance patterns to antibiotics emphasizes the importance of a regular assessment of local epidemiology to adapt protocols of empirical antimicrobial therapy. We would confirm these results with a comparison between the two periods : after and before the use of balneotherapy, to clean wounds of burn patients.

0339

A FIVE-YEAR REVIEW OF INFECTIONS CAUSED BY STENOTROPHOMONAS MALTOPHILIA IN AN INTENSIVE CARE UNIT

E. Paramythiotou¹, C. Diakaki¹, S. Vourli², S. Karabi¹, F. Frantzeskaki¹, L. Zerva², A. Armaganidis¹, G. Dimopoulos¹

¹Attikon University Hospital, ICU, Athens, Greece, ²Attikon University Hospital, Microbiology Department, Athens, Greece

INTRODUCTION. *Stenotrophomonas maltophilia* infections are a growing matter of concern in the Intensive Care Unit (ICU).

OBJECTIVES. Our purpose was to study the characteristics, treatment and outcome of infections caused by *Stenotrophomonas maltophilia* in ICU patients.

METHODS. This is a retrospective study conducted in a 5 - year period at an 18 - bed University ICU. All patients with a positive culture specimen were identified from the database of the microbiological laboratory. We recorded the demographic characteristics, severity scores on admission day and on day of *S. maltophilia* isolation, the site of infection or colonization, treatment received and all cause mortality. Cases considered as colonization were not included.

RESULTS. Between 1/2009 and 12/2013 thirty patients fulfilled the inclusion criteria. Their median age was 65,19 (range 21-84) and 18 were male. Five cases were acquired outside ICU. Comorbidities included: diabetes mellitus 4 pts, chronic renal failure 1, hematological disease 3, immunosuppression 7, malignancy 7, cardiac diseases 2, chronic pulmonary disease 5, while 11 pts were smokers. On ICU admission eighteen pts were in septic shock and 9 presented with multi - organ failure. Cause of admission was medical in 20 pts and surgical in 10 pts. Apache II score was 20.4 ± 7.6 and Sofa 9.4 ± 3.6 on admission while on day of *S. maltophilia* isolation, Apache II was 18.2 ± 6.7 and Sofa was 8.7 ± 3.4 . Sepsis was present on day of infection in 4 patients. *S. maltophilia* was isolated from the respiratory tract (53 %), the bloodstream (13 %), central catheter tip (10 %), pleural empyema (13 %), orthopedical wound (7 %) and peritoneal fluid (3 %). Infection was polymicrobial in 11 cases. Bacteremias were exclusively monomicrobial. For polymicrobial infections, microorganisms isolated included gram - negative, gram - positive and fungi (*C. albicans*). In vitro susceptibility was 100 % for trimethoprim - sulfamethoxazole, 90 % for levofloxacin and 100 % for minocycline. Not all isolates were examined for colistin susceptibility. Among isolates examined, 60 % were susceptible to colistin. Three pts did not receive any treatment because they died before the results were available. Thirteen patients received monotherapy, 8 with levofloxacin (LV), 3 with trimethoprim - sulfamethoxazole (TMP-SMX), and two with piperacillin - tazobactam. Combination treatment included colistin plus TMP-SMX or LV or gentamicin. Favourable clinical response after 14 days, was noticed in 29 patients and a good laboratory response in 28 pts. Duration of hospitalization was 82.6 ± 50.9 days and ICU LOS was 5.2 ± 4.05 . Overall mortality was 50 %.

CONCLUSIONS. *S. maltophilia* though infrequent as a cause of infection in the ICU setting, is responsible for a large spectrum of infections, often multi - microbial and presenting in patients with a high Apache score on ICU admission. A high overall mortality is noticed.

0340

CARBAPENEM RESISTANCE ENTEROBACTERIACEAE: THE NEW CHALLENGE

T. Merhabene¹, H. Maamouri¹, A. Ghariani², A. Jamoussi¹, K. Ben Romdhane¹, E. Mhiri², J. Ben Kheïr¹, L. Slim², K. Belkhouja¹, M. Besbes¹

¹Abderrahmen Mami Hospital, Intensive Care Unit, Ariana, Tunisia, ²Abderrahmen Mami Hospital, Microbiology Laboratory, Ariana, Tunisia

INTRODUCTION. Since their first description in 1996, the carbapenem resistant enterobacteriaceae had quickly emerged in the intensive care units. Nosocomial infection due to these strains is associated with increased morbidity and mortality perhaps as a result of a limited antibiotic options. Therefore, these strains represent a new threat to public health.

OBJECTIVES. The aim of our study was to describe clinical and paraclinical characteristics and evolving therapeutic and prognosis of nosocomial infections related to carbapenem resistant enterobacteriaceae.

METHODS. This was a retrospective systematic review of all patients admitted to ICU between September 2012 and March 2014. We recorded demographic, clinical and biological data, APACHE II and SOFA scores, treatment modalities and finally evolution.

RESULTS. During the study period, 21 patients were included (incidence = 0.2 %), 12 male and 9 female. The median age was 60 years. The median APACHE II scores and SOFA were 18 and 6. 12 patients received previous antibiotic therapy before admission. The main reason for ICU hospitalization was respiratory distress in 15 patients. On admission, invasive mechanical ventilation was required in 19 patients. Carbapenem resistant Enterobacteriaceae infection occurred after a median of 17 days. Before the onset of infection, 18 patients received antibiotics; the imipenem was the most used (in 10 patients). Sites of infection were pulmonary in 12 patients, urinary in 7 patients and 6 patients had a catheter-related infection. A *Klebsiella pneumoniae* carbapenem resistant was isolated in all patients. All strains were resistant to quinolones and susceptible to colistin, tigecycline and fosfomicin. The antibiotics prescribed were colistin in monotherapy in 15 patients, in association with tigecycline in 5 patients and another treated by combination fosfomicine-rifampicin. The median duration of antibiotic treatment was 10 days. The infection was complicated by septic shock in 11 patients among them 6 had ARDS. The median length of stay was 36 days (18 to 77 days). 14 patients (66 %) were died.

CONCLUSIONS. Nosocomial infection related to carbapenem resistant enterobacteriaceae begins to emerge in our ICUs. It is associated with an increased mortality. Preventive and multidisciplinary approach should be implemented based especially on the proper use of antibiotics.

0341

AN OBSERVATIONAL STUDY OF RISK FACTORS FOR IDENTIFYING HOSPITALIZED PATIENTS INFECTED WITH MULTI DRUG RESISTANT (MDR) PATHOGEN IN AN AREA WITH HIGH PREVALENCE OF MDR

S. Todi¹, A. Dey¹, M. Bhattacharyya¹

¹AMRI Hospitals, Kolkata, India

INTRODUCTION. In areas with high prevalence of multidrug resistant (MDR) organism, the significance of traditional risk factors for identifying patient population infected with MDR organism is not clear.

METHOD. A prospective observational cohort study in a 400 bed tertiary care hospital with 50 bed multidisciplinary intensive care unit in India, over a period of 18 months from 1st Jul. 2009 till 30th Dec. 2010. Patients who were admitted from the community to the medical floor and intensive care unit (ICU) with an admitting diagnosis of sepsis and subsequently had a positive microbiological culture were studied. Risk factors for infection with MDR organism were noted. Previous antimicrobial therapy, current hospitalization of 5 days or more, previous hospitalization, residence in a nursing home or extended care facility, home infusion therapy (including antibiotics), chronic dialysis, home wound care, family member with MDR pathogen, immunosuppressive disease and unreliable history of antibiotic use.

RESULTS. 500 patients met the inclusion were analysed during the study period. The mean age of the study population was 59.2 years (+18.3) and 40 % were female. 44 % of the patients were admitted to the medical floor and 56 % to the ICU. 55.2 % (n = 276) of patients had culture positivity for MDR organism. Presence of one risk factor only was significantly associated with isolation of MDR organism in the entire cohort. Out of the 500 patients in the study, 261 patients (52 %) did not have a current hospitalization of more than 5 days. MDR organism were isolated from 98 (38 %) of these 261 patients. In this subgroup presence of one risk factor was not significantly associated with MDR organism but having two risk factors was significantly associated with MDR isolation. Analysis of the individual risk factors revealed that certain risk factors could not be elicited in this population from India. Risk factors like residence in a nursing home (n = 0), Home infusion therapy (n = 0), family member with MDR pathogen (n = 0) could not be elicited. Certain risk factors like home wound care [1.8 % (n = 9)] were found in a very small percentage of the study population. Moreover, non traditional risk factor like unreliable history of previous medications or alternative medication was present in 5.6 % (n = 28) patient in this study and was significantly associated with MDR isolation.

CONCLUSION. In areas with high prevalence of MDR organism having one risk factors is applicable to identify patients infected with MDR organism. In patients who are not currently hospitalized presence of more than one risk factors is more significantly associated with MDR isolation. Risk factors are population specific and certain risk factors are not applicable to this study population. Unreliable medical history had a significant association with MDR isolation.

0342

AN OBSERVATIONAL STUDY OF APPROPRIATENESS OF EMPIRICAL ANTIBIOTIC THERAPY IN HOSPITALIZED PATIENTS INFECTED WITH MULTIDRUG RESISTANT ORGANISM (MDR) IN AN AREA WITH HIGH PREVALENCE OF MDR

S. Todi¹, A. Dey¹

¹AMRI Hospitals, Kolkata, India

INTRODUCTION. In areas of high prevalence of multi drug resistant (MDR) organism appropriateness of empirical antibiotic choice has not been studied.

METHODS. A prospective observational cohort study in a 400 bed tertiary care hospital with 50 bed multidisciplinary intensive care unit in India, over a period of 18 months from 1st Jul. 2009 till 30th Dec. 2010. Patients who were admitted from the community to the medical floor and intensive care unit (ICU) with an admitting diagnosis of sepsis and

subsequently had a positive microbiological culture were studied. Patients transferred from other health care facilities were excluded. Patients were classified as having MDR or no MDR organism isolated. Demographics of the patient population was noted. In vitro susceptibility of microorganism was noted and appropriateness of initial antibiotic choice was analysed.

RESULTS. 500 patients who met the inclusion were analysed during the study period. The mean age of the study population was 59.2 years (+ 18.3) and 40 % were female. 44 % of the patients were admitted to the medical floor and 56 % to the ICU. In 54 % (n = 271) of the study population (n = 500) the empirical choice of antibiotic was correct. 55.2 % (n = 276) of patients had culture positivity for MDR organism. Of these 65.9 % (n = 182) had inappropriate antibiotic. This was in contrast to the 20.9 % (n = 47) of the 224 non MDR organisms isolated who received inappropriate antibiotic (p value < 0.05). MDR organisms commonly responsible for inappropriate choice of antibiotics were MDR Acinetobacter baumannii (16.5 %), the most commonly missed organism. This was followed by extended spectrum Beta-lactamase Escherichia coli (14.8 %), Amp C + ESBL Escherichia coli (7.9 %), Multi-drug resistant Pseudomonas aeruginosa (7.4 %), Amp C + ESBL Klebsiella pneumonia (6.5 %) and Multi-drug resistant Klebsiella pneumonia (5.2 %).

CONCLUSION. Inappropriate empirical antibiotic therapy is common in areas with high prevalence of MDR organism.

Cardiac arrest: CPR & beyond: 0343-0352

0343

SIMULATIONS IN CARDIOPULMONARY RESUSCITATION: FEARS TO BE ADDRESSED AND EXPECTATIONS TO BE FULFILLED

E. Geromarkaki¹, D.M. Fitrolaki¹, T. Tavladaki¹, A.M. Spanaki¹, E. Vasilaki¹, S. Ilia¹, E. Blevrakis¹, A. Chatzimichali¹, G. Briassoulis¹

¹University Hospital of Heraklion, PICU, Heraklion, Greece

INTRODUCTION. Surviving cardiac arrest depends on early cardiopulmonary resuscitation (CPR). Simulation training in Pediatric (PLS) and Advanced Pediatric (APLS) courses facilitates acquisition of critical CPR skills that have the potential to impact patient outcome.¹ The skills, but not simulations, are also offered in our Basic Life Support (BLS) courses. Unfortunately, the outcome of out-of-hospital cardiac arrests is bad, mostly due to lack of rescuers' specific skills or uncertainty imposed by different BLS algorithms.²

OBJECTIVES. To investigate fears and hesitations expressed by trainees concerning CPR implementation in different age victims; to assess their self-estimated competence in involved BLS, PLS, APLS skills, their attitudes to current and their expectations to future CPR algorithms.

METHODS. Medical students, nurses, junior residents, and rescuers had to pass a 5-hour BLS learning seminar (skill stations on CPR, defibrillator, intra-osseous needle, bag-mask ventilation, foreign body relief), or a 1-day PLS or 3-days APLS, also including cardiac arrest simulations. Successfully enrolled trainees were asked to fill up an anonymous questionnaire regarding CPR awareness, attitudes, and expectations regarding interventions that might improve arrest resource management performance.

RESULTS. Of the 324 (38.9 % male, 61.1 % female) trainees, 258 (79.6 %) participated in BLS (medical students 53.3 %), 23 (7.1 %) in PLS (nurses 100 %), 43 (13.3 %) in APLS (residents 100 %, p < 0.0001). BLS trainees would avoid inserting intraosseous needle in 39.4 % vs. PLS 0 % or APLS 9.3 % (p < 0.0001) or bag-mask ventilating (12.8 % vs. PLS 0 %, APLS 0 %, p < 0.04). They would equally attempt CPR in an adult (98.8 %), child (99.2 %) or infant (98.8 %), attempt CPR in a drowning infant (94.2 %) or defibrillate (94.2 %). PLS trainees were more unwilling to attempt a foreign body relief (17.4 % vs. BLS 1.5 %, APLS 0 %, p < 0.0001). New CPR providers were afraid of forgetting correct algorithms (APLS 16.7 %, PLS 4.3 %, BLS 10.9 %) or being in panic (males 15.9 %, females 34.8 %, p < 0.0001) not responding appropriately (BLS 28.2 %, PLS 17.4 %, APLS 27.9 %). BLS trainees suggested practicing twice a year (49 %) compared to once a year proposed by PLS (43.5 %) or APLS (46.5, p < 0.005). More females (14.1 %) characterized current BLS algorithms "not simple" compared to males (7.9 %, p < 0.06). Both suggested future CPR seminars should follow a simulation-based "all in one algorithm" (89.7 % and 90.9 %), mandatory in their education (98-100 %).

CONCLUSIONS. A simulation-based educational intervention (PLS, APLS) improves self-estimated competence of CPR providers and facilitates acquisition of critical BLS skills that have the potential to impact patient outcome. Efforts aiming at further simplifying different algorithms into an all-in-one future CPR might also reduce CPR-panic and improve BLS-attitudes.

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0344

INDICATION FOR ECPR - FROM THE COST EFFECTIVENESS ANALYSIS OF SAVE-J STUDY

T. Atsumi¹, T. Sakamoto², N. Morimura³, K. Nagao⁴, Y. Asai⁵, H. Yokota⁶, Y. Tahara⁷, M. Hase⁸, S. Nara⁹, Y. Asaka¹, K. Ariyoshi¹, SAVE-J Study Group

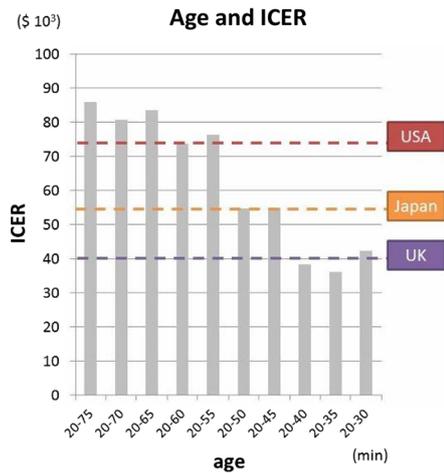
¹Kobe City Medical Center General Hospital, Department of Emergency Medicine, Kobe, Japan. ²Teikyo University School of Medicine, Department of Emergency Medicine, Tokyo, Japan. ³Yokohama City University School of Medicine, Department of Emergency Medicine, Yokohama, Japan. ⁴Surugadai Nihon University Hospital, Department of Cardiology, Resuscitation and Emergency Cardiovascular Care, Tokyo, Japan. ⁵Sapporo Medical University School of Medicine, Department of Emergency Medicine, Sapporo, Japan. ⁶Nippon Medical School, Department of Emergency and Critical Care Medicine, Tokyo, Japan. ⁷National Cerebral and Cardiovascular Center, Department of Cardiovascular Medicine, Osaka, Japan. ⁸Teine Keijinkai Hospital, Emergency and Critical Care Center, Sapporo, Japan

INTRODUCTION. The analysis from the SAVE-J study, extracorporeal cardiopulmonary resuscitation (ECPR) for out-of hospital cardiac arrest (OHCA) has shown to improve outcome. 1 But on the other hand, there is skeptical opinion about ECPR's cost effectiveness.

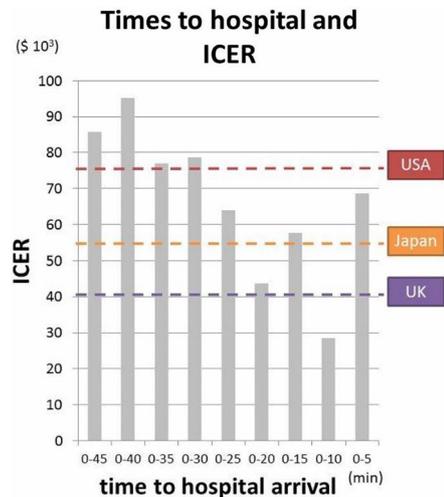
OBJECTIVES. This study is to determine the indication for ECPR from cost effectiveness point of view, by analyzing data of SAVE-J study.

METHODS. We evaluated quality adjusted life years (QALY) and incremental cost effectiveness ratio (ICER) from SAVE-J database. Different age groups and time to hospital arrival were sorted to extract data, and cost effectiveness of each group was compared.

RESULTS. The cost per one QALY was \$81,575 in ECPR group, and \$67,040 in non-ECPR group. The ICER was \$85,768 per QALY and ICER had tendency to decrease when limiting indication criteria.



Age and ICER



Time to hospital and ICER

CONCLUSIONS. In Japan, implementation of new treatment is said to be about \$50,000 ~ \$60,000 per QALY. In this study, ICER was about \$85,800 per QALY and this result was not excellent in terms of cost effectiveness. But when an implementation criteria was limited, ICER decreased to be reasonable enough to meet the criteria. By revising the implementation criteria, ECPR will be a treatment which matches cost effectiveness.

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0345

THERAPEUTIC HYPOTHERMIA (TH) INDUCTION DURING CARDIOPULMONARY RESUSCITATION - A CASE CONTROL TRIAL

G.J. Himaaldev¹, S. Pulgam², N. Rajagopalan², V. Jaicob²

¹29434, Narayana Hrudayalaya, Intensive Care, Bangalore, India, ²29434, Narayana Hrudayalaya, Critical Care, Bangalore, India

INTRODUCTION. The optimal timing of therapeutic hypothermia is still uncertain. It has been suggested that neurological injury could be decreased if target temperature of 32 degree centigrade could be achieved faster by initiating therapeutic hypothermia during the resuscitation as opposed to starting hypothermia after return of spontaneous circulation.

OBJECTIVES. To evaluate the feasibility, safety and efficacy of induction of hypothermia during cardiac arrest resuscitation before the return of spontaneous circulation (ROSC) in In Hospital Cardiac Arrest (IHCA) patients irrespective of their initial cardiac rhythm in patients between 18 to 70 years of age.

METHODS. We initiated Intra-arrest cooling (IAC) by infusion of ice cold saline in all eligible adult IHCA patients and continued further following ROSC with surface cooling for 24 h. Neurological status as assessed by Pittsburgh CPC (cerebral performance category) score following rewarming on 2nd day, 7th day and at the time of discharge was considered the primary outcome. Time required to achieve spontaneous circulation, time required to achieve target temperature (TTT), survival and complications related to hypothermia like arrhythmias, coagulopathy and electrolyte disturbances were considered to be the secondary outcomes. Institution review board and ethics committee approval was taken.

RESULTS. Among 34 patients in study (IAC) group, 9 were excluded, 5 were fully awake after ROSC, 4 died without ROSC. Initial cardiac rhythm was ventricular tachycardia (VT) in 2 (8 %) patients and asystole in 23 (92 %) patients. 14 (56 %) patients had survived and 7 (28 %) had good neurological recovery with CPC scores of 1 and 2. Mean time to achieve target temperature (TTT) was 208 ± 37 min. Mean ROSC time was 8 ± 4 min. In control

group of 25 patients, initial rhythm was VT in 1(4 %) and asystole in 24 (96 %). 9 (36 %) patients survived and 3 (12 %) had good neurological recovery. Mean TTT was 218 (SD 82) minutes. Mean ROSC time was 11 ± 5 min. No statistically significant difference was noted in ROSC, TTT, Neurological recovery and survival between the groups. There were no reported serious complications due to hypothermia in both the groups.

CONCLUSION. Initiation of Hypothermia during resuscitation is safe and feasible. Intra arrest cooling group showed better neurological recovery. Eventhough no statistical difference was found between the two groups, there was a clear indication in favor of intra - cardiac arrest hypothermia with regard to survival and neurological recovery. Results of this ongoing study should be able to throw more light on this.

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0346

THERAPEUTIC HYPOTHERMIA IN PATIENTS WHO ACHIEVE ROSC FOLLOWING CARDIAC ARREST: AN OVERVIEW OF CURRENT PRACTICE IN WEST MIDLAND CRITICAL CARE UNITS AND EMERGENCY DEPARTMENTS

T.L. Davis¹, N. Arora¹

¹Heart of England NHSTrust, Anaesthetic and Intensive Care Unit, Birmingham, United Kingdom

INTRODUCTION. Therapeutic hypothermia following cardiac arrest has become a standard component of post-resuscitation care^{1,2,3}

OBJECTIVES. To look at current practice of Critical Care Units and Emergency Departments in the West Midlands area regarding therapeutic hypothermia following cardiac arrest.

METHODS. A list of hospitals in the West Midlands area was compiled through online Deanery resources. Hospitals which did not have a Critical Care Unit or Emergency Department were excluded. 18 hospitals were identified as meeting these criteria. Individual departments were telephoned and asked to partake in the survey. Answers were recorded on a proforma.

RESULTS. Of the 18 Critical care units identified, all received cardiac arrest patients. 14 out of 18 used active cooling (78 %), 1 hospital used passive cooling and 1 did not use cooling at all. Of those that used active cooling 8 units used cooling systems (61 %), 2 units used cooling packs (15 %), 2 units used air blankets set to a cool setting (15 %) and 1 unit used a combination haemofiltration and ice (7 %). Of the 18 Emergency Departments identified 10 responded to the survey (55 %). All of these received cardiac arrest patients. 3 departments (30 %) used active cooling in cardiac arrest patients. Only 1 department (10 %) used a cooling system, 2 used ice packs and cold fluids. 70 % of Emergency Departments did not instigate active cooling.

CONCLUSIONS. From this survey we have established that despite current guidelines, implementation and practice of therapeutic hypothermia is varied among emergency departments and critical care units in the West Midlands. A majority of critical care units are using therapeutic hypothermia in those that meet criteria; over half are using specific cooling systems, which may be associated with fewer side effects. Therapeutic hypothermia within emergency departments is less common. However there was only a 50 % response rate in departments so may not be wholly representative. Current guidelines state "cool as soon as possible"³, most of the studies this guideline is based on achieved target temperature in 2-4 h; therefore cooling should ideally start in emergency departments. 70 % of emergency departments did not actively cool patients in hospitals in which critical care units did have a cooling protocol. This delay in treatment could lead to loss of benefit from therapeutic hypothermia and is not in keeping with current NICE guidelines.

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0347

COMPARISON OF THE I-GEL® VERSUS ENDOTRACHEAL INTUBATION FOR IN-HOSPITAL TREATMENT OF OUT-OF-HOSPITAL CARDIAC ARREST

Y.H. Lee¹, S.M. Park¹

¹Hallym University Sacred Heart Hospital, Hallym University Medical Center, Department of Emergency Medicine, Anyang-si, Republic of Korea

INTRODUCTION. 2010 American Heart Association (AHA) guideline emphasize airway management for victims with out-of-hospital cardiac arrest (OHCA)[1]. However, the optimal method for managing the airway during cardiac arrest remains controversial[2]. Most patients with OHCA have been managed with back valve mask (BVM) by emergency medical service (EMS) providers and doctors have inserted advanced airways in emergency rooms in Korea.

OBJECTIVES. We compared OHCA outcomes between patients receiving endotracheal intubation (ETI) and the Comparison of supraglottic airway versus endotracheal intubation for the pre-hospital treatment of out-of-hospital cardiac arrest in an in-hospital setting.

METHODS. A retrospective chart review was done on non-traumatic OHCA who were managed either ETI or the i-gel® in the department of emergency medicine at Hallym University Hospital from January 2012 to January 2014. Primary outcome was neurologically-intact survival to hospital discharge (cerebral performance category 1-2). And secondary outcome were sustained ROSC, survival to hospital discharge and rate of successful insertion.

RESULTS. Of 260 non traumatic adult OHCA, 172 the i-gel®, 88 received ETI. Unadjusted neurologically-intact survival was: ETI 4.5 %, the i-gel® 3.5 % (p = 0.68). Compared with the i-gel®, ETI achieved no differences in sustained ROSC (p = 0.28) and hospital survival (p = 0.36). The i-gel® had a significantly higher success rate than ETI (97.1 versus 87 %; p = 0.002).

CONCLUSION. There was no difference in neurologically favorable outcome, sustained ROSC and hospital survival from non-traumatic OHCA for ETI versus i-gel in hospital setting. However, the i-gel® supraglottic airway was associated with higher successful insertion rate. **REFERENCES.** 1. Neumar RW, Otto CW, Link MS et al. Part 8: adult advanced cardiovascular life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2010; 122: S729-767. 2. Deakin CD, Nolan JP, Soar J et al. European Resuscitation Council Guidelines for

Resuscitation 2010 Section 4. Adult advanced life support. *Resuscitation* 2010; 81: 1305-1352.

0348

AN EARLY TEST TO PREDICT A 6-MONTH NEUROLOGICAL OUTCOME AFTER CARDIAC ARREST: NEURON SPECIFIC ENOLASE OR SSEP?

V. Campanile¹, A. Peratoner², F. Verginella², M. Zuliani², P. Rossini², A. Scamperle², P. Grassi²

¹Emergenza - Anestesia e Rianimazione, Ass1 Triestina-118, Trieste, Italy, ²University Hospital, Perioperative Medicine, Intensive Care and Emergency Medicine, Trieste, Italy **INTRODUCTION.** Anoxic coma following cardiac arrest (CA) is a common problem with ethical, social and legal consequences. Since the beginning of Therapeutic Hypothermia Era¹ using recently Target Controlled Temperature Management² too, patients are maintained on sedation for a number of days until the management of the temperature is done, to reduce brain-metabolism and to avoid shivering.

OBJECTIVES. We would determine which of our routine tests is the best to overview and predict the 6-month neurological outcome.

We focus our analysis on the evaluation of the Neuron Specific Enolase (NSE) and on the recording of evoked somatosensory potentials (SSEP).

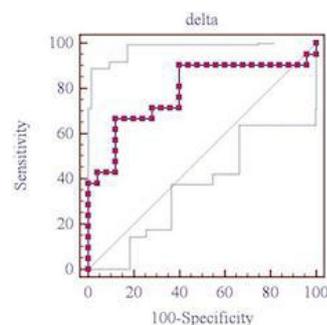
METHODS. Our target is to correctly manage the temperature in all patients with GCS ≤ 8 after in- and out of hospital CA and ROSC within 60 min. In our protocol we test NSE for the first 2 days. We record SSEP two times: the first when the patient reaches the target temperature, the second when the patient reaches 37 °C.

We paid attention to all NSE results, to the Δ NSE calculation, and to the amplitude of the N20 wave, recorded trough SSEP.

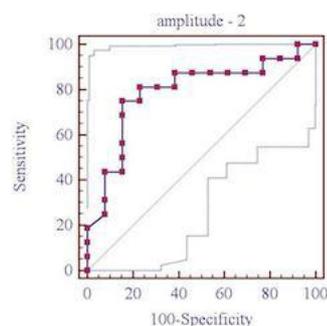
Neurological outcome at 6 months is assessed using Cerebral Performance Category Scale (CPC).

RESULTS. Using ROC analysis we estimated the cut-off value of good decrease of NSE on the 2nd day (-5.7 ng/dl; significance level P = 0,0001) and of n20 amplitude at 37 °C (0.71 μ V; significance level P = 0,0013).

We then tested the results obtained trough the Stepwise Method and noticed that N20 amplitude is a stronger predictor than Δ NSE. The odd ratio of N20 amplitude is 11,2 with an area under the ROC curve (AUC) of 0,864.



Delta NSE



N20 amplitude

CONCLUSIONS. NSE is a validated test to monitor the brain damage after an anoxic insult. N20 amplitude seems to be the most reliable early predictor of good neurological outcome after cardiac arrest. N20 amplitude appears to be the real expression of the residual neuron population.

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0349

CHARACTERISTICS AND OUTCOMES OF CARDIOPULMONARY ARREST FOR 3 YEARS IN A TERTIARY HOSPITAL

A. Iglesias Santiago¹, M. Colomo Gonzalez¹, R. de la Chica Ruiz-Ruano¹, A. Sanchez Gonzalez¹, ARIAM-Andalucia

¹Hospital Virgen de las Nieves, Intensive Care Unit, Granada, Spain

OBJECTIVES. To describe the characteristics and outcomes of patients who suffered a cardiopulmonary arrest (CPA) in a tertiary hospital, according to Utstein style.

METHODS. It was performed a prospective cohort study, according to Utstein style, of every in-hospital CPA occurred in the Medical-Surgical center in Hospital Universitario Virgen de las Nieves for a period of 3 years (July 2009 to June 2012). CPA occurring in operating theatre and recovery area and those in which extra-hospital life support manoeuvres were initiated were excluded. All patients in whom resuscitation was not performed or in which were suspended, by the existence of an advance care plan, by the existence of do not attempt cardiopulmonary resuscitation orders that were not known at the start of resuscitation or in which resuscitation was deemed futile, were also excluded. Results were expressed as percentages, means and medians \pm standard deviation.

RESULTS. During this period 297 patients suffering at least one CPA episode and were resuscitated. Treated patients were mostly males (61,3 %) and the median age was 69 years (65.2 \pm 14.2, interquartile range 57-76 years). The most common etiology was cardiac pathology (40,4 %, ischemic heart disease was responsible for 11,4 % of total). The second most common etiology (24 %) was respiratory followed by CPAs of unknown cause (13,8 %). Regarding the location where CPA occurred, the ICU was the most frequent location (43,8 %), followed by wards (27,3 %). The predominant initial rhythm in our patients were PEA/extreme bradycardia (43 %), and only 22,6 % had an initial shockable rhythm. In the initial shockable rhythms median delay until the electric treatment was performed was 4 min (6,9 \pm 8,4 min). Survival to hospital discharge was 22,9 %. 68 patients were discharged from the hospital, 57 of them presented good functional status (83,8 %), 8 moderate disability (11,7 %) and only 3 severe disability (4,4 %).

CONCLUSIONS. The hospital survival in our environment is similar to the commonly described. The archetypal patient is a male in the seventh decade of life, which suffers a CPA of cardiac etiology and non-shockable rhythm and shows good functional status at hospital discharge.

0350

CARDIAC ARREST AND MILD THERAPEUTIC HYPOTHERMIA: PRELIMINARY RESULTS OF A NATIONAL REGISTRY IN SPAIN

A. Loza-Vazquez¹, F. Del Nosal-Sáez², C. León-Gil¹, A. Lesmes-Serrano¹, Grupo PCRR-HT del GTCC- PNRCV y SEMICYUC

¹University Hospital of Valme, Intensive Care Unit, Seville, Spain, ²National Plan CPR, Madrid, Spain

BACKGROUND. There aren't nationwide data in Spain on the incidence and results of treatment of patients recovered out-of-hospital and in the hospital settings from an episode of cardiac arrest.

OBJECTIVES. To determine,

- the epidemiology and results of cardiac arrest recovery and,
- to assess the use and prognostic influence of mild therapeutic hypothermia (MTH).

METHODS. Prospective observational cohort multicentre study conducted in adult polyvalent ICUs in Spain. Cohorts were patients suffering from cardiac arrest out-of-hospital or during their stay in the hospital, undergoing recovery manoeuvres and arriving to the ICU. The Utstein Style criteria were used for cardiac arrest reporting. Epidemiological variables, demographic data and neurological functional capacity were recorded at hospital discharge and at 6 and 12 months thereafter. Data were registered using a web-based platform. <https://pcr-hipotermia.investigacion-intensivos.org>. Data of the first patients included in the registry between January and March, 2014, are analyzed. Descriptive results are presented and expressed as frequencies and percentages, or mean and standard deviation (SD) or median and interquartile range (IQR).

RESULTS. A total of 87 participating ICUs provided data of 104 cases. Seventy-two (69,2 %) patients were men, with a median age of 68 years. Cardiac arrest occurred out-of-hospital in 61 % of cases (at home in 33 %, at the street in 17,3 %) and in-hospital in 39 % (at the emergency department in 14 %). Witnessed cardiac arrest was registered in 96 % of cases, including a family member and health care personnel with and without monitoring 36,5, 25 and 13,5 % of cases, respectively. Previous life support was recorded in 48 patients (46,2 %). First cardiac rhythm included ventricular fibrillation, asystole and pulseless electrical activity/electromechanical dissociation in 36,5, 36 and 13 % of cases, respectively. Return of spontaneous circulation was achieved before 20 min in 66 patients (63,5 %). Post-resuscitation treatment included MTH in 53 cases (51 %), percutaneous coronary intervention in 22 (21,2 %) and fibrinolysis in 2. Cooling methods during the maintenance phase of MTH included the use of thermal blanket, ice packs and hydrogel plates in 14,4, 13,5 and 8,7 % of cases, respectively. The intra ICU mortality was 37,5 % (39 cases). They were discharged 65 patients, of whom 33 % had good neurological outcome with Cerebral Performance Category CPC (1 and 2).

CONCLUSIONS. The majority of cases of Cardiac arrest recovery occurred outside the hospital, at home and were witnessed, with previous life support and MTH performed in half of the cases. External cooling methods were the most commonly used. Also, one-third of the patients who survived had a good neurological outcome CPC (1 and 2).

0351

HYPOTHERMIA PROTOCOL: EXPERIENCE IN AN INTENSIVE CARE UNIT

B. Amaral¹, S. Alves², M. Isidoro², V. Fonseca², F. Barros², A. Ramos²

¹HPP Hospital de Cascais Dr. José de Almeida, Unidade de Cuidados Intensivos, Cascais, Portugal, ²HPP Hospital de Cascais Dr. José de Almeida, Cascais, Portugal

INTRODUCTION. Mortality from cardiac arrest (CA) is very high, even when advanced life support (ALS) is precocious. Therapeutic hypothermia to improve survival and neurological outcomes, has been used in judiciously selected patients.

METHODS. We performed a retrospective study from 2010 until 2014, in our Intensive Care Unit (ICU), which included hospitalized patients after CA. Were included 80 patients, however 10 were excluded: the exclusion criteria were the return to spontaneous circulation (ROSC) with only life basic support, or not ROSC after ALS. It was performed a multivariate data analysis: age, gender, place where CA occurred, initial rhythm, inclusion in the hypothermia protocol, neurological status by CT imaging and death. The criteria for inclusion in the hypothermia protocol were: CA at any initial rhythm, resulting in ROSC (ventricular fibrillation/ventricular pulseless tachycardia/asystole/pulseless electrical activity), age over 14, GCS below 8 points, systolic BP above 90 mmHg (under aminergic support or not) and initial temperature above 34 °C. In the included patients, hypothermia was began as soon as possible (20 min to 6 h after CA) and was maintained for 24 h, under sedation and curarization, with target temperature of 32-34 °C.

RESULTS. Of the 70 patients included, 44,3 % were women and 55,7 % men. CA occurred at younger ages in males (37,5 % versus 20 % under 65) (p0.18) and these had a higher survival rate compared to females (65,4 % versus 34,6 %) (p0.36). However, 30,8 % of the discharged patients had less than 65 compared with 69,2 % aged over 65 (p0.56). 62,7 %

patients died, 58,6 % during the ICU admission. Only 17 patients were included in the hypothermia protocol, and from those 7 survived (41 %) compared to 22 who did not undergo hypothermia (45,8 %) (p0.026). Also, the arrest rhythm was compared and from 85,7 % who presented an initial non-shockable rhythm, 11 were included in the hypothermia protocol. From shockable rhythm patients, 6 (out of 10) were included (p0.010) of which 4 survived (57,1 % of all patients who underwent hypothermia and were discharged). Regarding the neurological outcome, the CT scanning presented anoxia images in 16,7 % of patients who were discharged (33,3 % of patients undergoing hypothermia versus 66,7 %) (p0.17). Of all CA, 9 occurred in the pre-hospital, and only 3 of them survived (33,3 %), however, compared with the 22 inpatients who survived (36,1 %) the difference was not statistically significant (p0.004).

DISCUSSION. The success of therapeutic hypothermia on survival and neurological outcomes has been questioned in recent studies. Our study, reinforces the ineffectiveness of this therapy regarding to survival. However, with respect to neurological outcome, there was a statistically significant decrease in anoxic lesions prevalence in patients undergoing hypothermia protocol.

0352

TARGETED TEMPERATURE MANAGEMENT AFTER OUT OF HOSPITAL CARDIAC ARREST: AN AUDIT OF CURRENT PRACTICE AND OUTCOMES IN THE CTICU OF A LONDON TEACHING HOSPITAL

J. Bailes¹, M. Leopold¹, D. Spray¹

¹St George's Healthcare NHS Trust, Cardiothoracic Intensive Care, London, United Kingdom

INTRODUCTION. Induction of mild hypothermia (33 °C - 36 °C) has been shown to prevent and moderate the damage caused by out of hospital cardiac arrest (OHCA) [1]. There are a number of practical difficulties when considering targeted temperature management (TTM) after OHCA. The nature of these difficulties can result in TTM being started too late in the disease process.

OBJECTIVES. To measure overall outcomes in the CTICU of patients admitted with OHCA. To audit the timing of onset of TTM and length of time to reach target temperature on arrival in CTICU. To measure the range of temperatures during the TTM period with a never event for temperatures to drop below 31 °C or above 38 °C up to 48 h from return of spontaneous circulation (ROSC).

METHODS. A prospective audit, conducted over a two and a half month period (1/9/2013 - 20/11/2013). Sources of data collection included London Ambulance Service (LAS) handover sheets, patient notes, electronic patient record (EPR) and CTICU daily charts.

RESULTS. 20 patients were included with a male:female ratio of 16:4 and age range 23-80 years (median 63). 19 patients suffered a VF arrest and one was admitted post PEA arrest.

Average time from ROSC to admission to CTICU was 4.26 h (median 3.75, range 1.75-11.0 h). Once in CTICU the average time from arrival to the start of TTM was 2.61 h (median 2.25, range 0.50-6.00 h) and average time from ROSC to start of TTM was 6.97 h (median 5.75, range 3.25 to 14.00). Target temperature was reached in an average of 4.83 h from start of TTM (median 4.00, range 0.25-16.25 h). In terms of unit outcome, 13 patients survived (68.4 %) and 6 died (31.6 %). Of the 13 that survived, 8 were discharged from CTICU with a GCS of 15, 4 with a GCS of 14 and 1 was transferred to another hospital with a GCS of 8.

CONCLUSIONS. The treatment of out of hospital cardiac arrests and the speed at which TTM is started from ROSC depends on many factors, most of which are outside the control of any intensive care unit. However, the speed at which TTM is started once a patient has arrived in the intensive care unit is a time that can be strictly controlled. At present there is no clear time target for when TTM should be started from arrival.

Reference must be made to the recent NEJM trial [1] where hypothermia at a targeted temperature of 33 °C did not confer a benefit as compared with a targeted temperature of 36 °C. It is also noteworthy that the survival rate in this audit was 68.4 % compared to 50 % and 48 % in the TTM trial.

AUDIT RECOMMENDATIONS.

- A proposed protocol to facilitate the decision making process in TTM.
- A target of 1 h from arrival to initiation of TTM.
- Comprehensive coverage of TTM within local induction.

REFERENCE(S). 1. Targeted Temperature Management at 33 °C versus 36 °C after Cardiac Arrest. Nielsen N et al. N Engl J Med. 2013 Nov 17.

Hospital-acquired infections: 0357–0370

0357

IMPACT OF TWO YEARS APPLICATION OF SELECTIVE DECONTAMINATION OF THE DIGESTIVE TRACT IN A MIXED INTENSIVE CARE UNIT IN A UNIVERSITY TERTIARY-CARE HOSPITAL

C. Sánchez Ramírez¹, M. Cabrera Santana¹, A. Hernández Viera¹, S. Hípola Escalada¹, L. Caípe Balcárcel¹, N. Sangil Monroy², J.L. Romero Luján¹, V. Peña Morant¹, A. Padrón Mujica¹, P. Saavedra Santana³, S. Ruiz Santana¹

¹University Hospital of Gran Canaria Dr Negrin, Intensive Care Unit, Las Palmas de Gran Canaria, Spain, ²University Hospital of Gran Canaria Dr Negrin, Pharmacy Department, Las Palmas de Gran Canaria, Spain, ³Las Palmas de Gran Canaria University, Mathematics and Informatics Department, Las Palmas de Gran Canaria, Spain

INTRODUCTION. Selective Digestive Decontamination (SDD) is an antimicrobial prophylaxis proposed to reduce the incidence of severe infections of lower airways (1). Despite of the evidence accumulated its use remains controversial.

OBJECTIVES. To prospectively evaluate the impact of SDD application to prevent nosocomial infections, after two years.

METHODS. This study was conducted in a 30-bed-medical-surgical ICU. All consecutive patients admitted to the ICU from October 1, 2011 to September 30, 2013 expected to require tracheal intubation for longer than 48 h were given SDD (SDD study group) with a 4-day course of intravenous cefotaxime, plus enteral polymixin E, tobramycin, amphotericin. B in an oropharyngeal paste and in a digestive solution. Oropharyngeal and rectal swabs were obtained on admission and once weekly. Nosocomial infections were diagnosed by ENVIN HELICS programme criteria. We compared all patients admitted to ICU with nosocomial ICU infections from October 1, 2011 to September 30, 2013 (SDD group) to non-SDD group. In both groups, categorical variables were summarized as frequencies and percentages and the continuous ones as means and standard deviations (SD) when the data followed the normal distribution or medians and interquartile ranges (IQR) when they did

not. The percentages were compared using the test of Chi square test or Fisher exact test, means with the t-test and medians with the Wilcoxon test for independent samples. For each one of the acquired infections (catheter-related and other secondary bacteremias, pneumonia and urinary infections) the incidences per 1000 days of exposure in each cohort and the corresponding relative risks were obtained using the Poisson regression. Statistical significance was set at $p \leq 0.05$. The data were analyzed using PASW statistical software (SPSS). **RESULTS.** Results are shown in Tables.

Table 1 Univariate analysis.

		SDD		P
		No N = 110	Yes N = 122	
Age, years		59.5 ± 15.8	60.5 ± 17.1	.654
Male/Female, %		67.3 / 32.7	68.0 / 32.0	.902
Apache-II		21.2 ± 7.7	22.0 ± 7.2	.406
Glasgow Coma score		15 (8 ; 15)	14 (9 ; 15)	.111
McCabe score				.358
		1 89 (80.9)	94 (77.0)	
		2 21 (19.1)	26 (21.3)	
		3 0	2 (1.6)	
Patients				.945
	Medical	79 (71.8)	87 (71.3)	
	Scheduled surgery	10 (9.1)	10 (8.2)	
	Emergency surgery	21 (19.1)	25 (20.5)	
Inflammatory response				.002
	Normal	2 (1.8)	4 (3.3)	
	Sepsis	23 (20.9)	32 (26.2)	
	Severe sepsis	34 (30.9)	13 (10.7)	
	Septic shock	51 (46.4)	73 (59.8)	
Days in ICU		35 (20 ; 54)	36 (21 ; 74)	.725
Deaths, n (%)		36 (32.7)	36 (29.5)	.597
Previous surgery, n (%)		22 (20.0)	25 (20.5)	.926
Trauma patients, n (%)		17 (15.5)	17 (13.9)	.744
MRGNB		12 (10.9)	2 (1.6)	.003
Acinetobacter baumannii		13 (11.8)	3 (2.5)	.005
VRE		0	0	-
ESBL		38 (34.5)	18 (14.8)	< .001
MRSA		4 (3.6)	3 (2.5)	.711
Pseudomonas MR		10 (9.1)	12 (9.8)	.847
Diabetes mellitus, n (%)		34 (30.9)	36 (29.5)	.816
Liver cirrhosis, n (%)		6 (5.5)	9 (7.4)	.552
COPD ¹ , n (%)		9 (8.2)	18 (14.8)	.119
Renal Failure, n (%)		40 (36.4)	33 (27.0)	.127
Neoplasia, n (%)		10 (9.1)	13 (10.7)	.690
CAD patients, n (%)		19 (17.3)	19 (15.6)	.727
Parenteral Nutrition, n (%)		26 (23.6)	35 (28.7)	.363
Immunosuppression, n (%)		8 (7.3)	9 (7.4)	.976
Neutropenia, n (%)		3 (2.7)	3 (2.5)	.1
Leukocytosis, n (%)		82 (74.5)	81 (66.4)	.175
Anemia, n (%)		16 (14.5)	13 (10.7)	.371
Malnutrition, n (%)		12 (10.9)	5 (4.1)	.047

COPD¹: Chronic obstructive pulmonary disease; SDD: Selective Digestive Decontamination; CAD: Coronary artery disease; MR: Multiresistant; ARB: Antibiotic resistant bacteria; MRGNB: Multiresistant Gram Negative Bacteria; VRE: Vancomycin Resistant Enterococcus; MRSA: Meticillin-resistant Staphylococcus Aureus

and

Table 2. Rate/ 1000 days exposure

		SDD*		P	RR (95% CI)
		No	Yes		
Pneumonias/MV*	Pneumonias/1000 days/MV	9.85	4.03	< .001	0.417 (0.285 ; 0.611)
Urinary infections	Urinary infection/1000 days urinary catheter	3.33	1.92	0.031	0.575 (0.348 ; 0.951)
CRB ² and primary Bacteremia	Bacteremias/1000 days/CVC	3.59	3.04	0.501	0.847 (0.521 ; 1.375)
Secondary bacteremias/	Secondary bacteremias/1000 days UCI	3.38	1.63	.005	0.482 (0.290 ; 0.800)
N° ARB	N° ARB/1000 days in UCI	9.48	2.25	< .001	0.237 (0.163 ; 0.344)

* SDD: Selective digestive tract decontamination; MV: Mechanical ventilation; CRB: Catheter related Bacteremia; CVC: Central vein catheter; ICU: Intensive Care Unit; ARB: Antibiotic resistant bacteria; RR: Relative Risk; CI: Confidence Interval

Patients with SDD had significantly less Extended Spectrum Bacteraemias (ESBLs) and Antibiotic Resistant Bacteria (ARB) infections. We had also a significant reduction in ICU: nosocomial pneumonias, urinary tract infections, other secondary bacteremias and multi-resistant bacteria infection rates in SDD group versus non SDD. There was no any infection by Clostridium difficile. There was a notorious decrease on the defined antibiotics daily doses (DDD)/100 ICU stays during SDD Isolated microorganisms are shown in Table.

	SDD	
Isolated microorganisms	No = 170	Yes = 156
Acinetobacter baumannii, number(n)	19	4
Enterobacter cloacae.n	20	10
Escherichia coli.n	11	11
Klebsiella pneumoniae.n	30	20
Pseudomonas aeruginosa.n	22	37
Candida albicans.n	8	7

[Table 3. Isolated microorganism]

CONCLUSIONS. After two years applying SDD a significant reduction in nosocomial pneumonia, urinary infections and secondary bacteremias rates, together with a significant decrease of ARB infections and antibiotic consumption was shown compared to the non-SDD group.

REFERENCE. Liberati A, D'Amico R, Pifferi S, et al. Antibiotic prophylaxis to reduce respiratory tract infections and mortality in adults receiving intensive care. Cochrane Database Syst Rev 2009;CD000022.

0358

APPLICATION OF THE RECOMMENDATIONS FOR THE PREVENTION OF VENTILATOR-ACQUIRED PNEUMONIA (VAP) AND THE OPTIMIZATION OF THE ANCILLARY MEDICAL CARE- DOES IT HELP DECREASING THEIR RATE INCIDENCE?

M. Karoui¹, S. Kamoun¹, A. Ben Souissi¹, M. Ben Romdhan¹, I. Nefzi¹, M.S. Mebazaa²
¹Mongi Slim Hospital La Marsa, Sidi Daoued, Tunisia, ²Mongi Slim Hospital La Marsa, Anesthesiologist and ICU, Sidi Daoued, Tunisia

INTRODUCTION. VAP is the most frequent ICU acquired infection. It is associated with a very significant mortality rate which ranges from 20 to 50 % and can reach 70 %. The reduction of these infections is thus of major concern. Several preventive measures can be put to work in order to reduce their incidence effectively.

OBJECTIVES. To observe the consequences of the various measures taken in a new ICU on the incidence of the VAP and the mortality rate.

METHODS. Prospective study was conducted on all patients admitted in our ICU and requiring tracheal intubation and mechanical ventilation (MV) more than 48 h. The patients were subdivided into two groups according to the periods: between April and August 2013, all the episodes of VAP were documented (Gr-1). In September 2013, an action plan modifying the preventive measures of the VAP was set up (Gr-2). This date was used as a reference to evaluate our practices before and after installation of preventive measures. The principal criterion of judgment was the density of incidence of the VAP. Secondary criteria were the duration of MV and ICU stay, mortality rate, antibiotic consumption and the modification of bacterial ecology. Test of t-Student for the quantitative variables and Chi2 with Fisher correlation for the qualitative variables. $p < 0.05$ was considered significant.

RESULTS. The study included 84 patients: 50 of which were in the Gr-1 and 34 patients in Gr-2. Demographic characteristics of the studied population (age, gender, race, index of body mass) and the rate of tobacco addiction were not different. The SAPS II was 38 in Gr-1 and 34 in Gr-2. The average duration of stay in ICU decreased by 27.8 to 12 days ($p < 0.05$). The incidence of VAP was significantly reduced passing by 58 % to 46.4 % ($p < 0.05$). In the Gr-1, 100 % of the VAP were early (<5 days) versus 47 % in the Gr-2 ($p < 0.05$). In Gr-1, 91.3 % of the patients presented two episodes of VAP during their stay compared to the Gr-2: 44.12 % ($p < 0.05$). Mortality rate was decreased by 60.9 (Gr-1) to 44 % (Gr-2). Bacteriological profile of the early VAP in the Gr-1 was dominated by Klebsiella pneumoniae (34.8 %) and Acinetobacter baumannii (17.4 %). In the Gr-2, E. coli and staphylococcus aureus were the two prevalent germs (27.27 %).

DISCUSSION. The application of strict protocols and specific strategies results in a decrease incidence of VAP.

These protocols and strategies consist in:

- Reducing the duration of MV and using noninvasive MV whenever possible,
- Keeping patients in the semi recumbent position (45°) except against indication,
- Maintaining endotracheal tube cuff pressure above 20 cm H₂O, and
- Using a heat-and-moisture exchanger or heated-wire circuit instead of a conventional active humidifier.

However, these several measures did not show an impact on antibiotic consumption or on bacterial ecology. It is imperative to respect the recommendations for VAP prevention and to try to develop new measures.

0359

PREVENTION OF VENTILATOR-ASSOCIATED PNEUMONIA (VAP): IS STAYING A PLACE FOR THE SUBGLOTTIC SECRETIONS DRAINAGE IN 2014? THE PREVAP VENDEE STUDY

J.-C. Lacherade¹, K. Bachoumas¹, A. Caille², J.-B. Lascarrrou¹, N. Maquigneau¹, A. Yehia¹, M. Fiancette³, M. Henry-Lagarrigue⁴, E. Chalou³, N. Jacob⁴, C. Desbards⁵, J.-M. Huneault⁴, C. Lebert¹, I. Vinatier¹, L. Martin-Lefevre¹, C. Hurlepe⁵, J. Dimet⁶, J. Reigner¹

¹CHD Vendee, Intensive Care Unit, La Roche sur Yon, France, ²CIC INSERM 1415, Tours, France, ³CHD Vendee, Emergency Department, La Roche sur Yon, France, ⁴Centre Hospitalier Côte de Lumière, Emergency Department, Les Sables d'Olonne, France, ⁵CHD Vendee, Pharmacy Department, La Roche sur Yon, France, ⁶CHD Vendee, Clinical Research Unit, La Roche sur Yon, France

INTRODUCTION. Drainage of subglottic secretions (SSD) is recommended to prevent the occurrence of VAP with a high level of evidence, especially in considering early-onset pneumonia (1). Nevertheless, uncertainties are remaining: the impact of the new generation of endotracheal tube allowing SSD in a context of low baseline VAP incidence and the harmlessness of the use of SSD.

OBJECTIVES. The primary objective was to assess the impact of SSD on the incidence of microbiologically-confirmed and adjudicated VAP. Secondary objectives were the SSD impact on: rate of Ventilator-Associated Event according to the CDC definition, incidence of postextubation laryngeal dyspnea, use of antibiotics, duration of mechanical ventilation and of ICU stay, ICU and hospital mortality.

METHODS. SSD has been implemented in our ICU during May of 2011. A preventive VAP bundle has been already used in our ICU including semirecumbent body position, oropharyngeal care with chlorhexidine, endotracheal cuff pressure between 20-30 cm H₂O and sedation algorithm. The SSD implementation was the opportunity to perform this before (retrospective)-after (prospective) study.

To be close to the routine practice, the specific endotracheal tubes allowing SSD were available not only in our unit but also in the emergency department and in the pre hospital mobile intensive care unit of our hospital and of one of the neighbouring hospitals. In the SSD period, subglottic secretions were suctioned manually using a 10-ml syringe every 2 h. During the study periods, patients requiring invasive mechanical ventilation for more than 48 h have been included. The main non-inclusion criteria were: patients admitted in ICU after a planned surgery or with a tracheostomy tube and patients intubated with another

endotracheal tube than the specific one allowing SSD during the second study period. The study protocol was approved by an appropriate ethics committee. We estimated the incidence of VAP of 14 % in the control period and 7 % after the SSD implementation. 300 patients to each period would allow detection of this difference with 80 % power and a 2-tailed significance level of .05. **RESULTS.** 600 patients have been included: 300 from June 2009 to December 2010 during the control period and 300 during the SSD period from July 2011 to January 2014. Data were extracted from our electronic medical record. The VAP adjudication has been performed the 3 April of 2014. Statistical analysis will be performed by the INSERM Clinical Investigating Center 1415 of Tours (France) in June 2014. **CONCLUSIONS.** This before/after study focused on the impact of SSD in the context of low baseline VAP incidence. All results will be provided at the 2014 annual ESICM congress after final analysis. **REFERENCE(S).** 1. Subglottic secretion drainage for the prevention of ventilator-associated pneumonia: a systematic review and meta-analysis. Muscedere J, Rewa O and al. Crit Care Med. 2011;39:1985-91

0360
SELECTIVE DECONTAMINATION OF THE DIGESTIVE TRACT AND OTHER RISK FACTORS FOR THE DEVELOPMENT OF NOSOCOMIAL PNEUMONIA IN AN ICU

C. Sánchez Ramírez¹, M. Cabrera Santana¹, A. Hernández Viera¹, L. Caipe Balcazar¹, S. Hípola Escalada², J.L. Romero Luján¹, N. Sangil Monroy², P. Saavedra Santana³, S. Ruiz Santana³
¹University Hospital of Gran Canaria Dr Negrín, Intensive Care Unit, Las Palmas de Gran Canaria, Spain, ²University Hospital of Gran Canaria Dr Negrín, Pharmacy Department, Las Palmas de Gran Canaria, Spain, ³Las Palmas de Gran Canaria University, Mathematics and Informatics Department, Las Palmas de Gran Canaria, Spain
INTRODUCTION. Nosocomial Pneumonia (NP) is a common cause of morbidity in critically ill patients. Interventions beneficial to the prevention of NP have a significant impact on the care of these patients [1]. **OBJECTIVE.** To identify risk factors associated to the development of NP in patients admitted to an Intensive care Unit (ICU). **METHODS.** Prospective study that included patients that developed NP from October 1, 2010 to September 30, 2013. We applied Selective Decontamination of the Digestive tract (SDD) from October 1, 2011 to September 30, 2013 We used ENVIN-Helices NP diagnosis criteria. We analyzed most of the independently risk factors of NP showed. Categorical variables were summarized as frequencies and percentages and the continuous ones as means and standard deviations (SD) when the data followed the normal distribution or medians and interquartile ranges (IQR) when they did not. The percentages were compared using the test of Chi square test or Fisher exact test, means with the t-test and medians with the Wilcoxon test for independent samples. Those variables that showed statistical significance with the mortality in the univariate analysis were introduced in a multivariate logistic regression analysis. A retrospective variable selection based on the Akaike information criterion was performed. The logistic multidimensional resulting model was summarized as p-values corresponding to the likelihood ratio tests and in adjusted odd-ratios which were estimated by means of 95 % confidence intervals. Statistical significance was set at p < 0, 05. The data were analyzed using PASW statistical software (version 18.0, SPSS, Chicago IL). **RESULTS.** 232 patients were included in the study. The risk factors analysis to developing NP is summarized in Tables

Table 1. Univariate analysis

	Nosocomial Pneumonia		P
	Yes N = 107	No N = 125	
Age, years	55.1 ± 16.8	64.3 ± 15.0	< .001
Male / Female, %	73.8 / 26.2	62.4 / 37.6	.063
Apache-II	21.3 ± 7.2	21.9 ± 7.6	.531
Glasgow Coma Score	12 (7; 15)	15 (12; 15)	< .001
McCabe score			.309
	1	89 (83.2)	94 (75.2)
	2	17 (15.9)	30 (24.0)
	3	1 (0.9)	1 (0.8)
SDD, n (%)	48 (44.9)	74 (59.2)	.029
Patients			.002
	Medical	79 (73.8)	87 (69.6)
	Scheduled surgery	2 (1.9)	18 (14.4)
	Emergency surgery	26 (24.3)	20 (16.0)
Days in UCI,	38	33	.206
Deaths	38 (35.5)	34 (27.4)	.185
Inflammatory response			.003
	No	0	6 (4.8)
	Sepsis	17 (15.9)	38 (30.4)
	Severe sepsis	22 (20.6)	25 (20.0)
	Septic Shock	68 (63.6)	58 (46.8)
Previous surgery	18 (16.8)	29 (23.2)	.228
Trauma patients, n (%)	24 (22.4)	10 (8.0)	.002
Catheter related Bacteremias, n (%)	15 (14.0)	55 (44.0)	< .001
Secondary bacteremias, n (%)	13 (12.1)	47 (37.6)	< .001
Diabetes mellitus, n (%)	30 (28.0)	40 (32.0)	.512
Liver cirrhosis, n (%)	7 (6.5)	8 (6.4)	.965
COPD, n (%)	11 (10.3)	16 (12.8)	.551
Urinary infections, n (%)	14 (13.1)	47 (37.6)	< .001
Renal failure, n (%)	31 (29.0)	42 (33.6)	.449
Neoplasia, n (%)	9 (8.4)	14 (11.2)	.479
CAD patients, n (%)	18 (16.8)	20 (16.0)	.866
Parenteral nutrition, n (%)	22 (20.6)	39 (31.2)	.067
Immunosuppression, n (%)	8 (7.5)	9 (7.2)	.936
Neutropenia, n (%)	3 (2.8)	3 (2.4)	1
Leukocytosis, n (%)	63 (58.9)	100 (80.0)	< .001
Anemia, n (%)	16 (15.0)	13 (10.4)	.296
Malnutrition, n (%)	7 (6.5)	10 (8.0)	.671

* COPD: Chronic obstructive pulmonary; SDD: Selective Digestive Decontamination; CAD: Coronary artery disease; MR: Multiresistant disease.

Table 2. Univariate analysis

	Nosocomial Pneumonia		P	
	Yes N = 107	No N = 125		
ARB n (%)				
	GNBMR	11 (10.3)	3 (2.4)	.012
	Acinetobacter baumannii	10 (9.3)	6 (4.8)	.173
	VRE	0	0	-
	ESBL	23 (21.5)	33 (26.4)	.384
	MRSA	3 (2.8)	4 (3.2)	1
	Pseudomonas MR	11 (10.3)	11 (8.8)	.701

SDD: Selective Digestive Decontamination; MR: Multiresistant; ARB: Antibiotic resistant bacteria. MRGNB: Multiresistant Gram Negative Bacteria; EVR: Vancomycin Resistant Enterococcus MRSA: Meticillin-resistant Staphylococcus Aureus

(univariate) and

Table 3. Multidimensional logistical analysis (Nosocomial Pneumonias)

	P*	OR (95%CI)
Age (by year)	.003	0.965 (0.943 ; 0.989)
SDD*	.040	0.429 (0.189 ; 0.974)
Septic Shock	< .001	4.234 (1.852 ; 9.679)
Catheter related bacteremia	< .001	0.037 (0.013 ; 0.107)
Secondary bacteremias	< .001	0.033 (0.011 ; 0.099)
Urinary infection	< .001	0.077 (0.028 ; 0.212)
Leukocytosis	.002	0.252 (0.101 ; 0.624)

SDD: Selective Digestive Decontamination; OR: Odd Ratio

(logistic multidimensional). Mean age of 107 patients with NP was 55 years, 73.8 % were men and the mean Apache II was 21. The independent and protective risk factors associated to NP were age, SDD, septic shock, leukocytosis at ICU admission, urinary infections and catheter related and secondary bacteremias. These last four protective factors should not be interpreted as if they specifically protected the studied patients from NP but that these patients must have a different pathology. **CONCLUSION.** SDD protects (57 %) independently the risk to develop an ICU NP. Septic shock independently increase four times the risk. **REFERENCE.** Collard HR, Saint S Matthey MA. Prevention of ventilator-associated pneumonia: an evidence-based systematic review. Ann Intern Med. 2003;138(6):494.

0361
VENTILATOR-ASSOCIATED PNEUMONIA (VAP) RATES ARE SIGNIFICANTLY REDUCED BY DEPLOYING THE VAP BUNDLE IN AN ACADEMIC EMERGENCY DEPARTMENT

L. DeLuca¹, L. Stoneking², K. Grall², A. Tran¹, J. Rosell², A. Vira², D. Davidson¹, L. Cox¹, E. Gerlach¹, J. Gonzaga¹, B. Munzer¹, W. Larson¹, A. Westergard¹, K. Denninghoff¹
¹University of Arizona Medical Center, Emergency Medicine, Tucson, United States, ²University of Arizona Medical Center - South Campus, Emergency Medicine, Tucson, United States

INTRODUCTION. Ventilator-associated pneumonia (VAP) is associated with significant mortality. Patients intubated in the Emergency Department (ED) may not receive prevention measures (the “VAP bundle”) until ICU arrival. Patients intubated in the ED frequently develop VAP. We determine the mortality rate for these patients and the effect of ED VAP prevention efforts on VAP rates. **OBJECTIVES.** Reduction in VAP rates for patients intubated in the ED. Determine mortality for patients intubated in the ED who develop VAP. **METHODS.** A pre-post design was used. Patients were consecutively identified using an existing airway QI database prior to VAP bundle introduction to obtain baseline VAP and mortality rates. After bundle deployment, patients were prospectively screened over a nine-month period. All records were evaluated by two teams using a predefined algorithm. Disagreements were resolved by committee. “At risk for VAP” was defined as survival >48 h, still intubated, and no pneumonia or significantly abnormal chest x-ray at the time of intubation. Mortality and VAP rates were compared using Fisher’s exact test. This QI project was exempted from oversight by our IRB. **RESULTS.** The pre-intervention cohort (PRE) comprised 404 patients, 14 were eliminated due incomplete data, leaving 390 patients. The post-intervention cohort (POST) comprised 162 patients. The “at risk” group was 78 (20 %) PRE and 30 (18.5 %) POST. For “at-risk” patients in the PRE cohort, 33/78 (42.3 %) developed VAP, and their mortality rate was double that of those who did not (18.2 % vs. 8.9 %, p < 0.05). For the POST cohort 6/30 (20 %) developed VAP (p < 0.05 compared to PRE). **CONCLUSIONS.** VAP commonly occurs in patients intubated in the ED. In “at risk” patients, mortality doubles if VAP develops. ED VAP prevention efforts significantly reduced VAP rates. **REFERENCE(S).** 1. Vincent JL, Bihari DJ, Suter PM, Bruening HA, White J, Nicolas-Chanoin MH, Wolff M, Spencer RC, Hemmer M (1995) The prevalence of nosocomial infection in intensive care units in Europe. Results of the European prevalence of infection in intensive care (EPIC) study. Epic international advisory committee. JAMA 274:639-644. 2.

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0362

IN DEPTH OF VAP STAFF EDUCATION; WHICH PATIENT CATEGORIES BENEFIT MOST IN TEACHING MEDICAL/SURGICAL ICUS IN ALEXANDRIA UNIVERSITY HOSPITALS?

A.M. Elmenshawy¹, T.H. Elbadawy², H.A.A. Abu Khaber³, S.F. Hafez⁴, E.E.M.H. Ibrahim⁵, A.M. Fayed¹

¹Alexandria University/Alexandria Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt, ²Alexandria University/Alexandria Faculty of Medicine, Cardiology and Angiology, Alexandria, Egypt, ³Alexandria University/Alexandria Faculty of Medicine, Anesthesia and Surgical Intensive Care, Alexandria, Egypt, ⁴Alexandria University/Alexandria Faculty of Medicine, Medical Microbiology and Immunology, Alexandria, Egypt, ⁵Alexandria University/Alexandria Faculty of Medicine, Chest Diseases, Alexandria, Egypt

INTRODUCTION. VAP staff education successfully reduced VAP rate and overall clinically defined and laboratory confirmed VAP without significantly affecting MV, ICU, antibiotic days, and mortality rate. In trying to explore the preferential impact of VAP staff education on special patient categories.

OBJECTIVES. To highlight which patients' categories benefit most from VAP staff education in different medical/surgical ICUs in Alexandria University hospitals.

METHODS. Subgroup analysis of a quasi-experimental study with before and after prospective cohort in 2 medical/surgical ICUs of Alexandria university affiliated hospitals during the period from September 2007 till May 2013. All data of efficacy of VAP staff education were analyzed into early, late onset, single and multiple VAP episodes. VAP, non VAP, MV <7 days (1 W), 7-14 (2 W) days, and >14 days (3 W).

RESULTS. The clinically defined VAP decreased significantly in ICU3 (by 24 % and p = 0.016), it was significantly decreased in 2 W patients (by 29.9 % and p = 0.009), while insignificantly decreased in 1 W (by 35 % and p = 0.229) and remained same in 3 W MV pts (both 100 %). It was insignificantly decreased in early and late-onset (by 41.7 and 20.4 %, p = 0.493), single and multiple VAP episodes (24.3 and 22.4 %, p = 0.960). In ICU1 the clinically defined VAP decreased insignificantly and in 1 W (by 58 % and p = 0.063), 2 W (by 8 % and p = 0.684), 3 W (by 1 % and p = 0.1) MV patients, single and multiple VAP episodes (by 0.6 and 20.9 % and p = 0.324). It was significantly decreased in early onset (by 59 % and p = 0.008) and insignificantly increased in late onset VAP. Mortality rate insignificantly changed in 1 W (0.382 and 0.158), 2 W (0.684 and 0.688), 3 W (1 and 0.803), all MV (0.155 and 0.627), early onset VAP (0.809 and 0.1), late onset (0.866 and 0.688), single, (0.449 and 0.283) and multiple VAP episodes (1 and 0.839), non-VAP (0.397 and 0.556), and VAP patients (0.663 and 0.270) in ICU1 and ICU3 respectively. MV days changed insignificantly in VAP (0.263 and 0.649), non-VAP (0.472 and 0.315) and all MV patients (0.937 and 0.057) in ICU1 and ICU3 respectively. ICU stay and antibiotic days changed insignificantly in VAP, non-VAP, 1 W, 2 W, 3 W, all MV patients in both units. Trauma diagnosis and low Glasgow scale was identified as risk factor for VAP (0.005 and 0.020) and MV, ICU, antibiotic days and mortality were significantly higher in VAP patients in post-intervention phase of both units (all p < 0.001). Also trauma, neurological, medical, and toxicological diagnosis, high APACHE II score, low Glasgow coma scale, and long MV stay are identified as risk factor for mortality.

CONCLUSIONS. Data preclude definite conclusions in preferential impact of VAP staff education but suggest for a trend in MV patients between 7-14 days and in ICUs with high early onset VAP.

0363

THE BEGINNINGS OF A SEPSIS UNIT IN A TEACHING HOSPITAL. RESULTS FROM THE FIRST YEAR

R. Zaragoza¹, C. Hurtado¹, S. Sancho¹, F. Puchades², J. Camarena³, R. González³, A. Valero⁴

¹Hospital Universitario Dr. Peset, Sepsis Unit/Intensive Care Unit, Valencia, Spain, ²Hospital Universitario Dr. Peset, Sepsis Unit/Internal Medicine Department, Valencia, Spain, ³Hospital Universitario Dr. Peset, Sepsis Unit/Microbiology Department, Valencia, Spain, ⁴Hospital Universitario Dr. Peset, Sepsis Unit/ED, Valencia, Spain

INTRODUCTION. The mortality of severe sepsis and septic shock remains unacceptably high. The development of a multidisciplinary sepsis rapid response team (Sepsis unit) could improve the survival of these patients and could also diminish their length of stay.

OBJECTIVES. The aims of this study were to describe the principal clinical an epidemiological characteristics of the patients treated by a Sepsis unit and to analyse the possible benefits on mortality and length of stay after the implementation of this unit in a teaching hospital.

METHODS. During a year period, 403 severe sepsis and septic shock patients in a teaching hospital were prospectively evaluated. Clinical and microbiological variables were recorded. Two different periods were analyzed in order to analyse the possible differences in mortality rates and length of stay. Period A: From 1-October-2012 to 15-January-2013 when an electronic check list to guide the management of these patients was applied without active interventions of sepsis team and Period B: From 16-January-2013 to 30-September 2013 when Sepsis team began to work actively. A univariate analysis was performed to define the possible differences between to periods using SPSS package (15.0). Statistical significance was considered when p value < 0.05.

RESULTS. Among 576 patients activated, 403 of them corresponded to severe sepsis (64.9 %) and septic shock (35.1 %). Their mean APACHE II and SOFA score were 17.68 ± 6.70 and 5.00 ± 3.01 respectively. The most frequent sources of infections were the respiratory focus (41.3 %), urinary (29 %) and abdominal (17.8 %). Microbiological documentation was achieved in 50.1 %. The main etiologies were: E.coli (50 %); S. aureus (7.9 %); K. pneumoniae (6.9 %) and S. pneumoniae (4.4 %). Global mortality was 19.8 %. The principal place of activation was ER in the 62.1 % of the cases. Only 28 % of patients were admitted in ICU. The number of activations was higher in period B (23.7 vs 40 cases per month). The global mortality rate (23.3 % vs 19.4 %) and length of stay (11.51 ± 13.21 vs 10.90 ± 12.02 days) were lower in period B without statistical significance.

CONCLUSIONS. The development of a sepsis unit in a teaching hospital implies an increase of severe sepsis episodes detected and a clear tendency to diminish the mortality rates and the length of stay of the severe sepsis and septic shock patients.

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0364

KNOWLEDGE AND ATTITUDES TOWARDS FAECAL BACTERIOTHERAPY ON ITU

S. Crabtree¹, J. Gupta¹

¹University Hospital Birmingham, Birmingham, United Kingdom

INTRODUCTION. Critically ill patients are known to be high risk for C.difficile infection. C.difficile infection is traditionally treated pharmacologically, however recurrent infection is associated with prolonged treatment course and poor quality of life. Faecal bacteriotherapy is a safe and effective method for treatment, with reported cases of complete resolution of symptoms. Patient studies have concluded that patients would consider this treatment. Physician perception appears to be a significant barrier.

OBJECTIVES. To assess physician knowledge of current treatment for C.difficile, their awareness of faecal bacteriotherapy as a treatment for the infection and their thoughts surrounding this.

METHODS. Survey of doctors working in ITU and Gastroenterology.

RESULTS. There were 37 responses to the survey. 27 were aware that faecal bacteriotherapy was a therapy for C.difficile. Almost all participants (34) would consider having this therapy if they developed C. difficile, however, ten would not tell their family or friends they had had the treatment. 17 surveyed would prefer to have faecal bacteriotherapy administered via NG tube compared to rectal preparation, citing physical discomfort associated with a colonoscope and the complications associated as reasons for this. Of those who preferred a colonoscope or enema (rectal enema 13, colonoscope 4), the most common reason given was the aversion to the therapy going down the throat. We also assessed the perception of doctors towards patient views on faecal bacteriotherapy. 27 thought patients would find the therapy 'unpleasant' or 'gross'. 30 respondents thought patients would consider a rectal enema 'unpleasant but would consider' as a treatment, whereas 22 thought patients would consider an NG tube 'unpleasant but would consider'. More doctors thought patients would not consider an NG tube (7) compared to a rectal enema (1). The most popular choice for donor was an unknown volunteer. The thought of a friend donating stool sample was not popular.

CONCLUSIONS. These results show that almost all participants surveyed would consider having this treatment themselves if they developed C.difficile. Preferred method was by NG tube. Asked what they thought of patient perception of faecal bacteriotherapy there was a contradiction to what they wanted themselves; more thought patients would prefer a rectal preparation compared to an NG tube. Though there is a belief that doctors are averse to faecal bacteriotherapy, in the small number of our colleagues sampled, the majority would consider having it as a treatment themselves, and think patients would be receptive to it. A wider survey of colleagues is needed, as well as a patient questionnaire within our trust.

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0365

BEYOND MATCHING MICHIGAN - A CONTINUOUS MONITORING AND QUALITY IMPROVEMENT PROJECT. ARE CARE BUNDLES REALLY THE ANSWER IN TARGETING ZERO INFECTIONS?

A. Wong¹, J. Knighton¹, H. Wilkins¹

¹Queen Alexandra Hospital, Dept of Critical Care, Portsmouth, United Kingdom

INTRODUCTION. Central venous catheters (CVCs) are widely used in patients in intensive care units (ICUs) and other hospital locations for monitoring, drug delivery, and dialysis. Blood stream infections (BSIs) from CVCs increase morbidity and are estimated to increase mortality risk by 25 %. The Michigan-Keystone project¹ was a landmark initiative to reduce CVC-BSI rates through a bundle of technical (insertion bundles) and non-technical interventions (leadership, teamwork and cultural change). The 'Matching Michigan' (MM) project is arguably the most prominent quality improvement project on the ICU internationally. CVC-BSI rates and compliance with CVC care bundles are starting to be used as a quality indicator of unit performance with significant financial implications and penalties.

OBJECTIVES. • To monitor the CVC-BSI rates of a single ICU in a district general hospital in the UK against set national targets.

• To assess the efficacy of interventions thought to reduce CVC-BSI rates.

• To continuously improve and target zero infections through a programme of technical and non-technical interventions.

METHODS. Data collection tools and packages are well described and readily available². Our unit has been collecting data since December 2009. Continuous surveillance of CVC-BSI rates allow for early identification of issues and assessment of interventions. Audit of CVC-insertion bundle compliance to assess its effect on infection rates.

RESULTS. Since December 2009 till December 2013, our unit has had 14133 cumulative total CVC-days. Our CVC-BSI rates per 1000 CVC days was 0.29. This was well below UK national target of 1.4 and indeed that quoted by the initial MM project group. We had 1 CVC-BSI in 2013. During this 4 year period, several "interventions" occurred which included regular changes in trainee doctors, introduction of new CVC insertion packs and hospital CVC guidelines. Audits on CVC insertion bundle compliance have been shown to be extremely variable. We were able to show that despite these interventions did not have an adverse effect on infection rates.

CONCLUSIONS. Our unit's CVC-BSI is performing well above national targets. However, there is no room for complacency. The strength of the MM initiative is to foster a cultural change in healthcare with regards to patient safety and healthcare-associated infections (HCAI). One CVC-BSI is one infection too many. Audit of documented compliance of insertion bundle has been shown to be variable on our unit. In improving quality of care on the ICU, there is a drive for units to be open and publish their HCAI rates and learn important lessons from each other.

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0366

A BUNDLE OF MEASURES FOR EXTERNAL CEREBRAL VENTRICULAR DRAINAGE ASSOCIATED VENTRICULITIS (EVDV): RESULTS FROM THE POST STUDY PERIOD

M. Chatzi¹, D. Makris¹, J. Papanikolaou¹, E. Koutsoumpa¹, E. Semertzi¹, K. Mantzarlis¹, E. Zakyntinos¹

¹University Hospital of Larissa, Intensive Care Unit, Larissa, Greece

INTRODUCTION. In a recent four-year study we showed that the implementation of a bundle of infection control measures was associated with a decrease of External Cerebral Ventricular Drainage Associated Ventriculitis (EVDV) from 28 to 10.5 % [1]. However, our findings could be explained by a Hawthorne effect associated with the study and not by the bundle itself.

OBJECTIVES. We assessed the incidence of EVDV in the period following the study of the bundle of EVDV control measures.

METHODS. We prospectively studied patients hospitalized due to cerebral hemorrhage in the ICU of University Hospital of Thessaly, during the first year following the “bundle” study [1]. Patient inclusion criteria included presence of external ventricular drainage and ICU stay >48 h. Ventriculitis was defined according to the CDC definition either with the detection of a pathogen in the CSF or the combination of at least one typical clinical sign indicating ventriculitis plus pathological CSF findings (elevated cell count and/or decreased glucose level). The bundle included: a) re-education of ICU personnel on issues of infection control related to EVD, b) meticulous intraventricular catheter handling, c) CSF sampling only when clinically necessary, d) routine replacement of the drainage catheter on the tenth drainage day if the catheter was still necessary.

RESULTS. Thirty-six patients (25 male) entered the study. Median (IQR) age was 46 (32-56) years, APACHE II 16 (14-19), SOFA 6 (5-8), GCS before intubation 7(5-8). Drainage days (DD) were 8 (12-17), 26 (72.2 %) patients underwent craniectomy. Multiresistant bacteria (Acinetobacter baumannii, Klebsiella pneumoniae) isolated in 66 % ventriculitis cases. EVDV incidence was 8.3 % and drain-associated infection rate (DA-IR) was 5.4 infections/1000DD. ICU mortality was 36.1 % and ICU stay was 23 (8-35) days.

CONCLUSIONS. The effect of a bundle of measures for EDVD control was maintained one year following the implementation of the bundle.

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0367

DETERMINATION OF SCCMEC TYPES AND RAPD-PCR FINGERPRINTING OF METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS ISOLATED FROM INTENSIVE CARE UNIT PATIENTS

B. Yelken¹, T. Us², B. Bayram³, N. Erkasap⁴, B. Ekinci⁵, S. Ekemen¹

¹Eskişehir Osmangazi University, Medical Faculty, Department of Anesthesiology and Critical Care Medicine, Eskişehir, Turkey, ²Eskişehir Osmangazi University, Medical Faculty, Microbiology Department, Eskişehir, Turkey, ³Muğla Sıtkı Koçman University, Vocational School of Health Services, Medical Laboratory Skills Programme, Muğla, Turkey, ⁴Eskişehir Osmangazi University, Medical Faculty, Physiology Department, Eskişehir, Turkey, ⁵Muğla Sıtkı Koçman University, School of Health Sciences, School of Health Sciences, Muğla, Turkey

INTRODUCTION. Staphylococcus aureus can cause a wide spectrum of infections especially in intensive care units. Staphylococcal cassette chromosome mec (SCCmec), which harbors the methicillin resistance gene (mecA), typing has crucial role in understanding molecular epidemiology of methicillin resistant S.aureus (MRSA). Also a DNA fingerprinting analysis method based on randomly amplified polymorphic DNA (RAPD) is being used increasingly in many microbiology laboratories for epidemiological typing of an ever increasing range of bacteria. In this study it was aimed to determine Scmec types and RAPD-PCR fingerprinting in MRSA isolated from intensive care unit patients.

METHODS. Blood samples were collected from patients under mechanic ventilation treatment in different intensive care units of Eskişehir Osmangazi University Medical Faculty, over a one year period (2012-2013). In 45 of these blood samples MRSA was identified. Bacterial DNA was extracted by DNA isolation kit. Presence of mecA gene was proved in all samples and genotyped by PCR technique with proper primers for Scmec types (Type I–V). RAPD-PCR fingerprinting method was also performed for genotyping by using M13 and DAF4 primers.

RESULTS. Scmec type III has been detected in all 45 samples. According to RAPD-PCR fingerprinting the similarity level was at the 0 % between the most distant genotypes and the similarity level was at the 100 % between the most nearest genotypes.

CONCLUSIONS. We determined Scmec type III in all samples. However according to RAPD-PCR fingerprinting it was shown that DNA sequence was different between samples. This result shows the bacterial resistance development to antibiotics by DNA modifying. As a continuation of our study we will perform the association between RAPD-PCR fingerprinting genotypes and antibiograms.

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0368

PATIENTS WITH MULTIDRUG-RESISTANT BACTERIA IN THE SPANISH ICUS

M. Palomar¹, F. Alvarez Lerma², S. Uriona³, M. Campins³, F. Barcenilla¹, P. Olaechea⁴, M. Catalan⁵, M.P. Arenillas², R. Gimeno⁶, ENVIN-HELICS

¹H U Arnau de Vilanova, Lleida, Spain, ²Parc del Mar, Barcelona, Spain, ³H Vall Hebron, Barcelona, Spain, ⁴H Galdakao, Galdakao, Spain, ⁵H U Doce de Octubre, Madrid, Spain, ⁶H U La Fe, Valencia, Spain

INTRODUCTION. Bacterial resistance is a growing threat, especially in ICUs.

OBJECTIVES. To assess the proportion of patients who acquire at least 1 infection or colonization by multiresistant bacteria (BMR) and associated risk factors in Spanish ICUs.

METHODS. Prospective, observational, multicenter and prospective study (Spanish registry ENVIN-HELICS). During a 3 month period from 2010 to 2013 all patients admitted in

ICU for >24 h were analyzed. Demographic data and risk factors, were recorded. Patients were categorized as MR(+) when had (≥1) ICU-acquired infection or colonization by MRB and MR(-) the rest. Both groups were compared. We apply Chi squared test and multi-varied analysis for categorical variables and the Student's test for continuous variables. A p value < 0,05 was considered statistical significant.

RESULTS. Among 66.336 patients admitted in ICU, 2586 (3,90 %) were MR(+). The percentage of MR (+) patients per year was 3,96 (2010), 4,25 (2011), 3,89 (2012) and 3,54 (2013), OR 0,89 (0,79-1).

The identified MR were: n(%) MRSA 463 (0,71), VRE 34 (0,67), A baumannii 700 (1,06), P aeruginosa 629 (0,94), ESBL 804 (1,22) and other GNB 487 (0,80). The decline reached statistical significance only for A baumannii OR 0,67 (0,53-0,83).

Variables associated with MR (+) were admission from ward OR 1,67 (1,54-1,82), another ICU 3,05(2,18-3,61) or nursing home 2,29 (1,51-3,48). Medical conditions 1,72 (1,51-1,95) and emergency surgery 3,07 (2,65-3,56), trauma 1,85 (1,63-2,10), APACHE II score 20,34 vs 14,87 (p < 0,001) Glasgow coma score 12,28 vs 13,57 (p < 0,001) and antibiotic treatment at admission OR 2,54 (2,34-2,75).

The highest OR corresponded to extrinsic factors as mechanical ventilation 8,29 (7,41-9,29), CVC 7,30 (6,25-8,53), urinary catheter 5,69 (4,82-6,71), parenteral nutrition 5,14 (4,73-5,59) and extrarenal clearance techniques 4,71 (4,25-5,21).

Patients MR(+) had a highest LOS in ICU 28,18 vs 6,37 days (p < 0,001) and mortality rate 32,7 % vs 12,3 % OR 3,47 (3,19-3,78).

CONCLUSIONS. A decline in patients who got multiresistant bacteria in Spanish ICUs was observed in last year. The decline was not uniform for all bacteria.

The acquisition of MRB was associated with increased hospital stay and mortality. Risk factors were defined.

REFERENCE(S). <http://hws.vhebron.net/envin-helics/>

0369

IMPLEMENTING EVIDENCE-BASED TREATMENT PROTOCOLS BASED ON PRINCIPLES OF ANTIMICROBIAL STEWARDSHIP IN AN ICU OF A TERTIARY CARE HOSPITAL

J. Naveen¹, A. Warriar², P.P. Vivek¹

¹PRS Hospital, Critical Care Medicine, Trivandrum, India, ²PRS Hospital, Infectious Disease, Trivandrum, India

INTRODUCTION. In context of increasing antimicrobial resistance, there has been increased usage of broad spectrum antibiotics in ICU, which is not necessary for every patient. To address this, by choosing antibiotics based on certain risk factors, patient typing method was introduced in the ICU.

OBJECTIVES. The primary goal of antimicrobial stewardship is to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use, including the emergence of resistance, selection of pathogenic organisms, and toxicity. Hence, this was an attempt to rationalize the use of antibiotics by developing treatment protocols based on hospital microbiology data, patient risk stratification for presence of multi-drug resistant pathogens and encouraging de-escalation.

METHODS. An observation was done on the efficacy of implementing evidence-based antibiotic treatment protocols in a tertiary care hospital. Protocol was developed for Blood Stream Infections, Pneumonia, Intra-abdominal infections, Urinary Tract Infections and Skin & Soft Tissue Infections. Protocol was based on local microbiological data, risk stratification approach and emphasis on de-escalation. Data was collected on the antibiotic prescriptions for 3 months in the ICU after 9 months of introduction of protocol. There were 231 admissions, but 44 were excluded as they were not admitted with Sepsis, so totally 187 patients were taken for the study.

a)Health Care Contact b) Procedures c) Antibiotic Rx History d) Patients Characteristics	Type 1 a)Health Care Contact- b)Patients Characteristics	b)Procedures - No c)Antibiotic Rx History-No in last 90 days d)Patients Characteristics- Young - No comorbid conditions.	Type 2 a)Health Care Contact-Yes b) Procedures- Minimum c)Antibiotic Rx History-Yes in last 90 days d)Patients Characteristics-Elderly Few Co-morbid conditions. Immunocompromised, or with many comorbid conditions.	Type 3 a)Health Care Contact-Prolonged b)Procedures- Major invasive Procedures c) Antibiotic Rx History-Repeat multiple antibiotics d)Patients Characteristics- Type 4 i)Type 3 patient with fever despite antibiotic therapy (>5 days) with no obvious source/ after appropriate source control ii) ± severe sepsis/ septic shock iii)PUO ≥ 1 of the following (but not limited to) risk factors for invasive fungal infections TFN (total parenteral nutrition), Hemodialysis, Immundeficiency of variable origin. Major abdominal surgery, Multifocal candida colonization, Diabetes, etc.
Causative Pathogen could be	Susceptible to Common narrow spectrum antibiotics	ESBLs	ESBLs/ Pseudomonas// Acinetobacter/ MRSA	Candida albicans/non albicans
Antimicrobial of choice	Ceftriaxone.	Doxycycline/ Azithromycin	Piperacillin-Tazobactam, Cefepime-Tazobactam, Cefepime-sulbactam, Amikacin Ertapenem, Clarithromycin, Teicoplanin/ Linezolid	Imipenem/ Meropenem, Teicoplanin/ Linezolid, Clarithromycin
Fluconazole/ Caspofungin				

[METHODS- Patient Category & Antimicrobial Choices]

RESULTS. Protocol based risk stratification and empiric antibiotic therapy ensured appropriate antibiotic cover in more than 90 % with comparable survival rates as per APACHE-2 scores - good local data for safety and efficacy of the program.

Patient Class	Average APACHE-2 Score	Mortality %	Expected mortality as per APACHE-2 scores (international standards)
Type 1	13.8	10	15
Type 2	24.4	39	40
Type 3	29	44	55
Type 4	28	59	55

[Results]

Patient Type	Total Culture Number	Total Culture Positivity	Initial Antibiotic-Appropriate Antibiotic
Type 1	21	8	7 (87.5 %)
Type 2	49	18	16 (88.88 %)
Type 3	83	41	37 (90.24 %)
Type 4	34	29	28 (96.55 %)

[Appropriate initial Antibiotic]

CONCLUSIONS. The observation showed that, having evidence-based antibiotic protocols ensures more rational usage of antibiotics without adversely affecting clinical outcomes.

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0370

HOW DO WE MANAGE THE (TOO MANY?) URINE CULTURES (UC) PERFORMED IN A SURGICAL ICU: A FRENCH PROSPECTIVE STUDY

N. Colegrave¹, S. Figueiredo¹, P.-E. Leblanc¹, A. Potron², J. Duranteau¹

¹Bicêtre Hospital; Assistance-Publique-Hôpitaux de Paris; South-Paris University, Department of Anesthesia and Intensive Care, Le Kremlin Bicêtre, France, ²Bicêtre Hospital; Assistance-Publique-Hôpitaux de Paris; South-Paris University, Department of Microbiology and Molecular Biology, Le Kremlin Bicêtre, France

INTRODUCTION. Urinary tract infection (UTI) is one of the most common healthcare-associated infections and has significant clinical and economic implications, especially in intensive care units (ICUs)¹.

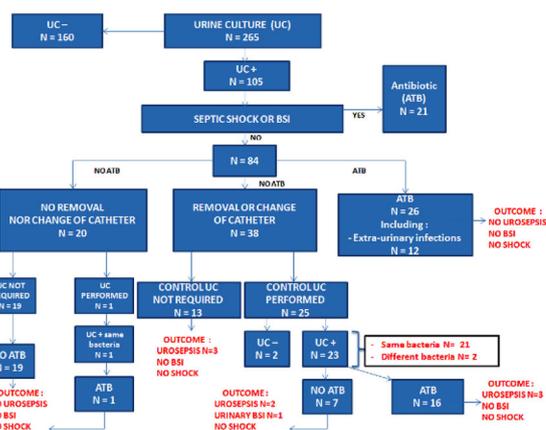
OBJECTIVES. To analyze the reasons why urine cultures (UC) are collected and how clinicians manage results of UC.

METHODS. Prospective observational study in a 30-beds surgical ICU. All consecutive UCs collected between December 2012 and July 2013 were analyzed. Clinical and biological data were collected: body temperature >38.5 °C (fever) or <36 °C (hypothermia), leukocytosis, presence or absence of: urinary catheter (Ukt), septic shock or severe sepsis, bloodstream infection (BSI), non-urinary tract infections; quantitative result of UC regarding leukocyturia and growth of bacteria (CFU/mL); antibiotic prescription, removal or replacement of Ukt; outcome 21 days after UC: urinary tract-related BSI, urosepsis, septic shock.

RESULTS. During 242 days, 265 UCs were collected in 190 patients (1.31 UC/day). At the time of UC, 230 (81 %) UCs were performed in patients with a Ukt. A total of 105 (40 %) UCs were positive (>10³ CFU/mL). Indications and management of UCs are shown in Table and Figure. Main indication for UC was fever or hypothermia (55 %). Twenty percent (21/105) of positive UCs were collected in patients with septic shock or BSI, with an indication of antibiotic therapy. Antibiotics for UTI were given for 31 of 84 positive UCs without septic shock nor BSI (37 %). Removal or change of Ukt without any antibiotic was performed in 38 of 84 positive UCs: in 22 of those cases (56 %), no antibiotic was given because fever disappeared or because control UC (collected 2 days after the first positive one) was negative. Data on outcome at 21 days of the 105 positive UCs showed no septic shock, 1 urinary-related BSI and 5 urosepsis in patients for whom no antibiotic was given and no septic shock, no BSI and 3 urosepsis in patients for whom antibiotics were given for the first positive UC (NS). In only 3 of the 8 urosepsis that occurred at day 21 was the bacteria identical as the one identified in the first UC.

Indication for the urinary culture	Patients(N = 265)	%
Septic shock or severe sepsis	28	11
Bloodstream Infection(BSI)	14	5
Fever or hypothermia ± Hyperleukocytosis	146	55
Hyperleukocytosis	12	5
Clinical symptoms (dysuria, urgencies, urinary frequencies...)	11	4
Other (Organ donor,perioperative...)	54	20

[Indication for the urinary culture]



DISCUSSION. Most of the UCs collected were negative and antibiotic therapy specifically for UTI was given in only 36 % of positive UCs. Positive UCs-related overall morbidity at day 21 was relatively low: 8 urosepsis, 1 urinary-related BSI and no septic shock.

CONCLUSIONS. Optimal indications and management of urine cultures in ICUs remain to be accurately determined. Simple removal or change of urinary catheter seems to be an interesting option to avoid antibiotic overuse.

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Risk assessment & biomarkers for AKI: 0372–0384

0372

EVALUATION OF NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN (NGAL) AND RENAL DOPPLER AS MARKERS OF ACUTE KIDNEY INJURY IN CARDIAC SURGERY

L. Badoux¹, E. Zogheib¹, O. Abou Arab¹, P.-G. Guinot¹, A.-M. Bourgeois¹, Y. Mahjoub¹, H. Dupont¹

¹CHU Amiens, Amiens, France

INTRODUCTION. The occurrence of postoperative acute kidney injury (AKI) after cardiac surgery is a serious frequent complication. Scores (RIFLE and KDIGO) currently used in the diagnosis of acute kidney injury include changes in serum creatinine and urine output. They lack specificity and have a late diagnosis.

OBJECTIVES. The aim of our study was to evaluate the neutrophil gelatinase-associated lipocalin (NGAL) and renal doppler as early markers of acute kidney injury in postoperative cardiac surgery.

METHODS. A pilot, observational, prospective, single-center study, including patients undergoing cardiac surgery at the University Hospital of Amiens. NGAL assays, measurements of renal vascular resistance index (RRI), demographic and hemodynamic data were recorded preoperatively, on admission (H0), at the sixth hour (H6) and the first day (D1) in surgical ICU. NGAL was taken from the blood and urine and assayed by techniques Eurobio[®] and Alere Triage[®]. The existence of an AKI was defined by the AKI KDIGO classification.

RESULTS. Twenty-three patients were included of which 9 % had developed an AKI class 3 persistent. These patients had an H6 RRI significantly higher AUC ROC curve 0.91 (95 % CI (0.71 to 0.99), p = 0.0001), a sensitivity (Se) to 100 % (16-100) and a specificity (Sp) of 81 % (58-95) for a cutoff of 0.75. They had a significantly lower D1 urinary NGAL with AUC 0.912 (95 % CI (0.69 to 0.99), p < 0.0001), Se 100 % (16-100) and Sp 82 % (57-96), positive predictive value 84.75 % (95 % CI: 53.2-98.4) and negative predictive value of 100 % (95 % CI : 66.4-100) for a cutoff of 46 ng/ml.

H6 NGAL Eurobio[®] plasma was higher among AKI patients with an AUC of 0.70 (95 % CI: 0.45-0.885) for a threshold of 262 ng/ml (95 % CI: 35-298) [Se = 66.7 %, Sp = 80 %].

CONCLUSIONS. In our study, D1 urinary NGAL and H6 RRI are good markers of severe AKI after cardiac surgery, although there is a large grey zone. The preoperative plasma NGAL and IRR could be useful in the diagnosis of patients at risk of developing post operative AKI and allow starting preventive actions and early cure. The H6 IRR is earlier and less costly for the diagnosis of AKI. The cutoff of 0.75 found in our study seems to be in agreement with the results of the literature [1,2].

These results must be confirmed by a larger number of patients.

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0373

RELATIONSHIP BETWEEN RENAL DOPPLER RESISTIVE INDEX AND SERUM CHLORIDE IN CRITICALLY ILL PATIENTS

R.A.G. Oliveira¹, P.V. Mendes^{1,2}, M. Park^{1,2}, L.U. Taniguchi^{1,2}

¹Intensive Care Unit, Emergency Medicine Discipline, Hospital das Clínicas, Universidade de São Paulo, São Paulo, Brazil, ²Education and Research Institute, Hospital Sirio Libanes, São Paulo, Brazil

INTRODUCTION. Renal doppler resistive index (RI) is a non-invasive tool that may help critical care physicians to predict acute kidney injury (AKI). Although data from experimental studies have shown negative association between the serum chloride (Cl) concentration and renal vascular tone, the impact of this phenomenon on RI is unknown.

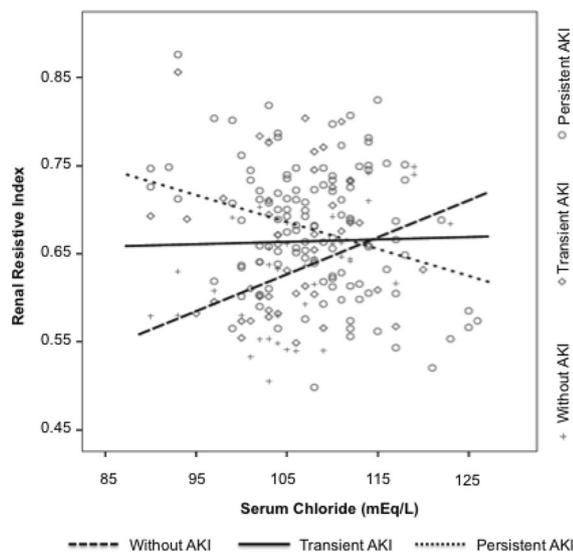
OBJECTIVES. Evaluate the influence of serum chloride on RI in critically ill patients.

METHODS. This prospective observational study was performed at medical-surgical ICU from November 2013 to February 2014. RI was performed daily by the same operator until ICU discharge, death or need for renal replacement therapy (RRT). All clinical and laboratory data were obtained routinely during daily ultrasound exams. Patients with chronic renal disease or on dialysis were excluded. AKI was defined according to KDIGO criteria. Transient AKI was defined by normalization of renal function within 48 h of AKI onset. Persistent AKI was defined by non-resolution of AKI within 48 h of onset or need for RRT. Correlation between RI and Cl was performed using Pearson's correlation coefficient.

RESULTS. 52 patients were included (52 % medical admissions, 62 % male, SAPS 3 of 54 ± 14). At ICU admission, 40 % were on vasopressor therapy and 60 % required mechanical ventilation. Baseline serum creatinine was 0.73 ± 0.26 mg/dL and mean Cl was 107 ± 7 mEq/L. 74 % patients developed AKI during ICU stay (59 % had persistent AKI and 13 % required RRT). At baseline, patients with persistent AKI had higher values of SAPS 3 (60 ± 12 compared to 49 ± 15 in transient AKI group or 50 ± 13 in without AKI group, $p < 0.05$) and serum creatinine (0.84 ± 0.31 mg/dL compared to 0.71 ± 0.19 mg/dL in transient AKI group or 0.57 ± 0.14 mg/dL in without AKI group, $p < 0.01$). Age, hemodynamic variables, Cl and RI were not different.

RI and serum chloride demonstrated a positive correlation ($r = 0.445$, $p < 0.01$) in patients without AKI, but a negative correlation ($r = -0.191$, $p < 0.05$) in those who developed AKI. In those subgroups of AKI, there was no correlation in those with transient AKI ($r = 0.001$, $p = 0.99$), but a negative correlation in those with persistent AKI ($r = -0.294$, $p < 0.01$, Figure).

Figure. Relationship between RI and Cl according to the categorical renal function



CONCLUSIONS. We observed a specific pattern of correlation between RI and Cl according to the categorical renal function (without AKI, transient AKI and persistent AKI) in critically ill patients.

0374

PREDICTING POSTOPERATIVE ACUTE KIDNEY INJURY IN A CARDIAC SURGERY POPULATION: EXTERNAL VALIDATION OF EXISTING SCORING SYSTEMS AND POSSIBLE BENEFIT OF IMPLEMENTATION OF THE BIOMARKER CH13L1

S. Vanderhaeghen¹, J. De Loo², E. Meyer^{2,3}, I. Herck¹, K. François^{3,4}, E. Hoste^{1,3}

¹Ghent University Hospital, Dept. of Intensive Care, Ghent, Belgium, ²Ghent University, Dept. of Pharmacology, Toxicology and Biochemistry, Veterinary Medicine, Merelbeke, Belgium, ³Ghent University, Ghent, Belgium, ⁴Ghent University Hospital, Dept. of Cardiac Surgery, Ghent, Belgium

INTRODUCTION. Acute kidney injury (AKI) is an important complication of cardiac surgery. Therefore, scoring systems may identify patients with increased risk for AKI (1-8). Urinary chitinase 3-like-protein 1 (CHI3L1) is a candidate biomarker for the earlier and more specific detection of postoperative AKI and possibly superior to serum creatinine (9).

OBJECTIVES. To validate 9 AKI scoring systems in an adult cardiac surgery patient population and to implement the biomarker CHI3L1 as a possible adjunct

METHODS. The study included 122 adult cardiac surgery patients without AKI, recruited during the period Sept 2012 to Aug 2013. Nine scoring systems were implemented to this data set (1-8). Each scoring system - except for that by Chertow (8) - generates a point score, which leads to a risk prediction for AKI expressed as a proportion. Overall performance of the scoring systems was evaluated by calculating the area under the receiver operator curve (AUC). In addition, we assessed the AUC of relative change in urinary CHI3L1 (corrected for urinary creatinine) from baseline to time of ICU admission separately and in combination with the scoring systems (by multiplication of points of the score and uCHI3L1).

RESULTS. When expressed as risk for AKI, the best score was that by Mehta (4) (AUC 0.71, 95 % CI 0.61-0.81, $P < 0.001$) and the worst that by Thakar (3) (AUC 0.56, 95 % CI 0.44-0.67, $P = 0.350$). When each score was evaluated upon the points generated, the scoring system by Ng (1) had the highest AUC (0.74, 95 % CI 0.64-0.83, $P < 0.001$) and the score by Thakar (3) the worst (AUC 0.61, 95 % CI 0.50-0.73, $P = 0.610$). Urinary CHI3L1 had an AUC of 0.76 (95 % CI 0.66-0.86, $P < 0.001$). The performance of the different scoring systems improved by integrating uCHI3L1. When scoring systems and uCHI3L1 were combined, AUC improved, with Thakar (3) as best and Wijesundera (5) as worst (AUC 0.79 vs 0.76, $P < 0.001$ for both).

CONCLUSIONS. The existing scoring systems to predict postoperative AKI in the adult cardiac surgery population had a moderate or bad sensitivity and specificity in our dataset of 122 patients. The individual scores expressed as points have a moderately better predictive value than the risk percentages they generate. The relative change in CHI3L1 measured in urine may be a future adjunct to improve the clinical usefulness of the scoring systems. Alternatively, some scoring systems may be used for targeted AKI biomarker assessment.

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0375

PERIOPERATIVE RISK FACTORS FOR ACUTE KIDNEY INJURY AND CHRONIC KIDNEY DISEASE IN LIVER TRANSPLANT PATIENTS

M. Popescu¹, G. Droc¹, S. Dima², D. Tomescu¹

¹Fundeni Clinical Institute, Anaesthesia and Critical Care, Bucharest, Romania, ²Fundeni Clinical Institute, General Surgery and Liver Transplantation, Bucharest, Romania

INTRODUCTION. Chronic kidney disease (CKD) is a common long-term complication of liver transplantation (LT). Data concerning perioperative risk factors for CKD are still in debate.

OBJECTIVES. The aim of this study is to assess perioperative risk factors for CKD at 6 months after LT.

METHODS. We retrospectively analyzed 112 consecutive LT recipients from January 2012 to May 2013. Preoperative data were collected: age, Model for End Stage Liver Disease (MELD) score, MELD-sodium, serum creatinine (Scr). Intraoperative blood loss, transfusion and need for vasopressor support were assessed. The postoperative development of Acute Kidney Injury (AKI) was evaluated and CKD was assessed at 1, 3 and 6 months after LT. Statistical analysis was performed using SPSS 19.0.

RESULTS. The mean age in the study group was 51 years (range 7-69). MELD score had a mean value of 15.78 (SD 4.96) and MELD-Na of 18.39 (SD 6.12). Thirty-nine patients (34.8 %) developed AKI during the first week after LT and 6 patients (5.4 %) required renal replacement therapy (RRT). The six months survival rate was 92.0 %. The incidence of CKD was 17.5 % and one patient required long-term RRT. We identified as preoperative risk factors for CKD patients' age ($p = 0.030$) and MELD-Na score ($p = 0.048$). Intraoperative blood loss and transfusion were statistically significant predictors for AKI but not for CKD. A statistically significant correlation was found between the intraoperative need for vasopressor support and both AKI ($p = 0.001$) and CKD ($p = 0.003$). Postoperative AKI ($p < 0.001$) and Scr levels at 1 month ($p < 0.001$) and 3 months follow-up ($p < 0.001$) were significantly correlated with the presence of CKD. There was no correlation between RRT and CKD ($p = 0.069$).

CONCLUSIONS. The incidence of CKD remains high after LT. The severity of liver disease prior to surgery (MELD-Na score but not MELD score), age, intraoperative need for vasopressor support and postoperative AKI are important risk factors for CKD.

0376

URINARY [TIMP-2]*[IGFBP7] FOR THE PREDICTION OF ACUTE KIDNEY INJURY AFTER CORONARY ARTERY BYPASS SURGERY (CABG)

M. Dudasova¹, K. Pilarczyk¹, D. Wendt¹, H. Jakob¹, F. Duse¹

¹University Hospital Essen, Department for Thoracic and Cardiovascular Surgery, Essen, Germany

INTRODUCTION. Acute kidney injury (AKI) is a common complication after cardiac surgery. Currently, prediction of AKI with classical tools remains uncertain.

OBJECTIVES. Therefore, it was the aim of the present study to evaluate two new urinary biomarkers - insulin-like growth factor-binding protein 7 (IGFBP7) and tissue inhibitor of metalloproteinases-2 (TIMP-2).

METHODS. Serial urinary samples of 49 consecutive patients undergoing isolated on-pump-CABG were collected and analyses for TIMP2 and IGFBP7 was performed. Primary clinical endpoint was the development of an acute kidney injury according to the classification of the AKI Network (AKIN). The NephroCheck™ test was used to simultaneously measure the two urinary biomarkers and calculate their multiplication [TIMP-2]*[IGFBP7].

RESULTS. 38 male and 11 female patients with a mean age of 69.9 ± 1.8 years were included. Out of these, 18 developed an AKI with 5 patients requiring renal replacement therapy. Early urinary [TIMP-2]*[IGFBP7] was significantly increased in patients who subsequently developed AKI compared to those who did not (maximum value within the first 24 postoperative hours: 4.33 ± 1.7 vs. 0.70 ± 0.11 , $p = 0.007$). Using receiver operating characteristic analyses, [TIMP-2]*[IGFBP7] shows a sensitivity of 80 % and a specificity of 72.7 % for the prediction of an AKI AKIN 3 (AUC 0.79, Cut-Off: 0.89).

CONCLUSIONS. The urinary [TIMP-2]*[IGFBP7] represents a sensitive and specific biomarker to predict AKI early after CABG. However, analyses from our ongoing larger study are necessary to confirm these findings and probably increase sensitivity and specificity.

0377

METFORMIN ASSOCIATED LACTIC ACIDOSIS IN A MEDICAL ICU. CLINICAL PROFILE AND OUTCOMES IN A THIRD LEVEL HOSPITAL IN SPAIN

V. Corral-Velez¹, M. Pons-Serra¹, X. Perez-Fernandez¹, G. Moreno-Gonzalez¹, N. Betancour-Zambrano¹, P. Cardenas Campos¹, N. Lopez-Suñe¹, P. Lopez¹, J. Ballus Noguera¹, J.M. Vazquez-Reveron¹, M. Hueso², J. Sabater-Riera¹

¹Hospital Universitario de Bellvitge, Intensive Care Medicine Department, Barcelona, Spain, ²Hospital Universitario de Bellvitge, Nephrology Department, Barcelona, Spain

OBJECTIVES. To identify patients with metformin associated lactic acidosis (MALA), its associated clinical characteristics and outcomes in the Critical Care Unit of Hospital de Bellvitge (Barcelona, Spain).

METHODS. A prospective observational study over an 8-year period (June/2006 to February/2014). We identified all patients admitted with a MALA diagnosis in the ICU defined by an increased anion gap metabolic acidosis ($pH < 7.35$, $HCO_3^- < 22$ mmol/L, lactate > 5 mmol/L) and metformin as usual medication. Among these patients, we evaluated their clinical features and outcomes.

RESULTS. We identified 16 patients with a diagnosis of MALA with a mean age of 69.4 ± 12.6 and a mean BMI of 30.2 ± 4.6 , 50 % of which were men. Mean APACHE

score was $29 \pm 8,66$ and mean SOFA score was $11 \pm 2,82$. All the patients presented type 2 diabetes mellitus on active treatment with metformin, 15 patients (93,75 %) had essential hypertension, 4 patients (25 %) had heart disease, 4 of them (25 %) had been diagnosed with COPD, 2 patients (12,5 %) had previous liver disease and 3 of them (18,75 %) had previous impaired renal function. These patients presented lactic metabolic acidosis (mean pH $7,09 \pm 0,16$, mean lactate levels $17,60 \pm 12,14$ mmol/L and mean bicarbonate levels $7,73 \pm 4,56$ mmol/L) and acute kidney injury with a mean creatinine $756,19 \pm 180,13$ μ mol/L at ICU admission. All except one presented distributive shock and vasopressors were needed. Continuous Renal Replacement Therapy (CRRT) was required in 14 of the cases reviewed due to AKI in context of acidosis and hemodynamic collapse. Hemofiltration (HVVC) was used in 7 patients (50 % of patient who needed CRRT) and hemodiafiltration (HDFVVC) in the remaining patients, with an average time of 3.7 days on CRRT. The mean lactate levels descended to 2.46 mmol/L within 48hs of CRRT. Renal function recovered to prior level in 15 patients (93.75 %) after CRRT. The overall mortality was 12.5 %, which is lower than reported in other studies (16.6 % mortality). **CONCLUSIONS.** Given that MALA is not an uncommon diagnosis in the ICU and it is a life-threatening condition with a high mortality when not treated, it is crucial to identify these episodes in order to initiate supportive therapies such as CRRT to improve outcomes in these patients. RRTs may be an effective and quick way to correct pH in patients with MALA, improving outcomes. We observed that, in spite of the severity of the cases identified, after AKI and early CRRT all except one of our patients achieved a complete recovery and did not need chronic renal replacement therapy after discharge.

0378 IDENTIFICATION OF THE CRITICALLY ILL PATIENT WITH AUGMENTED RENAL CLEARANCE: MAKE DO WITH WHAT YOU HAVE!

J.P. Baptista¹, N. Silva², E. Costa², F. Fontes², M. Marques³, G. Ribeiro², J. Pimentel¹
¹Centro Hospitalar e Universitário de Coimbra, Intensive Care Unit, Coimbra, Portugal, ²Centro Hospitalar e Universitário de Coimbra, Clinical Pathology, Coimbra, Portugal, ³Centro Hospitalar e Universitário de Coimbra, Statistical Department, Coimbra, Portugal
INTRODUCTION. Evaluation of renal function is essential in the critical care setting, where augmented renal clearance (ARC) and renal dysfunction are both under-diagnosed, with potential and profound clinical consequences. Urinary creatinine clearance is the best clinical surrogate of renal function. However despite its simplicity and practical applicability it is under-used either at the bedside of the patient or in clinical research. **OBJECTIVES.** Evaluation of the diagnostic value of urinary biochemistry in the identification of ARC in a population of adult critical ill patients. **METHODS.** Retrospective analysis of all the urine samples of the patients admitted to the ICU in 2012, in a multipurpose unit at a tertiary university hospital. Urine samples with contemporaneous serum creatinine ≥ 1.2 mg/mL were excluded. ARC was defined as 8-hours renal clearance of creatinine (8 h-CL_{CR}) > 130 and renal dysfunction as $8 \text{ h-CL}_{CR} < 60$ ml/min/1.73 m². Three classes of patients were defined according to renal function ($<60, 60-130, >130$ ml/min/1.73 m²). Discrimination of different associations between 3 markers (urinary creatinine, BUN and age) was studied. The cut-offs were decided based on the Yuden criteria. **RESULTS.** We analyzed 4271 urine sample from 477 patients. ARC was identified in 1409 samples (33 %) and renal dysfunction in 854 (20 %). Significant differences were found within 3 classes of renal function respecting: age, serum creatinine (C_u), BUN, urinary creatinine (C_u), urea, sodium and potassium concentrations and urinary output ($p < 0.01$ for all variables). The best balanced diagnostic value of ARC was attributed to the combination of C_u > 45 mg/mL, and age $< 65y$, whose showed a sensibility of 60 %, specificity of 88 %, a negative predictive value of 82 %, an accuracy of 78 % and a likelihood ratio for a positive result of 5. The addition of BUN < 20 mg/mL increased the specificity to 95 % (table).

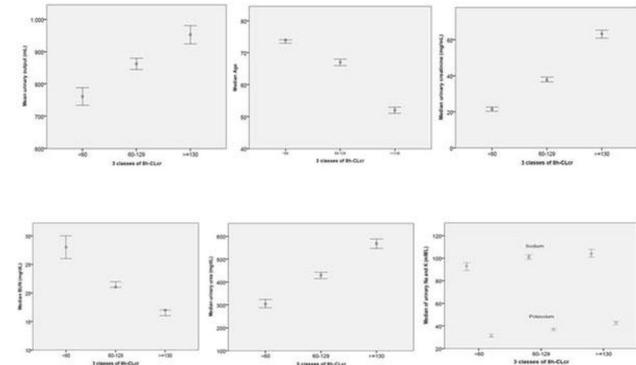


Fig. 1

CONCLUSIONS. ARC and renal dysfunction are two frequent occurrences in critically ill patients with normal C_u. The combination of C_u > 45 mg/mL, and age $< 65y$ allows the identification of patients with ARC with significant accuracy (78 %) and specificity (88 %). This simple method can be a useful tool to screen patients with ARC in ICUs where the measurement of CL_{CR} is still not established.

	URINARY CRT > 45 mg/dL	URINARY CRT > 45 and AGE < 65y	URINARY CRT > 45, AGE < 65 and BUN < 20 mg/dL
SENSIBILITY %	78	60	38
ESPECIFICITY %	69	88	95
POSITIVE PREDICTIVE VALUE	55	71	78
NEGATIVE PREDICTIVE VALUE	85	82	76
ACCURACY	71	78	76
POSITIVE LIKELIHOOD RATIO	2.4	5	7.6
NEGATIVE LIKELIHOOD RATIO	0.36	0.45	0.65

[Table]

0379 ROLE OF AKI BIOMARKERS TO PREDICT AKI EARLY AND POTENTIAL TO MODIFY CLINICIANS' PRACTICE

M. Ostermann¹, L. Forni², K. Kashani³, M. Joannidis⁴, A. Shaw⁵, L. Chawla⁶, J. Kellum⁷, on behalf of All Sapphire Investigators

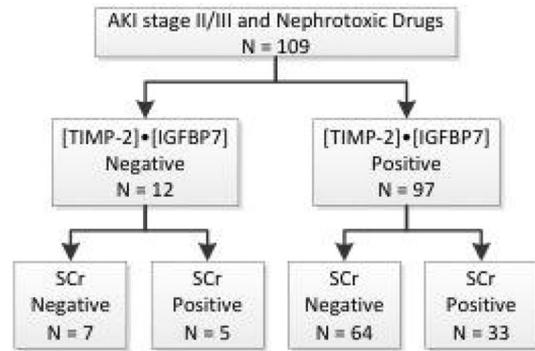
¹King's College London, Guy's & St Thomas Hospital, Critical Care, London, United Kingdom, ²Western Sussex Hospital, Worthing, United Kingdom, ³Mayo Clinic, Rochester, United States, ⁴University Hospital Innsbruck, Innsbruck, Austria, ⁵Vanderbilt University Hospital, Nashville, United States, ⁶George Washington University Medical Center, Washington, United States, ⁷University of Pittsburgh, Pittsburgh, United States

BACKGROUND. We recently reported a multi-centre study (Sapphire) where a biomarker combination of tissue inhibitor of metalloproteinase - 2 (TIMP-2) and insulin-like growth factor binding protein 7 (IGFBP7) were validated for risk stratification for acute kidney injury (AKI).¹ Subsequently we derived and validated a high sensitivity cutoff of 0.3 (ng/ml)²/1000 (the product of TIMP2 • IGFBP7) and showed that the biomarkers elevate 24 h prior to serum creatinine (sCr).^{2, 3}

We now examine the use of potentially nephrotoxic medications within the window between a positive biomarker test and biochemical diagnosis of AKI II or III to explore opportunities to reduce the risk of AKI as recommended by the Kidney Disease Improving Global Outcomes (KDIGO) AKI working group.⁴

METHODS. We identified all potentially nephrotoxic drugs given to patients enrolled in the Sapphire study¹ and examined whether the biomarker test could have enabled earlier discontinuation. In a retrospective analysis, we identified all patients who received at least one potentially nephrotoxic medication on the day they met the Sapphire endpoint (AKI stage II or III as per KDIGO classification). We then determined the number of these patients who had a positive biomarker test prior to AKI stage II/III.

RESULTS. Of 184 patients who developed AKI II/III, 109 (58 %) received one or more potentially nephrotoxic drug on the day of AKI II/III. 97 (89 %) of these patients had a prior positive biomarker test. (Figure 1) Furthermore, 64 (66 %) of the patients with a prior positive biomarker test did not fulfil the creatinine criteria for AKI stage I or greater before reaching the endpoint.



CONCLUSIONS. Nephrotoxic drug use is common in patients developing AKI. The use of the TIMP-2-IGFBP7 test could have identified many of these patients earlier than current methods. Thus a significant opportunity exists to use the biomarker test to reduce ongoing nephrotoxic drug administration.

FUNDING. Astute Medical

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0380 A CLINICAL SCORE TO PREDICT MORTALITY IN SEPTIC AKI REQUIRING CONTINUOUS RENAL REPLACEMENT THERAPY: THE HELENIC SCORE

R. Passos^{1,2}, F. Dutra², P. Batista¹, E. Macedo³, L. Correia¹, M. Dutra²

¹Hospital Sao Rafael, Salvador, Brazil, ²Hospital Portugues, Salvador, Brazil, ³Universidade de São Paulo, São Paulo, Brazil

INTRODUCTION. This study aimed to identify independent predictors of mortality in critical patients with septic acute kidney injury (AKI) who required dialysis. We created a risk score for assessing the probability of death in 7 days after the onset of dialysis therapy.

METHODS. One hundred eighty-six septic AKI patients undergoing continuous renal replacement therapy (CRRT) were included in the study. Study patients were at three different intensive care units at a Brazilian tertiary hospital.

RESULTS. The 7-day mortality rate was 45 %. Among 26 clinical and laboratory characteristics assessed at the day of initiation of CRRT, five remained independently associated with mortality after multivariate adjustment: norepinephrine use >0.3 mcg/kg/min, liver failure, clinical condition, lactate level, and pre-dialysis creatinine level. Logistic regression showed a relevant C-statistic of 0.82 (95 % CI = 0.76-0.88) and good calibration ($c^2 = 4.3$; $p = 0.83$). Scoring systems, including APACHE II, SAPS3, and SOFA, showed relatively poor discriminative ability for mortality (receiver operating characteristic curve [ROC], 0.5; 95 % CI = 0.48-0.66, $p = 0.10$; ROC, 0.48, 95 % CI = 0.40-0.57, $p = 0.08$; ROC, 0.58, 95 % CI = 0.49-0.66, $p = 0.58$ respectively).

CONCLUSIONS. We developed a regression model predicting 7-day mortality using data collected from patients with septic AKI requiring CRRT. The HEpatic failure, LactatE, Norepinephrine, Clinical condition, and Creatinine (HELENIC) score outperformed tested generic models.

0381
USE OF BIOMARKERS ASSOCIATED WITH CELL CYCLE ARREST AIDS IN THE PREDICTION OF LONG TERM OUTCOME AFTER ACUTE KIDNEY INJURY

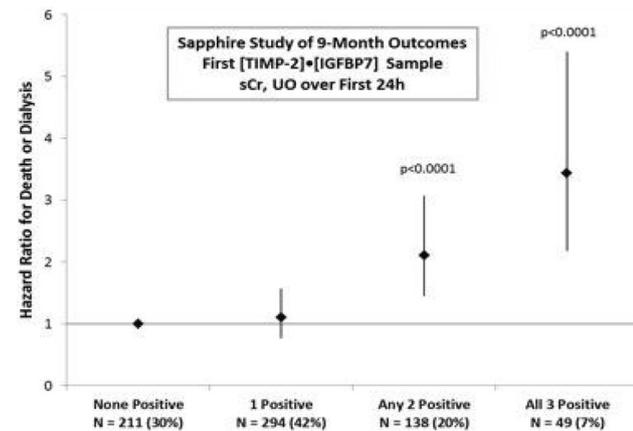
L. Forni¹, M. Ostermann², K. Kashani³, M. Joannidis⁴, A. Shaw⁵, L. Chawla⁶, J. Kellum⁷, on behalf of all Sapphire Investigators

¹Western Sussex Hospital, Worthing, United Kingdom, ²King's College London, Guy's & St Thomas Hospital, Critical Care, London, United Kingdom, ³Mayo Clinic, Rochester, United States, ⁴University Hospital Innsbruck, Innsbruck, Austria, ⁵Vanderbilt University Hospital, Nashville, United States, ⁶George Washington University Medical Center, Washington, United States, ⁷University of Pittsburgh, Pittsburgh, United States

BACKGROUND. In a recent multi-centre study (Sapphire), a biomarker combination of tissue inhibitor of metalloproteinase - 2 (TIMP-2) and insulin-like growth factor binding protein 7 (IGFBP7) were discovered and validated for risk stratification for acute kidney injury (AKI).¹ Subsequently we derived and validated a high sensitivity cutoff of 0.3 (ng/ml)²/1000.² The aim of this analysis was to determine whether the biomarkers add prognostic value when combined with conventional indices of AKI.

METHODS. 692 patients enrolled in the Sapphire study and followed up to 9 months were examined retrospectively. Data was stratified according to biomarker positivity on first sample as well as KDIGO classification of AKI stage I by either urine output, serum creatinine or both within 24 h of admission. End point was death or dialysis prior to 9 months.

RESULTS. Of 692 patients who were followed up for 9 months, 30 % were negative for all 3 criteria and served as the reference group. In patients who were biomarker positive and urine output positive the hazard ratio (HR) for the endpoint was 2.1 (95 % CI: 1.4 - 3.3) compared to 2.0 (95 % CI: 1.2 - 3.4) for creatinine criteria and biomarker positivity. These results were similar to patients with positive urine and creatinine criteria but a negative biomarker test HR: 2.3 (95 % CI: 1.1 - 4.5). 7 % of patients were positive for all 3 criteria resulting in a HR for death or dialysis at 9 months of 3.4 (95 % CI: 2.2 - 5.4). Thus any two criteria for AKI results in a doubling of the HR and all three lead to a more than 3-fold increase (Figure 1).



CONCLUSIONS. TIMP-2-IGFBP7 biomarker positivity together with serum and urine output criteria was superior in predicting dialysis or death at 9 months compared to using creatinine and/or urine output criteria alone. Thus the addition of biomarkers to conventional indices of AKI provides valuable information about patient status and prognosis.

FUNDING. Astute Medical

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0382
COLLOID VERSUS CRYSTALLOID IN SEPTIC NEUTROPENIC PATIENTS USING SERUM NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN (NGAL) AS AN EARLY MARKER OF ACUTE RENAL FAILURE

T.M. Zytoun¹, A.A. Mahrous¹, M.M. Megahed¹, M.M. Elsammk²

¹University of Alexandria, Critical Care, Alexandria, Egypt, ²King Fahd Jeddah Hospital, Clinical Pathology, Gedda, Saudi Arabia

BACKGROUND. Acute kidney injury (AKI) is an important event in critically ill patients. Searching for the ideal fluid which can be used in this critical condition is the target of this study.

PATIENTS AND METHODS. This study included fifty-six febrile neutropenic patients presented by severe sepsis and septic shock admitted to King Fahad Specialist Hospital-Dammam(KFSH-D) hospital, patients were randomly assigned to two groups: Group I: included 26 patients (crystalloid group-Ringer Lactate), group II: included 30 patients (colloid group- HES 130/0.4 (voluven), blood urea mmlol/l, serum creatinine mmlol/l, and blood NGAL level ng/ml were measured on admission and after treatment by 12 h. The primary end points were acute renal failure, the need for continuous renal replacement therapy (CRRT), and 28 day mortality.

RESULTS. There was significant increase in median creatinine level from admission to 12 h after treatment in both studied groups where it increased from 58 (21-200) mmlol/l to 106.5(49-780) mmlol/l (p < .001) in the crystalloid group, and in the colloid group it increased from 63.03(27.27) mmlol/l to 96.66(37.97) mmlol/l after 12 h (p < .001), the median creatinine level showed no statistically significant difference between both studied groups both on admission p = .730, and also after 12 h of treatment where it was 106.5(49-780) mmlol/l in first group compared to 90(44-210) mmlol/l in the second group p = .366.

Neutrophil gelatinase-associated lipocalin NGAL level changed significantly within the same group between the time of admission and after 12 h of treatment, in the crystalloid group, median NGAL level increased from 189(10-1800) ng/ml to 398.5(55-1900) ng/ml (p < .001), and in the colloid group it increased significantly from admission 190 (30-400) ng/ml till 12 h after treatment, 210(50-1020) ng/ml (p < .001).

Similar to urea and creatinine in both groups, the median NGAL level did not reach a statistically significant change between both groups on admission and after treatment by 12 h, 10 patients out of 26(38.5 %) included in the crystalloid group need for CRRT and out of 30 patients included in the colloid group, CRRT was needed in 13 patients (43.3 %) but the need for CRRT did not reach a statistically significant difference p = .712. acute renal failure (ARF) in this study developed in 14 patients in the crystalloid group (53.8 %) and in 19 patients (63.3 %) in the colloid group, with no statistically significant difference between both studied groups p = .472. The mortality rate was 63.4 % in the crystalloid group compared to 73.3 % in the colloid group with no Statistically significant difference p = .519.

CONCLUSION. Colloid as HES 130/0.4 did not differ from crystalloid as ringer lactate regarding the incidence of development of acute renal failure, need for CRRT, and the 28 days mortality rate.

KEYWORDS. Colloid, acute renal failure, NGAL

0383
EARLY DETECTION OF NGAL IN PLASMA AND URINE TO ASSESS ACUTE RENAL FAILURE IN PATIENTS AFTER CARDIAC SURGERY

M.E. Mendoza Ruano¹, P.M. Ravelo Hernandez¹, T. Rodriguez Gonzalez², J.J. Diaz Diaz¹, P. Saavedra³, S. Ruiz Santana⁴

¹Doctor Negrin University Hospital of Gran Canaria, Intensive Care Unit, Las Palmas de Gran Canaria, Spain, ²Doctor Negrin University Hospital of Gran Canaria, Laboratory and Clinical Analysis Department, Las Palmas de Gran Canaria, Spain, ³University of Las Palmas de Gran Canaria, Mathematics Department, Las Palmas de Gran Canaria, Spain

INTRODUCTION. Acute Renal Failure (ARF) is an important cause of morbidity and mortality in critically ill patients. Neutrophil gelatinase associated lipocalin (NGAL) emerge as a new biomarker of renal function and it seems it may be used for early diagnosis of ARF. **OBJECTIVE.** To evaluate urine and plasma NGAL as early biomarkers for renal impairment detection in patients undergoing cardiac surgery.

METHODS. Prospective, observational study in post-surgical cardiac patients, without previous renal disease, from March 2012 to November 2013. Patients who were reoperated within the first 12 h after surgery were excluded from the study. Determinations of NGAL were performed in all patients in urine and plasma at 0, 2, 6 and 12 h after ICU admission. Simultaneously, plasma creatinine determinations were also performed. NGAL determinations were summarized at their maximum values. The gold standard for acute renal failure was considered creatinine determinations obtained at the same hours. We define ARF equal or more than I, in base of RIFLE criteria.

In each of the study groups, categorical variables were summarized as frequencies and percentages and the numerical variables were summarized in means and standard deviations or medians and interquartile ranges depending if they gave or not, assumptions of normality. Percentages were compared, as appropriate, with the test of Chi square or Fisher's exact test, means with the t-test and medians with the Wilcoxon test for independent groups. For each period and marker a ROC analysis was performed. The discriminant value of the corresponding marker was assessed using the area under the ROC curve.

RESULTS. Table 1 summarizes the study variables in studied groups defined by the presence or absence of acute renal failure. Variables were similar in both groups. The maximum values of NGAL in urine and plasma were significantly higher in those patients with renal failure compared to patients without renal failure (p < 0.001 and p < 0.046, respectively). The area under the ROC curve (95 % CI) for the maximum urine NGAL value was 0.711 (0.592, 0.829), with an optimal cut-off of 42.3 ng/ml, sensitivity was 80 % and specificity 57.1 %. For maximum plasma NGAL, the area under the ROC curve (95 % CI) was 0.672 (0.529, 0.815) with an optimal cut-off of 244 ng/ml, sensitivity was 68.2 % and specificity in 67.2 %.

	Renal failure		P
	Yes N=25	No N=42	
Age, years, mean ± SD	67.9 ± 9.9	66.0 ± 9.5	439
Male / Female, %	88.0 / 12.0	57.1 / 42.9	008
Obesity, n (%)	9 (36.0)	11 (26.2)	396
Arterial hypertension, n (%)	18 (72.0)	32 (76.2)	703
Diabetes mellitus, n (%)	11 (44.0)	22 (52.4)	507
Smoking, n (%)	8 (32.0)	9 (21.4)	336
Apache-II, median (IQR)	18 (13; 22)	15.5 (12; 21)	516
Use of nephro-toxics	17 (68.0)	21 (51.2)	181
Diuretics	21 (84.0)	16 (38.1)	< 001
Low GC, n (%)	10 (40.0)	9 (21.4)	103
TRRC, n (%)	6 (24.0)	0	002
CEC, n (%)	23 (92.0)	35 (83.3)	466
Time CEC, minutes, median (IQR)	97 (83; 109)	93.5 (76; 109)	479
Eutis, n (%)	2 (8.0)	3 (7.1)	1
QX, n (%)			388
	Bypass	6 (24.0)	15 (35.7)
	Aortic valve	13 (52.0)	19 (45.2)
	Mitral valve	2 (8.0)	6 (14.3)
	Aortic and mitral valve	1 (4.0)	0
	Others	3 (12.0)	2 (4.8)
Maximum NGAL (Urine), ng/ml, median (IQR)	126 (44; 732)	32 (18; 110)	< 001
Maximum NGAL (plasma), ng/ml, median (IQR)	299 (201; 478)	186 (156; 270)	0.030

Sensitivities (†) and 1-specificities (‡) of both diagnosis rules

Table 1

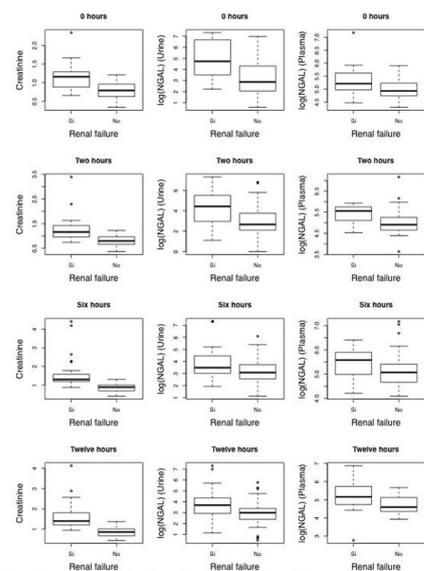


Figure 1. Boxplots for the markers in logarithm scale according to time and the group defined by presence or not of failure renal

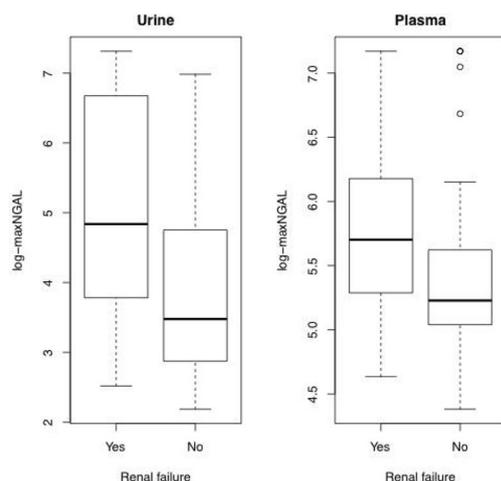


Fig. 2

CONCLUSIONS. Both NGAL in urine and plasma were found to be early biomarkers of acute renal failure in ICU patients after cardiac surgery. Urinary discriminating power turned out to be superior to plasma.

0384

PREDICTIVE VALUE OF PLASMA NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN AND STANDARD BIOCHEMICAL MARKERS FOR ACUTE KIDNEY INJURY AFTER MAJOR NON-CARDIAC SURGERY IN ICU

H.P. Shum¹, N.Y.W. Leung¹, K.C. Chan¹, L.L. Chang¹, O.Y. Tam¹, A.M.C. Kwan¹, W.W. Yan¹

¹Pamela Youde Nethersole Eastern Hospital, Department of Intensive Care, Hong Kong, Hong Kong, China

INTRODUCTION. Acute kidney injury (AKI) occurs in around 1 % of non-cardiac surgical patients. Neutrophil gelatinase-associated lipocalin (NGAL) was found to be a sensitive and specific biomarker for AKI after cardiac surgery. However, its performance in non-cardiac surgical patients has not been well studied.

OBJECTIVES. This study investigates the predictive value of plasma NGAL (pNGAL) and other standard biochemical markers for early detection of AKI in patients who were admitted to intensive care unit (ICU) after major or ultra-major non-cardiac surgery.

METHODS. A total of 151 patients were recruited. Serial blood samples at time 0 h and 6 h post ICU admission were collected and analyzed. The primary outcome was occurrence of AKI within 48 h of ICU admission defined using the creatinine and urine output criteria of the RIFLE (Risk-Injury-Failure-Loss-End stage renal disease) classification.

RESULTS. A total of 40 (26 %) patients developed AKI within 48 h of ICU admission. Among them, 17, 13, and 10 had a worst RIFLE class of Risk, Injury, and Failure respectively. pNGAL at 0 h and 6 h from ICU admission were significantly related to AKI severity. The areas under receiver operating characteristic curves (AUROC) for pNGAL increased with AKI severity (RIFLE Risk: Injury: Failure AUROC = 0.519; 0.638; 0.821 at 0 h and = 0.489; 0.710; 0.851 at 6 h respectively). It was highly predictive of the requirement of renal replacement therapy (0.880 at 0 h & 0.837 at 6 h respectively). Focused on prediction of AKI with RIFLE class of Injury or more, the AUROC for pNGAL at 0 and 6 h (0.737 and 0.796) were similar to several standard biochemical markers (6 h creatinine, 0 and 6 h albumin with AUROC ranged from 0.732-0.780).

CONCLUSIONS. pNGAL is useful, but not superior to standard biochemical markers, for prediction of early AKI in patients who received major or ultra-major non-cardiac surgery that required ICU care.

Cardiac crisis: 0395–0398

0385

FIBRINOLYSIS AS TREATMENT OF PULMONARY THROMBOEMBOLISM IN OUR ICU: COMPLICATIONS, ECHOCARDIOGRAPHIC EVOLUTION AND QUALITY OF LIFE AFTER DISCHARGE

E. Portugal Rodríguez¹, M. Del Valle Ortiz¹, O. Badallo Orévalo¹, M.E. Martínez Barrio¹, S.A. Ossa Echeverri¹, A. Berrazueta Sánchez de Vega¹, M. Gero Escapa¹, M. Montero Baladía¹, S. Puerto Corrales¹, J.M. Ayuela Azcárate¹

¹Hospital Universitario de Burgos, Burgos, Spain

INTRODUCTION. Massive pulmonary embolism (PE) is a cardiovascular emergency with high risk of in-hospital death at admission. Early diagnosis is necessary, since immediate treatment is effective. Fibrinolysis resolves the obstruction and has beneficial effects on hemodynamics.

OBJECTIVES: The aim is to describe the characteristics and management of patients with PE admitted to ICU. The second aim is to analyze the evolution of echocardiographic (TTE) parameters, treatment, complications and quality of life after hospital discharge of patients who underwent fibrinolysis.

METHODS. We performed a descriptive, observational study of patients with PE admitted to our general ICU (in a tertiary hospital) from 1/10/10 to 8/8/13. Variables: risk factors, type of PE, treatment, right cavities dilatation (RDC), TAPSE < 15 mm, tricuspid regurgitation (TR) and pulmonary hypertension (PHT). Complications such as minor haemorrhage (mh) [no need of therapeutic approach] or major haemorrhage (MH) [intracranial bleeding, hemoglobin drop >3 mg/dl or need of transfusion]. Clinical situation after 6-12 months from discharge: good standing (normal life), limited quality of life (dyspnea during exercise/partially dependent); or poor quality of life (dyspnea at rest/totally dependent). Need of O2 at home.

RESULTS. A total of 57 patients (50.9 % male) were analyzed. Their average age was 68.14 (±14.47). The risk factors were deep venous thrombosis (DVT) 43.9 %, previous PE 5.3 %, immobilization 29.8 %, neoplasia 15.8 %, oral contraceptive 10.6 %, smoking 15.8 %. AngioTC imagenes showed massive PE in 89.4 %. Underwent fibrinolytic therapy 75.4 % of all patients. After resuscitated cardiac arrest 15.8 % underwent fibrinolysis. In 7 % of the cases a filter was placed in the cave vein and 24.6 % required mechanical ventilation. ETT pre-fibrinolysis: RDC 95.3 %, TAPSE < 15 mm 30.2 %, TR 79.1 % and PHT 58.1 % (being severe in 37.2 %). Comparing ETT values at admission and discharge when available the results were: 85.2 % RDC and 100 % TAPSE recovered to normal values. PHT disappeared in 29.4 % and severe pulmonary hypertension persisted in 35.29 % (not statistically significant). A total of 69.8 % had no complications after fibrinolysis, 11.6 % and 18.6 % had mh or MH. The intra-ICU mortality was 14 %. From hospital discharge 53.8 % has good clinical condition, 38.46 % limited and 7.69 % poor quality of life. 14 % of patients required home O2.

CONCLUSIONS. Fibrinolysis is the first choice treatment for patients with PE admitted to ICU with good results and admissible complications. Parameters of right ventricular dysfunction mostly recover after fibrinolytic therapy. Some degree of HTP at discharge is maintained, although quality of life at 6-12 m is favorable.

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0386

SAFETY OF NITRATES IN PATIENTS PRESENTING IN ACUTE PULMONARY EDEMA WITH CONCOMITANT MODERATE OR SEVERE AORTIC STENOSIS: A RETROSPECTIVE COHORT STUDY

D. Claveau^{1,2}, A. Piha-Gossack³, S.N. Friedland⁴, J. Afilalo⁵, L. Rudski⁶

¹McGill University, Emergency Medicine Program, Montreal, Canada, ²Centre de Santé et de Services Sociaux de Trois-Rivières, Site Centre Hospitalier Régional, Emergency Medicine, Trois-Rivières, Canada, ³Université de Montréal, Faculty of Medicine, Montreal, Canada, ⁴McGill University, Faculty of Medicine, Montreal, Canada, ⁵Jewish General Hospital, Division of Cardiology and Clinical Epidemiology, Montreal, Canada, ⁶Jewish General Hospital, Division of Cardiology, Montreal, Canada

INTRODUCTION. Use of nitrates is considered contraindicated in severe aortic stenosis (AS) despite lack of scientific evidence to this effect.

OBJECTIVES. To evaluate the safety of nitrates in patients presenting with acute pulmonary edema and concomitant moderate or severe AS.

METHODS. A retrospective cohort study was conducted at two Canadian hospitals. Patients admitted with congestive heart failure who received intravenous or sublingual nitroglycerin from 2008 to 2013 were identified. Aortic stenosis presence and severity were defined based on the American College of Cardiology and American Heart Association guidelines.¹ Sixty-five patients with severe AS presenting with pulmonary edema were found to have received nitroglycerin. They were matched to an equal number of patients with moderate AS and patients without AS. Both the group with severe and moderate AS were independently compared to the group without AS. The primary outcome was clinically relevant hypotension, defined as hypotension leading to any of the following predefined events: nitroglycerin discontinuation, intravenous fluid bolus, vasopressor use or cardiac arrest. The main secondary outcome was the occurrence of sustained hypotension, defined as a systolic blood pressure below 90 mmHg lasting 30 min or more. Factors predicting clinically relevant hypotension were evaluated.

RESULTS. We included 195 patients equally divided between the three groups. There was no association between AS status and clinically relevant hypotension with an adjusted OR of 0.97 (95 % CI 0.40-2.37) and 0.99 (95 % CI 0.41-2.41) for moderate and severe AS, respectively. There was a trend towards more sustained hypotension in the group with severe AS with an adjusted OR of 2.34 (95 % CI 0.91-6.01). Using multiple logistic regression with model selection, factors more predictive of clinically relevant hypotension were female sex, lower initial systolic blood pressure, higher furosemide dose and use of noninvasive ventilation.

CONCLUSIONS. Moderate and severe AS is not associated with more clinically relevant hypotension when using nitroglycerin for acute pulmonary edema. Severe AS may be associated with more sustained hypotension but not requiring increased intervention.

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0387**LOWER ADMISSION END-TIDAL CARBON DIOXIDE PREDICTS MORTALITY IN PATIENTS WITH CARDIOGENIC SHOCK**A. Markota¹, E. Hajdinjak², A. Sinkovič¹¹University Medical Centre Maribor, Medical Intensive Care Unit, Maribor, Slovenia, ²Community Health Centre Ljubljana, Department of Emergency Medicine, Ljubljana, Slovenia

INTRODUCTION. CO₂ is a product of aerobic metabolism. It is carried by the venous circulation from peripheral tissues to the lungs, where it diffuses from pulmonary capillaries into the alveoli and can be measured as end-tidal CO₂. CO₂ reflects cardiac output. Cardiogenic shock is characterized by low cardiac output and insufficient delivery of oxygen to peripheral tissues. If supply of oxygen is insufficient, then production of CO₂ is decreased as well. Numerous factors can influence end-tidal CO₂ levels. However, in intubated patients the measurement is simple, minimal additional intervention is needed and is performed routinely in critical care setting. Consistently low end-tidal CO₂ levels predict poor outcome in cardiac arrest patients [1]. The role of end-tidal CO₂ in patients with cardiogenic shock has not been studied.

OBJECTIVES. The aim of this study was to analyze first measured etCO₂ after admission to intensive care unit and mortality of patients with cardiogenic shock. We hypothesized that patients with lower etCO₂ would have higher mortality because of decreased CO₂ production in more severely hypoperfused and hence shocked patients.

METHODS. We retrospectively included 17 adult patients with acute myocardial infarction and cardiogenic shock treated in years 2009-2011. Inclusion criteria were end-tidal CO₂ levels recorded on admission, ST-elevation acute myocardial infarction and cardiogenic shock. Only intubated patients were included. The patients were treated in a 12-bed medical intensive care unit with 24/7 percutaneous coronary intervention capability.

RESULTS. Ten patients (59 %) died. We observed nonsignificant differences between nonsurvivors and survivors in gender (60 % males vs. 57 % males, $p = 1$), APACHE II score (29.40 ± 5.27 vs. 27.86 ± 3.44 , $p = 0.51$), rates of cardiopulmonary resuscitation (no CPR in 80 % vs. 71 %, $p = 1$), admission lactate levels (4.68 ± 1.78 mmol/l vs. 4.08 ± 1.23 , $p = 0.45$), admission pH (7.19 ± 0.08 mmol/l vs. 7.23 ± 0.07 mmol/l, $p = 0.26$), use of vasopressors (90 % vs. 86 %, $p = 1$) and inotropes (60 % vs. 86 %, $p = 0.34$). A significant difference between nonsurvivors and survivors was observed in admission end-tidal CO₂ (5.18 ± 1.27 kPa vs. 6.33 ± 0.92 kPa, $p = 0.0477$) and age (71.6 ± 7.3 years vs. 60.3 ± 14.4 years, $p = 0.049$).

CONCLUSIONS. This small, retrospective study revealed that end-tidal CO₂ monitoring could be of use as predictor of mortality in patients with acute myocardial infarction and cardiogenic shock. Future research is warranted because of simplicity and minimally invasive nature of end-tidal CO₂ monitoring.

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0388**RELATION BETWEEN LEFT VENTRICULAR ASSIST DEVICE FLOW AND RECOVERY FROM ORGAN DYSFUNCTION AFTER CONTINUOUS FLOW VENTRICULAR ASSIST DEVICE IMPLANTATION**Y. Enokidani¹, M. Uji², A. Uchiyama², Y. Fujino²¹Osaka General Medical Center, Dept of Anesthesiology, Osaka, Japan, ²Graduate School of Medicine, Osaka University, Dept of Anesthesiology and Intensive Care Medicine, Osaka, Japan

INTRODUCTION. In our hospital, patients with chronic heart failure resistant to medication or acute heart failure deteriorating rapidly have been implanted ventricular assist device (VAD). Previous studies reported that VAD implantation improved organ perfusion and therefore organ function. However, few previous studies referred to the relation between VAD flow and the extent of recovery. Although pulsatile VADs were implanted in most of the patients in those studies, continuous flow VAD is now the most popular type.

OBJECTIVES. To assess whether there is a certain relation between postoperative VAD flow and recovery from organ dysfunction in patients implanted continuous flow VAD.

METHODS. This study included all patients who underwent continuous flow VAD implantation and admitted ICU postoperatively from January 2011 to December 2012 at Osaka University Hospital. We collected data from medical record retrospectively, which included left VAD (LVAD) flow (L/min, on and 72 h after ICU admission), serum bilirubin and creatinine (mg/dL, just and one week after VAD implantation, respectively), and patients' height and weight. We calculated LVAD flow index (L/min/m²), which meant LVAD flow divided by body surface area.

RESULTS. Of 30 patients matching inclusion criteria, 14 had shock before VAD implantation. Overall median LVAD flow index was 2.46, and median flow indexes in shock and non-shock groups were 2.58 and 2.29, respectively. In shock group, correlation coefficients between LVAD flow index and bilirubin and creatinine values were -0.17879 ($p = 0.5408$) and -0.16447 ($p = 0.5742$) one week after VAD implantation, respectively. There was no correlation between LVAD flow and laboratory test values of the liver and kidney. In non-shock group, similarly, correlation coefficients between LVAD flow index and bilirubin and creatinine values were 0.00532 ($p = 0.9844$) and -0.03852 ($p = 0.8874$) one week after VAD implantation, respectively, and there showed no correlation between LVAD flow and laboratory test values.

CONCLUSIONS. There is no specific relation between LVAD flow and recovery from organ dysfunction after continuous flow VAD implantation. Cardiac output from native heart might have influenced on our results.

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0389**EFFECTS OF EARLY REHABILITATION IN POST-CARDIAC ARREST SYNDROME**T. Mochizuki¹, N. Otani¹, S. Ohde², A. Mizuno³, S. Izumitani⁴, D. Okamura⁴, S. Sato⁴, S. Ishimatsu¹¹St. Luke's International Hospital, Emergency and Critical Care Medicine, Tokyo, Japan, ²St. Luke's Lifescience Institute, Center for Clinical Epidemiology, Tokyo, Japan, ³St. Luke's International Hospital, Cardiology, Cardiovascular Center, Tokyo, Japan, ⁴St. Luke's International Hospital, Rehabilitation, Tokyo, Japan

INTRODUCTION. Although early physical and occupational therapy (PT/OT) following critical illness results in better functional outcomes at hospital discharge¹, its efficacy for post-cardiac arrest syndrome (PCAS) is unclear. From January 1, 2012, we introduced an early multidisciplinary rehabilitation program including doctors, therapists, and nurses for PCAS survivors.

OBJECTIVES. This study aimed to identify whether this early rehabilitation program was effective for PCAS survivors

METHODS. We performed a retrospective cohort study of PCAS survivors treated with therapeutic hypothermia after an out of hospital cardiac arrest in our hospital from January 1, 2010 to December 31, 2013. Patients were excluded if they died during hospitalization, if the cause of cardiac arrest was non-cardiac in origin, and if they were 16 years of age or younger. Clinical outcomes were assessed at 30 days after admission using the Pittsburgh cerebral performance category (CPC). We defined good neurological prognosis as CPC 1-2 and an unfavorable prognosis as CPC 3-4. We defined two groups: those treated before the program was implemented were a standard rehabilitation group (SR group) and those treated after the program was implemented were defined as an early rehabilitation group (ER group). Thereafter, we compared time to onset of rehabilitation, length of intensive care unit (ICU) stay, ventilator-free days (VFD), and neurological prognosis. We used the Mann-Whitney U test for continuous variables and the Chi square test for qualitative variables.

RESULTS. In total, 320 patients were resuscitated and admitted to our ICU; 268 were excluded, and the final study sample comprised 52 patients (SR group: 30, ER group: 22). The ER group had a shorter average time to onset of rehabilitation than the SR group (9.5 days, versus 6.9 days; $P < 0.05$). The probability of good neurological prognosis at 30 days after admission was higher in the ER group than in the SR group (56.7 %, versus 90.9 %; $P < 0.05$). No differences existed for VFD and length of ICU stay.

CONCLUSIONS. Early rehabilitation in PCAS may improve the probability of good neurological prognosis at 30 days after admission. Further large-scale prospective analysis of early rehabilitation in PCAS is expected.

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0390**THE PREDICTIVE OUTCOME OF PROCALCITONIN ON NEUROLOGICAL OUTCOME AFTER CARDIAC ARREST IS NOT INFLUENCED BY THE USE OF ANTIBIOTICS DURING SELECTIVE DECONTAMINATION OF THE DIGESTIVE TRACT**W. de Ruijter¹, F.L. Veldhuis^{1,2}, M.L. Honing³¹Medisch Centrum Alkmaar, Intensive Care Unit, Alkmaar, Netherlands, ²VU University Medical Center, Amsterdam, Netherlands, ³Gemini Hospital, Den Helder, Netherlands

INTRODUCTION. Selective decontamination of the digestive tract (SDD) is an antibiotic strategy aimed to reduce the incidence of Ventilator Associated Pneumonia, and improve morbidity and mortality of critically ill patients.(1) The inflammation parameter Procalcitonin (PCT) has been shown to predict neurological outcome after cardiac arrest. (2) We investigated whether procalcitonin levels are influenced by SDD, and interfere with its predictive value for neurological outcome after cardiac arrest.

OBJECTIVES. Verifying that the use of SDD has no effect on PCT levels.

METHODS. A prospective observational study in patients after successful CPR who received therapeutic hypothermia, with or without treatment with antibiotics according to the SDD protocol. (1) Serum PCT levels were determined every 8 h until 72 h. The two groups were compared for PCT levels, and analysed for post-hypothermic fever, occurrence of pneumonia, and the Glasgow Coma Scale after 72 h. Results are mentioned as mean \pm SD.

RESULTS. We included 35 patients (15 SDD- vs. 20 SDD+) for analysis. Mean PCT levels in both groups were not significantly different. Maximum PCT levels are reached between 24 and 48 h, max. mean PCT level amounted to 4.89 ± 11.3 at $t = 32$ h. In the SDD+ group, fever occurred less frequently ($p = 0.006$), 13 patients with fever in the SDD- group vs. 8 in the SDD+ group. Three patients developed pneumonia, all in SDD-. Patients with pneumonia had similar PCT-levels compared to patients without pneumonia. Patients with a GCS of 5 or lower at 72 h after admission, had significantly higher PCT-levels at 8, 16, 24, 32 and 40 h. Here, treatment with or without SDD also made no difference.

CONCLUSIONS. PCT levels were not influenced by the administration of antibiotics during SDD. However, SDD decreases fever in post-cardiac arrest patients, indicating that translocation of bacteria from the digestive tract or the anti-inflammatory properties of SDD may play a role in developing post-hypothermic fever. In the study period of 72 h, serum PCT-levels are not reliable as a predictor for post-hypothermic fever and infection in patients after CPR. Elevated PCT-levels after cardiac arrest are associated with low GCS after 72 h. PCT-levels are thought to be influenced by the presence and the severity of post-cardiac arrest syndrome (PCAS), and ischemia/reperfusion damage to the central nervous system as a part of this syndrome. (1) Further research is needed to determine the reliability of PCT as a biomarker for the severity of PCAS or (neurological) outcome and possible clinical implications.

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0392**IAM MECHANICAL COMPLICATIONS IN CRITICAL PATIENTS**M. Recuerda¹, A. Estella¹, V. Perez¹, M. Jaén², P. Guijo²¹Hospital Jerez de la Frontera, Cádiz, Spain, ²Hospital Jerez de la Frontera, Medicina Intensiva, Cádiz, Spain

OBJECTIVES. The incidence of mechanical complications of ischemic cause does not exceed 1 % of heart attacks. The aim of this study is to describe the clinical and epidemiological characteristics of post-infarction mechanical complications and to study the relationship with the treatments received, type of stroke and its location.

MATERIALS AND METHODS. Prospective observational study in a medical-surgical ICU of a 2nd level hospital with 17 beds for a period study of 24 months. Consecutive patients with a mechanical complication of ischemic origin were included. The variables analyzed were age, sex, cardiovascular risk factors, usual treatment, ischemic heart disease and previous catheterization, reason for admission, infarct location, treatment received, number and type of stent, use extractor thrombus, TIMI flow back, echocardiography and Swan- Ganz data, surgery and exitus. Data were analyzed using SPSS version 18.

RESULTS. 11 patients were included, 63.6 % males. 45.5 % developed dysfunction of the mitral valve apparatus, 27.3 % septal defect (CIV), and 27.3 % remaining cardiac rupture in the context of ischemic heart disease. The average age in CIV was 69 years, all of them were admitted for STEMI and underwent catheterization implanting drug-eluting stents with TIMI III flow, IIB - IIIA inhibitors and thrombus extractor was used. The average age at valve dysfunction was 60 years, 80 % were admitted with STEMI and 100 % had more than two vessels affected by coronary angiography, 40 % died. In cardiac rupture the median age was 72 years, 100 % had electrocardiographic abnormalities in the anterior localisation and all cardiac tamponade was observed in echocardiography, 66.6 % died.

CONCLUSIONS. CIV is more frequent in our series of patients diagnosed with STEMI, stenting and use of extractor and inhibitors IIB/IIIA thrombus. In valvular dysfunction prevails NSTEMI and have 2 or more coronary vessels affections. Heart failure is associated with increased age and have higher mortality.

0393

OPTIMISING PAIN FREE FUNCTION FOLLOWING ELECTIVE ENDOVASCULAR AND OPEN ABDOMINAL AORTIC ANEURYSM REPAIR: A REVIEW OF PRACTICE AND OUTCOMES

J. Searle¹, R. Kapoor¹

¹Kent and Canterbury Hospital, Dept of Anaesthetics, Canterbury, United Kingdom

INTRODUCTION. Post-operative epidural use following Abdominal Aortic Aneurysm (AAA) repair must, for each patient, balance adequate analgesia against benefits of early mobilisation [1,2]. Though used intra-operatively for endovascular repair (EVAR), current local trend is to terminate epidural infusions in recovery wherever possible, relying instead upon intravenous or indeed oral analgesia.

OBJECTIVES. This study aims to audit current range of practice and correlate this against pain scores within the immediate post-operative period. It further aims to identify 'high-risk' times for increased pain, to better target interventions and monitoring.

METHODS. A retrospective review was conducted of all elective AAA repairs – 'EVAR' and 'open' - over a four-month period within a regional vascular centre. Approval was obtained from the hospital audit department. Anaesthetic records and critical care charts were applied to an anonymised, pre-designed audit pro-forma. Data included epidural technique, infusion type and timing, analogue pain scores (0-3; 'mild' to 'severe') for 48-hours post-operatively and additional analgesia requirements. Data were considered non-parametric. Analysis was conducted using STATA v12.1 (Texas, USA).

RESULTS. Twenty-seven patients were identified. Of 20 patients undergoing EVAR, 17 left theatre with an epidural in situ. Over 48-hours, average pain scores were rated 'mild' or less where epidural infusions were terminated immediately post-operatively (mean 0.47; median 0; range 0-1). These were non-significantly lower than those in whom infusions continued (mean: 0.47 vs 0.77; $p = 0.08$). Maximal pain score was '2' among all EVAR patients and '3' among 'open', though this never persisted to the subsequent measurement. Among both EVAR ($p = 0.014$) and open ($p < 0.01$) patients, pain scores were significantly higher during the second 24-hour period, compared to the first (fig 1). Higher scores were also seen among patients admitted from theatres after 5 o'clock, compared to those arriving before (0.17 vs 0.60; $p = 0.017$).

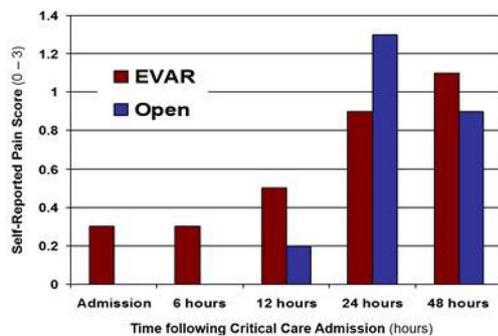


Fig. 1 Average pain scores over 48-hours post-op

CONCLUSIONS. An individualised approach to analgesia is highly important. Within a critical care environment, discontinuation of epidural infusions in selected EVAR patients post-operatively is not associated with development of significant pain. Close monitoring is required to ensure early intervention when pain does develop however. Particular attention should be paid to patients 24-hours post-operatively and those arriving from theatres 'out-of-hours'.

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0394

PAIN PERCEPTION OF INVASIVE AND NONINVASIVE INTERVENTIONS IMPLEMENTED AFTER CARDIAC SURGERY IN INTENSIVE CARE UNIT

A. Yava¹, A. Koyuncu², N. Pusu², V. Yildirim², U. Demirkılıç²

¹Hasan Kalyoncu Faculty of Medical Sciences, Department of Nursing, Ankara, Turkey,

²Gulhane Military Medical Academy, Department of Cardiovascular Surgery, Ankara, Turkey

AIM. To determine the effect of invasive and noninvasive interventions implemented in intensive care unit to patients after cardiac surgery on the pain perception and hemodynamic parameters.

MATERIAL AND METHOD. This study was a prospective, pre-post measured clinical trial. Invasive and noninvasive interventions were determined as coughing, breathing exercises, milking drains, mobilization, removing drain, and endotracheal aspiration. Numerical Rating Scale was used for determining of pain perceptions immediately before and after interventions. Blood pressure and heart rate (pulse) were also recorded prior to the

procedure and immediately following the interventions. Pain treatment applications were recorded before one hour such implementations. Sixty-two patients were included in the study. Wilcoxon Signed Rank test was used for statistical analyses and p values of < 0.05 were accepted as being statistically significant.

RESULTS. Mean age of the patients were 51.25 ± 18.05 years, most of them were (87.1 % male, and 74.2 % of the patients were undergone coronary by-pass grafting surgery. The patients' all invasive and noninvasive pain scores were increased after interventions statistically significant ($p < 0.05$). The highest pain scores were recorded in endotracheal suctioning before and after implementation (respectively 7.30 ± 1.04 and 8.80 ± 1.25). The patients' systolic and diastolic blood pressure and pulse rate were increased after drain removal and endotracheal aspiration interventions as statistically significant ($p < 0.05$).

CONCLUSION. All patients' pain scores and hemodynamic parameters were increased after invasive and noninvasive interventions. It was suggested that individual pain assessment and proper pain treatment needed before such implementations.

KEYWORDS. Pain, hemodynamic parameters, invasive and noninvasive interventions, cardiac surgery.

0395

ASSESSMENT OF OBESITY PARADOX AFTER AORTIC VALVE REPLACEMENT

M. Sileli¹, F. Ampatzidou¹, S. Tsagkaropoulos², A. Madesis², T. Karaiskos², A. Vlachou², A. Badour², K. Diplaris², G. Drossos²

¹General Hospital 'G. Papanikolaou', Cardiac Surgery ICU, Thessaloniki, Greece, ²General Hospital 'G. Papanikolaou', Cardiothoracic Surgery, Thessaloniki, Greece

INTRODUCTION. Obesity is recognized as a major risk factor in the development of cardiovascular diseases. There is increasing evidence concerning patients undergone coronary revascularization that higher BMI is related to a paradoxical decrease in mortality. The effect of obesity paradox on postoperative morbidity and mortality after aortic valve surgery remains to be clarified.

OBJECTIVES. Primary objective was to assess whereby obesity directly impacts on early morbidity, hospital stay and 30-day mortality after isolated aortic valve surgery. Secondary objective was to evaluate obesity subcategories as independent predictors of early postoperative morbidity.

METHODS. We conducted a retrospective study in 96 consecutive patients recovered in ICU following aortic valve surgery between June 2012 and March 2014. Combined valve surgery procedures and very lean patients ($BMI < 18.5 \text{ kg/m}^2$) or those on renal dialysis were excluded prior to the study. Patients were allocated to three groups based on the preoperative Body Mass Index (BMI): normal weight (Group 1; $BMI = 18.5\text{-}24.9 \text{ kg/m}^2$, $n = 12$), overweight (Group 2; $BMI = 25\text{-}29.9 \text{ kg/m}^2$, $n = 44$) and obese (Group 3; $BMI > 30 \text{ kg/m}^2$, $n = 40$). We further subdivided obese patients into two subcategories: class I ($BMI = 30\text{-}34.9 \text{ kg/m}^2$, $n = 25$) and class II ($BMI > 34.9 \text{ kg/m}^2$, $n = 15$). Early morbidity was defined as prolonged mechanical ventilation ($> 48 \text{ h}$), pneumonia, re-intubation rate, acute kidney injury (AKI), atrial fibrillation (AF), MODS and deep sternal infections. Furthermore, overall morbidity, length of stay (LOS) and 30-day mortality were analyzed. Statistical analysis was carried out using Chi square and Student's t-test. Predictive ability was assessed using regression analysis.

RESULTS. Early cumulative postoperative mortality was 2.1 % (2 of 96 patients). Patients suffering from overweight or obesity did not demonstrate an overall statistically significant increased complication rate compared to those with normal BMI. Furthermore, overweight or obesity did not affect hospital stay or 30-day mortality ($p = \text{NS}$; primary goal). Further analysis on obese subcategories (class I, class II) failed to reveal predictive ability concerning overall postoperative morbidity (HR 0.61, 95 % confidence interval -0.71 to 1.94, $p = 0.36$; secondary goal).

CONCLUSIONS. Co-morbidities accompanying aortic valve disease may potentially influence early outcomes. On the contrary, obesity does not have a negative impact on morbidity and mortality. Our findings are in line with previous studies¹. This study extends knowledge that nor obesity or obesity subcategories prove to be predictive of worse early postoperative outcomes. This neutral effect of obesity has to be further investigated.

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0396

IMPACT OF EARLY POSTOPERATIVE ANEMIA ON OUTCOMES AFTER ON PUMP CARDIAC SURGERY

G. Linkaite¹, J. Guseinovaite¹, D. Ringaitiene¹, I. Norkiene¹, T. Jovaisa²

¹Vilnius University, Faculty of Medicine, Clinic of Anesthesiology and Intensive Care,

Vilnius, Lithuania, ²Lietuvos Sveikatos Mokslu Universitetas, Anesteziologijos ir

Reanimatologijos Klinika, Kaunas, Lithuania

INTRODUCTION. In various modern guidelines recommend lower threshold for blood transfusion varies from 60 g/L to 80 g/L. Higher level of hemoglobin is recommended for some populations, such ongoing bleeding, acute coronary syndrome or hemodynamic instability.

OBJECTIVES. The aim of our study was to evaluate the impact of early postoperative hemoglobin decrease on outcomes after coronary artery bypass grafting.

METHODS. A retrospective analysis of 179 consecutive patients was conducted in tertiary referral university hospital. Postoperative transfusion threshold was defined as hemoglobin level below 90 g/L. On admission to ICU after surgery 11,7 % of patients ($n = 25$) had a reduction in hemoglobin level below 90 g/L. Postoperative outcomes, regarding STS derived major complication incidence (postoperative acute renal failure requiring dialysis, postoperative neurologic deficit, postoperative AV block, postoperative mechanical circulatory support, unplanned reoperation) was compared with higher postoperative hemoglobin group $\geq 90 \text{ g/L}$ ($n = 158$, 88,3 %).

RESULTS. Both patient groups were homogenic comparing intraoperative parameters. We did not find any statistically significant differences between both groups regarding surgery duration, CPB time or intraoperative fluid balance. Analysis of postoperative variables showed that patients with lower postoperative hemoglobin level were significantly more often subjected to postoperative complications in univariate analysis (11 (21,2 %) vs 11 (8,7 %) $p = 0.02$). However multivariate analysis showed that early postoperative anemia was not an independent predictor of complicated postoperative course (OR 1.9; CI = 0,6-6,5 $p = 0,294$). While postoperative bleeding was independently associated with major complication development after on pump cardiac surgery (OR 0,99; CI = 0,9-1,0; $p = 0,024$).

CONCLUSIONS. The decision to transfuse should not be based only on hemoglobin level but should incorporate individual patient characteristics and symptoms. Postoperative Hb

decrease below the transfusion threshold of 90 g/l is not an independent predictor of postoperative complications after elective cardiac surgery.
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0397 DETERMINING THE RISK FACTORS FOR ACUTE KIDNEY INJURY IN HEART SURGERY WITH CIRCULATION EXTRACORPOREAL (CEC) LONG

J.A. Villalobos Silva¹, S. Facundo Bazaldua², M.A. Montes de Oca Sandoval³, C.R. García Barra², K.C. Trejo García⁴, A. Casillas Ramirez²

¹Hospital Regional de Alta Especialidad Victoria (HRAEV), Intensive Care Unit, Victoria, Mexico, ²Hospital Regional de Alta Especialidad Victoria (HRAEV), Victoria, Mexico, ³Cardiología, Centro Medico Siglo XXI IMSS, Terapia Postquirúrgica, Mexico, Mexico, ⁴Hospital Infantil de Tamauilipas, Anestesiología, Victoria, Mexico

INTRODUCTION. Despite the enormous advances in the management of postoperative care of heart surgery, renal complications secondary to prolonged cardiopulmonary bypass (CPB) are presented in almost all patients. Acute renal injury (ARI) after cardiac surgery is associated with increased mortality, increased incidence of complications, a longer stay in the intensive care unit (ICU) and a significant increase in costs in health care.

OBJECTIVES. Identify risk factors for acute kidney injury in cardiac surgery associated with cardiopulmonary bypass (CPB) long.

METHODS. The information was collected by researchers from the records of patients scheduled for heart surgery open heart admitted to the Intensive Care Unit of the Regional Hospital of Alta Specialty (HRAEV) and Siglo XXI Medical Center (IMSS) 01 January 2013 to December 1, 2013. Of the 450 files reviewed included 69 who had a time of over 120 min (CEC > 120) extracorporeal circulation, general data of each patient, cardiovascular risk factors (CVRF) were recorded, the data of the variables were also recorded to study and made a database for statistical tests using SPSS 16 program.

RESULTS. Analyzed 69 cases, age 53 ± 21 years, the 73 % of the study group belonged to the male gender (n = 51) and 27 % female (n = 18), the 44 % were older adults analyzed, comorbidities or CVRF who had more than 3 preoperative risk factors (62 %) and only had 2 or fewer risk factors (38 %). When stratified APACHE and EuroSCORE, we observed 11.55 ± 2.02 APACHE and 6.50 ± 1.25 EuroSCORE was performed at baseline PaO₂/FIO₂ of Qx and admission to ICU, watching < 65 years preQx 310 ± 37 mmHg in PostQx 226 ± 27 with p = < 0.05, and > 65 years in preQx 298 ± 27 mmHg and 219 ± 35 post Qx with p = < 0.05. Surgical bleeding 877 ± 78, hemodynamics TAM 86 ± 10 mmHg in over 65 years vs 80 ± 8.7 mmHg (p = NS), 9.5 ± 1.8 PVC mmHg in over 65 years vs 14 ± 2.8 mmHg (p = NS), 3.1 ± GC 0.8 L/min in over 65 years vs 3.4 ± 1.1 L/min (p = NS). The decline in GFR greater than 50 % of baseline was 39 % and the association of risk was measured, with: comorbidities (> 3) OR 4, 40, hypoalbuminemia (< 3.0gr/dL) OR 1.26, LVEF (< 40 %) OR 2.10 and EuroSCORE (> 6 pts) OR 1.75. The complications observed in this study were renal replacement therapy (RRT) in 10 %, acute myocardial infarction (AMI) perioperative 3 % systemic inflammatory response (SIRS) 6 % syndrome, prolonged ventilation-associated pneumonia and mortality 10 % 30 %.

CONCLUSIONS. Patients with prolonged CPB present with greater kidney damage than expected in this study was observed in almost 40 % of patients. The factors associated with renal injury were the presence of more than 3 comorbidities prior to surgery and LVEF less than 40 %, less association we hypoalbuminemia < 3.0gr/dL and EuroSCORE > 6.

0398 USE OF INTRA-AORTIC BALLOON PUMP IN CARDIAC SURGERY: ANALYSIS OF THE CARDIAC SURGERY REGISTER ARIAM

E. Trujillo-García¹, J. Muñoz-Bono¹, G. Gómez-Gallego¹, E. Curiel-Balsera¹, J. Mora-Ordóñez¹, M.C. Martínez-González¹

¹H. R. U. Carlos Haya, Málaga, Spain
OBJECTIVES. Analysing results regarding intra-aortic balloon pump in cardiac surgery in patients included in the ARIAM Register.

METHODS. Observational, retrospective and multicentric study of cardiac surgery patients included in the ARIAM-Andalucía Register of cardiac surgery from March 2008 to July 2013. Quantitative variables are expressed as mean and standard deviation, while qualitative variables are expressed as ratios and absolute value. The Mann-Whitney's test and Fischer's exact test were used when necessary; alpha error was set at 5 %.

RESULTS. A total number of 8026 patients were operated in cardiac surgery in 5 years. Out of these patients, 4.5 % (358) needed an intra-aortic balloon pump (65.4 % were males). Clinical features are shown in Table 1.

		Intraaortic balloon pump (n= 358)			
Age		63±10			
Gender		Male 234 (65.4%)		Female 124 (34.6%)	
Euroscore Log		13±16			
Hypertensión		243 (67.9%)			
Diabetes		144 (40.2%)			
Dyslipemia		197 (55%)			
Smoker		81 (22.6%)			
Cardiac failure		164 (45.8%)			
Renal failure		70 (19.6%)			
Other cardiac surgery		34 (9.5%)			
Presurgery Cardiac failure		I 78 (21.8%)	II 80 (22.3%)	III 114 (31.8%)	IV 16 (18.4%)
Type of surgery		Valve 191 (53.4%)	CABG 134 (37.4%)	Aortic 6 (1.7%)	
		Urgent 81 (22.6%)	Emergency 44 (12.3%)	Elective 233 (65.1%)	

Table. 1

Surgery times in patients who needed intra-aortic balloon pump were 146 ± 81 and 90 ± 66 min for extracorporeal circulation and cross-clamp time, respectively. Intraoperative mortality rate was 4.7 % and reached 40.2 % 30 days after admission. Patients who were implanted an intra-aortic balloon pump showed eight-times higher mortality rate than patients who needed no intra-aortic balloon pump during or after surgery (40.2 % vs 8.4 %, p = 0.0001, OR 8.1, IC 95 % (6.4-10.3)). Besides, higher mortality rate was observed as the intra-aortic balloon pump implementation was delayed (29.6 % if implanted pre-surgery, 44.2 % during surgery, and 54.4 % in ICU post-surgery).

Average ICU stay was 9 ± 22 days, and hospital was 21 ± 28 days. Intra-aortic balloon pump patients had a longer ICU stay (9 ± 22 days vs. 5 ± 10 days, p = 0.002), but no differences were observed in hospital stay (21 ± 28 vs 20 ± 24 days, p = 0.054).

CONCLUSIONS. Intra-aortic balloon pump was needed in 4.5 % of cardiac surgery patients with high Euroscore prognosis in this period. ICU stay was higher in patients who required intra-aortic balloon pump; no differences were found in hospital stay. Mortality rate was high (around 40 %) and increases as implant delays.

Predictors of ICU outcome I: 0399-0412

0399 A MULTIPLE BIOMARKERS PANEL FOR THE RISK STRATIFICATION OF CRITICALLY ILL PATIENTS WITH ACUTE/CHRONIC DECOMPENSATED HEART FAILURE - THE BILLIARD STUDY

H.M.S. Al Ashmawy¹, A.M. Fayed², I. El Reweiny², A.M. Mahrouss², H.S.H. Assaad²

¹Alexandria University/Alexandria Faculty of Medicine, Cardiology, Alexandria, Egypt, ²Alexandria University/Alexandria Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt

INTRODUCTION. Heart failure is driven by multiple pathophysiological processes. There is growing interest for measuring biomarkers reflective of these pathways as a mean to risk-stratify patients and improve performance of existing clinical risk scores.

OBJECTIVES. The improved prediction of short term mortality in critically ill patients with acute decompensated heart failure (ADHF) combining a panel of multiple biomarkers to largely validated clinical risk scores; the ADHERE in-hospital mortality 1 & the EFFECT 30 days/1 year mortality risk scores. 2 As well as the prediction of a composite of MACES & subsequent need for advanced ICU support therapy. The panel included: B-type natriuretic peptide (BNP) (Stretch), high sensitivity troponin T (hsTnT) (Necrosis), soluble ST2 (sST2) (Stretch/Inflammation), Galectin-3 (Gal-3) (Inflammation/Remodeling) & Parathormone hormone (PTH) (Neurohormonal activation).

METHODS. The levels of biomarkers were measured on ICU admission for 60 patients with severe ADHF admitted to the Alexandria University Hospital. Areas under receiver operating curves (ROC) & cutoff points were calculated for the prediction of the stated endpoints.

RESULTS. 88.33 % of the patients had NYHA III-IV, mean LVEF was 30.8 %, SBP 107 mmHg & a 1 year mortality of 18.3 %. Levels of BNP, hsTnT, sST2 & Gal-3 were significantly higher in non-survivors compared to survivors, while there was no significant difference in the level of PTH. The addition of (BNP + sST2 + hsTnT + Gal-3) to the clinical risk scores improved their performance; improved the AUC for the ADHERE in-hospital mortality score from 0.697 to 0.962 (p = 0.006), the EFFECT 30 days mortality risk score from 0.734 to 0.954, p = 0.027 & the EFFECT 1 y mortality score from 0.643 to 0.931, p = 0.005. The panel improved the AUC for the prediction of MACES compared to the routinely used BNP alone, AUC 0.636, 0.958, respectively, p < 0.001, at a cutoff points of 1278 pg/mL for BNP, 0.04 ng/mL for hsTnT, 3788 pg/mL for sST2 & 11.16 ng/mL for Gal-3. The levels of BNP were higher in patients who needed high doses IV diuretics, p = 0.025, while patients who needed IV vasodilators had higher levels of sST2, p = 0.02.

CONCLUSIONS. Combining a panel of multiple biomarkers (BNP, hsTnT, ST2, Gal-3) reflecting diverse biologic HF pathways to clinical risk scores improves the prediction of short term mortality & the risk for MACES in critically ill patients with severe ADHF.

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0400 EVALUATION OF MODIFIED EARLY WARNING SCORE TO PREDICT SEPSIS IN EMERGENCY HOSPITAL

A. Mukhtar¹, W. Osama¹, M. Hamdy¹, A. Hasanin¹, A. Gado¹, M. Aly¹, R. Mahros¹, H. Elazizi¹

¹Cairo University Faculty of Medicine, Cairo, Egypt

INTRODUCTION. Infection and sepsis are among the leading causes of death worldwide. The annual burden of sepsis in high income countries is estimated to approach 2.8 million cases with a mortality ranging from 25-50 %. Early detection of patient with sepsis remained the most important factor to improve the outcome. Severity scoring systems related to sepsis have been developed to help early diagnosis of sepsis as well as quality improvement and benchmarking. Modified Early Warning Score (MEWS) is one of the scoring systems which is simple and suitable for bedside application. (1).

OBJECTIVES. The objective of the study was to assess the ability of MEWS to predict the occurrence of sepsis in patients admitted to surgical ward after emergency operation.

METHODS. This was 6-month prospective cohort study. All consecutive patients admitted to surgical ward after emergency operations were observed for development of sepsis. Sepsis was confirmed by blood culture and/or the presence of clinical sign based on the Centers for Disease Control definition of a hospital acquired infection. MEWS was calculated for any patients had two or more signs of systemic inflammatory response (SIRS). Serum lactate was measured and if the lactate level ≥ 1.5 mmol/L, one additional point was added to MEWS score.

RESULTS. Seventy patients were admitted to surgical ward post emergency operations. Thirty-two patients met systemic inflammatory response syndrome (SIRS) criteria. Sepsis was documented in 21(58.3 %) patients. Using a cut-off value of 6 or more, MEWS yielded sensitivity 33.3 %, specificity 92.3 %, positive predictive value 87.5 % and negative

predictive value 46.1 %. Incorporation of lactate into MEWS score caused a minor increase in sensitivity with no effect on specificity.

	Sensitivity	Specificity	Positive predictive value	Positive predictive value
MEWS \geq 6	33.3 %	92.3 %	87.5 %	46.1 %
MEWS \geq 6 + lactate	52.3 %	92.3 %	91.6	54.5 %

[Predictive capacity to diagnose sepsis]

CONCLUSIONS. Under the setting of this study, MEWS \geq 6 has high positive predictive value and can be used in non-ICU setting for early identification of patients with sepsis.
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0401 EVALUATION OF DISCRIMINATION OF SCALES GRACE AND KILLIP SUPPLEMENTED WITH AGE IN ACUTE CORONARY SYNDROME

M.-P. Fuset-Cabannes¹, M.D. Arias-Verdu², E. Aguilar-Alonso³, J.A. Arboleda-Sánchez², J. Cuiat-De la Hoz¹, G. Quesada-García², M. Rojas-Amezúa³, E. Morán-Fernández², M. García-Delgado⁴, J. Latour-Perez⁵, R. Rivera-Fernández², ARIAM-SEMICYUC, ARIAM-ANDALUCIA

¹Hospital La Fe, Valencia, Spain, ²Carlos Haya University Hospital, Malaga, Spain, ³Infanta Margarita Hospital, Intensive Care Unit, Cabra, Spain, ⁴Virgen de las Nieves University Hospital, Granada, Spain, ⁵University Hospital Elche, Elche, Spain

INTRODUCTION. Although acute coronary syndrome patients have a high ICU admission rate, the general prognostic indexes used in critical care are not been systematically applied to this pathology.

OBJECTIVES. To evaluate the usefulness of GRACE and Killip scales supplemented with age for initial risk stratification of patients with acute coronary syndrome.

METHODS. Prospective cohort observational study used data from ARIAM-Spanish Society of Intensive Care Medicine (Semicyuc) and ARIAM-Andalusian registry. We included all patients admitted to ICU with acute coronary syndrome with and without ST elevation (STEMI and NSTEMI) between 2011 and 2012 (ARIAM-Semicyuc registry) and a group of cases from ARIAM-Andalusian registry between 2002-2012. We analyzed age, sex, Killip class at admission, GRACE scale and mortality. Predictive models were generated using multivariate logistic regression. ROC curve was used to assess discrimination capacity.

RESULTS. 9192 patients, 3808 and 5384 from ARIAM-SEMICYUC and ARIAM-Andalusia respectively. 4966 (54 %) are STEMI and 4226 (46 %) are NSTEMI. 75.1 % males. Age was 64.89 \pm 18.27 years. GRACE score was 142.35 \pm 39.97 points. 7160 patients (77.9 %) were Killip I. ICU mortality was 4.4 % and hospital mortality was 6.4 %. Dead patients were older (72.88 \pm 10.37 vs 64.31 \pm 18.72 years, $p < 0.001$) and higher GRACE score 200.03 \pm 40.71 vs 138.33 \pm 36.65 points, $p < 0.001$).

When age was categorized in intervals according to TIMI scale groups, the mortality was 2.7 % in < 65 years, 6.5 % in 65-75 years and 12.7 % > 75 years ($p < 0.001$). Mortality increased at higher Killip score : 2.7, 10.4, 24.1 and 51.1 % ($p < 0.001$). Mortality was higher in STEMI (7.5 %) with regard to NSTEMI (5.2 %) ($p < 0.001$).

After multiple linear regression GRACE scale is related to Killip score ($R = 0.649$, $R^2 = 0.422$), so that to major Grace scale higher Killip score ($p < 0.001$). Including the intervals age variable (by TIMI scale categories), the R is 0.778 and the R^2 was 0.605.

If we add the variable STEMI/NSTEMI increases to 0.815 and 0.664 respectively. 66 % of GRACE scale variability could be explained by three variables: Killip class, intervals age and coronary syndrome.

Discrimination of hospital mortality assessed with the area under the ROC curve for GRACE scale was 0.86 (0.84-0.88) according GRACE scale, for Killip scale 0.77 (0.75-0.80) and for Killip-age - STEMI/NSTEMI model was 0.84 (0.82-0.85).

CONCLUSIONS. GRACE scale discriminates well hospital mortality in acute coronary syndrome. Discrimination capacity was higher than Killip score, but similar to a patients simple model using Killip class, age and acute coronary syndrome type.

0402 ABILITY OF THE ACUTE KIDNEY INJURY TO IMPROVE THE PROGNOSTIC PERFORMANCE OF NATIONAL EARLY WARNING SCORE

A. Oskuei¹, S.O. Amin¹, D. Connolly¹, A. Geeti¹, D. Kaufman¹

¹Bridgeport Hospital/Yale University School of Medicine, Internal Medicine, Bridgeport, United States

INTRODUCTION. Acute kidney injury (AKI) has shown to be an independent predictor of mortality in many different groups of hospitalized patients. RIFLE criteria (Risk, Injury, Failure, Loss of kidney function, End-stage kidney disease) is a classification system for AKI and many studies have validated its prognostic ability. There are early warning scoring systems such as National Early Warning Score (NEWS), which are used for early recognition and directing care of deteriorating non-ICU patients.

OBJECTIVES. The objective of this study was to assess whether the addition of renal function would improve the prognostic ability of the NEWS at the time of rapid response team (RRT) activation.

METHODS. This is an observational study of a random sample ($N = 105$) of patients on the hospital wards whose physiological parameters met criteria for RRT activation. Serum Creatinine (Cr), GFR and NEWS closest to the time of RRT activation were collected from the hospital's electronic medical records. AKI was defined as acute rise in serum Cr (within 24 h) by ≥ 0.3 mg/dl or a 50 % increase. The RIFLE classification was based upon the Acute Dialysis Quality Initiative criteria. The primary outcomes were in-hospital death, transfer to higher level of care or transition to hospice. The predictive value of RIFLE classification, NEWS, and combination of both were measured and compared using receiver operating characteristic (ROC) curves.

RESULTS. Out of the 105 RRT activations, 39 patients had at least one positive outcome, including 11 in-hospital deaths. For the single outcome of death, the addition of RIFLE classification to NEWS improved AU-ROC from 0.772 (95 % CI, 0.655-0.888, $p < 0.05$) to 0.798 (95 % CI, 1.136-1.792, $p < 0.05$). For the combined endpoints of in-hospital death, transition to higher level of care or hospice, the AU-ROC for NEWS alone and combined

with NEWS was the same at 0.783 (95 % CI, 0.691 to 0.874, $p < 0.05$) and 0.783 (95 % CI, 1.206-1.675, $p < 0.05$) respectively.

CONCLUSIONS. RIFLE classification appears to improve the prognostic ability of NEWS for in-hospital mortality in deteriorating floor patients. Kidney function is routinely checked at the time of Rapid Response and combining this with patient's acute hemodynamic changes may allow us to better predict mortality.

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0403 VALIDATION OF THE SAPS-3 SCORE IN PATIENTS ADMITTED TO THE INTENSIVE CARE UNITS FOR INTOXICATION

M.D. Arias-Verdú¹, I. Macías-Guarasa¹, E. Aguilar-Alonso², M.E. Banderas-Bravo¹, R. Rivera-Fernández¹, E. Castillo-Lorente³

¹Carlos Haya University Hospital, Intensive Care Unit, Málaga, Spain, ²Hospital de Cabra, Intensive Care Unit, Cabra, Spain, ³Neurotraumatological Jaen Hospital, Intensive Care Unit, Jaen, Spain

OBJECTIVE. To evaluate how the SAPS-3 score works in patients admitted to the ICU for intoxication.

METHODS. During the period 2008 - 2013, we studied all patients admitted to the ICU for intoxication, in different Spanish hospitals, Carlos Haya in Málaga, local hospital in Cabra (Córdoba), and the Neurotrauma hospital in Jaen. Those patients who were intoxicated but were admitted for other causes were not studied. We studied the type of intoxication, gravity, the need for mechanical ventilation and mortality. The Hosmer-Lemeshow test was used to analyze the correlation between predicted SAPS-3 mortality and observed mortality, with a significance level of 0.05.

RESULTS. 119 patients were admitted: 76 in Malaga, 21 in Cabra and 22 in Jaen. Intoxication causes were: medication in 92 patients (77.3 %), caustics in 11 (9.2 %) and alcohol in 16 (13.5 %). 78.3 % were attempted suicides. The mean age was 44.42 \pm 13.85. Mean Glasgow Coma Scale (GCS) score was 8.39 \pm 4.51, < 8 points in 72.5 %, 69.7 % of patients need mechanical ventilation. Gravity according to SAPS-3 was 54.17 \pm 11.33 points, and predicted mortality by SAPS-3 was 26.98 % for the general equation and 27.78 % for the equation relating to our geographical area. The hospital mortality was 6.7 %. The population was divided in different groups according the predicted mortality by the SAPS-3 general equation: below 20 %, between 20 and 40 %, 40 and 60 %, 60 and 80 % or above 80 %. The predicted mortality was, respectively, 11, 29, 47, 68 and 86 %. The observed mortality was, 6.6, 2.2, 7.7, 20 and 12.5 %; $H = 35.10$ ($p < 0.001$). There was a wide discrepancy between the predicted and observed percentages. The differences were statistically significant. The equation for our geographical area had similar discrepancies: $H = 36.47$ ($p < 0.001$).

CONCLUSIONS. The patients admitted to our ICU for intoxication have a high gravity according to SAPS-3, but the observed mortality is lower than predicted. These discrepancies are very high. The SAPS-3 score is not useful for evaluating mortality in these patients, and is not useful for providing information to the families about the risk of death of these patients.

0404 LENGTH OF STAY, TISS, APACHE II AND SOFA SCORES IN PREDICTION OF THE PRESSURE ULCER DEVELOPMENT IN MIXED ICU

M.H. Ahtiala¹

¹Turku University Hospital, Service Division, Perioperative Services, Intensive Care Medicine and Pain Management, Turku, Finland

INTRODUCTION. Patients in intensive care units (ICU) have a high risk of developing pressure ulcers (PU)(1). In 2010, a research program was launched to study the occurrence of PUs in a large medical-surgical (mixed) ICU and the significance of different risk factors for PUs.

OBJECTIVES. The roles of length of stay (LOS), TISS, Apache II and SOFA scores in prediction of the PU development in mixed ICU are reported.

METHODS. The Turku University Hospital adult ICU has 24 beds for surgical and medical patients. Average number of patient treated yearly is 1630 and average LOS is 3.6 days. Jackson/Cubbin (J/C) pressure ulcer risk scale is used to assess patients' PU risk at admission and thereafter daily (2). The following evaluations among others are made: APACHE II (on admission day), TISS and SOFA scores daily.

RESULTS. In 2011 and 2012 the PU prevalences and incidences were 9.6 % and 6.2 %, and 9.6 % and 6.6 %, respectively. The LOS of patients, who developed PU during their ICU stay was significantly longer than those who did not developed PU (Table 1). The longer the ICU stay the more prevalent was the possibility of PU development ($P < 0.001$).

	PU at admission	PU incidence in ICU	No PU	All
Mean days (SD)	6.6 (5.7)	14.2 (12.7)	2.7 (3.5)	3.6 (5.8)
N	104	212	2957	3273

[Table 1. Length of stay of patients with PU]

TISS, Apache and SOFA scores on admission day were somewhat higher on those who had a PU at admission and who developed PU during their ICU stay. The values for those with PU during the ICU stay vs no PU were 34.7 vs 31.0, 21.1 vs 17.5 and 8.6 vs 6.7, respectively. The TISS scores remain at the admission level irrespective of duration of ICU stay and pressure ulcer development. Furthermore, the Apache scores were not related to the J/C-risk scores or pressure ulcer development. However, the higher the SOFA score at admission the more prevalent was the development of PU during the ICU stay. Significantly more of the PU patients had higher SOFA scores than the non-PU patients. (Table 2).

SOFA-score	PUs, N	PU incidence %	No PUs, N
<6	29	2.7	1046
6-11	106	5.8	1718
≥/ > 12	40	17.4	190
Total	175		2954

[Table 2. SOFA and PU incidence during the ICU stay]

CONCLUSIONS. Higher TISS scores in patients with PUs are explained both partly by one extra point delivered to patients based on their PU and need of demanding intensive care. Apache scores were not related to PU development confirming the previous finding in much smaller ICU population (3). The higher SOFA scores at admission were related to development of PUs and the difference prevailed even those patients whose treatment time was ≥ 3 days. Thus length of stay as suggested previously (1) and SOFA scores seem to be independent risk factors for PU development.

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0405 MEDICAL SEQUELAE AND HOSPITAL MORTALITY IN CRITICALLY ILL PATIENTS AFTER DISCHARGE FROM ICU

A. Estella¹, M. Jaén¹, L. Pérez Bello Fontaña¹, M. Recuerda¹, V. Pérez Madueño¹, P. Guijo¹, T. Rico¹

¹Hospital of Jerez, Intensive Care Unit, Jerez de la Frontera, Spain

INTRODUCTION. Post-hospital recovery phase, follow up and clinical outcomes of critically ill patients after discharge from the Intensive Care Unit are poorly documented.

OBJECTIVES. The objectives of this study were to follow up patients discharged from ICU, to analyze clinical outcome and mortality after ICU discharge and to describe the rate of hospital readmissions and sequelae of critically ill patients.

METHODS. Prospective observational study conducted in a medical- surgical ICU of a community hospital. Consecutive patients discharged from ICU during a time of study of four months were included, patients admitted in ICU for permanent pacemaker or venous reservoirs implantations were excluded. The variables analyzed were age, gender, APACHE II, reason for ICU admission, ICU and conventional ward length of stay and mechanical ventilation requirements. Dependency status according Spanish law 39/2006, ICU and hospital readmission rate and mortality were recorded. Statistical analysis was performed with SPSS 18 software.

RESULTS. 184 consecutive patients were analyzed, 61.4 % men and 38.6 % women. Mean age was 58.8 ± 13 years, APACHE II at admission was 14.5 ± 6.7. The most frequent reason for ICU admission was acute coronary syndrome, 32.1 %, surgical pathology represented 23.4 %, 5.4 % were admitted for traumatic pathology, 1.6 % were hematologic patients and remaining reasons for ICU admissions were for other medical causes. 37.5 % required mechanical ventilation. The mean ICU length of stay was 6.1 ± 4.9 days and ward length of stay was 10.7 ± 25 days. 6.5 % were readmitted to the ICU and 8.7 % in conventional wards. 9.8 % of patients achieved recognition of dependence after ICU admission. The hospital mortality was 4.3 %, most of these patients, 62.5 %, dead during the first month after ICU discharge.

CONCLUSIONS. The post- ICU mortality happens in a low percentage and mostly one month after discharge. Health status after ICU discharge must to be analyzed; it can be measured by the recognition of a situation of dependence. A significant percentage of patients have permanent sequelae after ICU admission.

0406 CORRELATION BETWEEN QTC ON ADMISSION ECG AND NURSING AND SEVERITY INDEXES IN ICU PATIENTS

A. Vakalos¹, E. Drampala¹

¹Xanthi General Hospital, ICU, Xanthi, Greece

INTRODUCTION. Causes of prolonged corrected QT interval (QTc) include cardiomyopathy, severe bradycardia, high-grade AV block, anti-arrhythmics, hypothyroid and hypothermia. Nevertheless, a longer QTc puts the patient at increased risk for torsade de pointes.

OBJECTIVES. The aim of our observation retrospective study was to correlate QTc interval in ICU patients on admission ECG, with nursing and severity indexes in our both medical and surgical ICU served in community hospital.

METHODS. From October to December 2013 we looked for QTc interval (ms) in ECG automatically analyzed on admission in 48 ICU patients who survived ICU. Mean age (years) 60.06, mean APACHE II score on admission: 23.28, mean length of ICU stay (LOS, days): 8.43, mean duration of mechanical ventilation (VD, days): 5.41, Predicted Mortality (%). Using linear correlation method, we looked for linear slope, correlation coefficient (r), and coefficient of determination (r²), and by linear regression method using ANOVA test we looked for p value, according QTc interval and nursing (LOS, VD) and severity (age, APACHE, Predicted mortality) indexes.

RESULTS.

	Slope	St. Error	r	r2	L. CI	U. CI	p value
Age	0.088	0.075	0.173	0.030	-0.064	0.240	0.2486
APACHE	0.055	0.029	0.271	0.073	-0.004	0.115	0.0677
Pred. Mortality	0.1205	0.102	0.173	0.030	-0.087	0.328	0.2483
LOS	0.000	0.041	0.002	4.469	-0.082	0.083	0.9889
V.D.	0.008	0.036	0.033	0.001	-0.065	0.082	0.8238

[Results]

CONCLUSIONS. According to our data, there was no statistically significant correlation detected between QTc interval and Age, Predicted Mortality, LOS nor VD. On the other hand, there was borderline statistical significant, weak positive linear correlation between QTc interval and APACHE II score on admission. Our data suggest that QTc interval in ICU patients on admission ECG has no impact on ICU hospitalization, still may be useful bounding the severity in some ICU patients.

0407 EVALUATION AND MONITORING OF WORK ACTIVITIES AFTER 3-YEAR FOLLOW-UP IN ICU PATIENTS WITH TRAUMATIC BRAIN INJURY

E. Aguilar-Alonso¹, M.D. Arias-Verdu², M. Delange-Van Der Kroff³, E. Curiel-Balsera², A. Muñoz-López², J.F. Fernández-Ortega², M.A. Prieto-Palomino², R. Rivera-Fernández²

¹Hospital Infanta Margarita, Intensive Care Unit, Córdoba, Spain, ²Hospital Regional Universitario Carlos Haya, Intensive Care Unit, Málaga, Spain, ³Hospital Comarcal Axarquía, Intensive Care Unit, Málaga, Spain

OBJECTIVE. The aim was to study work activities after 3 years in patients admitted to the ICU with traumatic brain injury (TBI)

METHODS. A prospective cohort study in an ICU of a reference hospital. We studied ICU-admitted patients consecutively with TBI between 2004 and 2008. We used validated scales including the Glasgow Outcome Scale (GOS) and the Project for the Epidemiological Analysis of Critical Care Patients Quality of Life questionnaire.

RESULTS. We studied 531 patients, age 40.35 ± 19.75 years, APACHE II 17.94 ± 6.97 points, Glasgow Coma Scale at admission 7.53 ± 3.83 points. Cranial tomography at admission was: diffuse injury type I (10.4 %), diffuse injury type II (28.1 %), diffuse injury type III (24.5 %), diffuse injury type IV (8.3 %), evacuated mass lesion (22.6 %), non-evacuated mass lesion (6.2 %). Hospital mortality was 28.6 %, 171 (32.2 %) patients died after 1 year (6.6 % missing) and 181 (34.1 %) died after 3 years (16.2 % missing). Regarding work activities, after 1 year, 28.5 % of 326 patients evaluated have no difficulties with work, 4.6 % have difficulties but work as before, 10.1 % work only part-time or have changed to a job requiring minimum effort and 56.7 % of patients do not work. After 3 years, 41.2 % of 238 patients evaluated have no difficulties with work, 4.6 % have difficulties but work as before, 12.6 % work only part-time or have changed to a job requiring minimum effort and 41.6 % of patients do not work. Evolution between 1 and 3 years by the McNemar test was statistically significant (P < 0.001). A total of 173 patients were in similar situation, only one had deteriorated and in 62 (26.05 %) patients the evaluation of work activity had improved.

CONCLUSION. After 1 year of admission from the ICU with TBI, more than 50 % of patients have difficulties with work. After 3 years the number of patients who work has increased although approximately 40 % of the surviving patients do not work.

0408 ASSOCIATION BETWEEN MAXIMUM DAILY LACTATE LEVELS AND DAILY SEQUENTIAL ORGAN FAILURE ASSESSMENT SCORE: A RETROSPECTIVE, OBSERVATIONAL STUDY

M. Egal¹, A. Lima¹, J. van Bommel¹, J. Bakker¹, A.B.J. Groeneveld¹

¹Erasmus MC University Medical Center, Department of Intensive Care, Rotterdam, Netherlands

INTRODUCTION. The interpretation of hyperlactatemia in critically ill patients is complex, and factors other than hypoperfusion may be involved. The presence of hyperlactatemia independent of tissue hypoxia has also been associated with morbidity and mortality. The Sequential Organ Failure Assessment (SOFA) score is a simple method to describe organ dysfunction/failure in critically ill patients. However, little is known about the relation of each individual organ dysfunction from the SOFA scores to hyperlactatemia in critically ill patients.

OBJECTIVES. To evaluate daily maximum lactate levels (L_{max}) as a marker of hypoperfusion and organ failure and to analyze its relation to the respiratory, cardiovascular, hepatic, coagulation, renal and neurological systems, as assessed by SOFA subscores, and changes in total SOFA score and SOFA subscores.

METHODS. We included all patients admitted to our mixed Intensive Care Unit (ICU) between January 2008 and December 2013. We collected the daily L_{max}, daily maximum noradrenaline dose in mcg/kg/min per hour, and the daily SOFA score per organ for the first 96 h of ICU admission. To calculate the SOFA score, the worst value for each variable in each 24-hr period was used. Each SOFA subscore was recorded, and the total SOFA score was calculated. Delta total SOFA score (Δ SOFA_{total}), delta SOFA subscore (Δ SOFA_{organ}), and delta lactate (Δ Lactate) were defined as the difference between two subsequent total, subscores, and lactate levels, respectively. An unfavorable outcome was defined as Δ SOFA > 0 in either total or subscore, and in Δ Lactate > 0. The Chi square test was used to estimate the association between changes in lactate and both Δ SOFA_{total} and Δ SOFA_{organ}. Differences in the mean L_{max} or delta lactate and SOFA categories or noradrenaline dose were tested by a one-way analysis of variance (ANOVA). The Bonferroni post hoc test was performed if a significant main effect was observed. A p-value < 0.05 was considered statistically significant.

RESULTS. We included 5,787 unique patients (55 ± 16 years; 40 % female) with a mean ICU stay of 6.6 ± 11 days, and with 18 % ICU mortality. In each organ category, highest L_{max} was associated with the highest value of the each SOFA subscore.

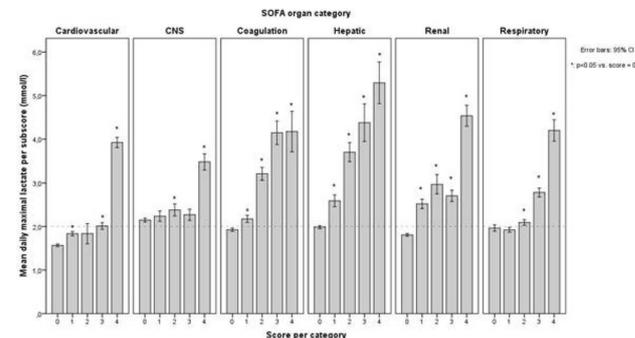


Fig. 1 Hyperlactatemia was associated with a higher score in each SOFA organ category. In contrast to the cardiovascular subscore, the highest daily noradrenaline dose was association with L_{max}

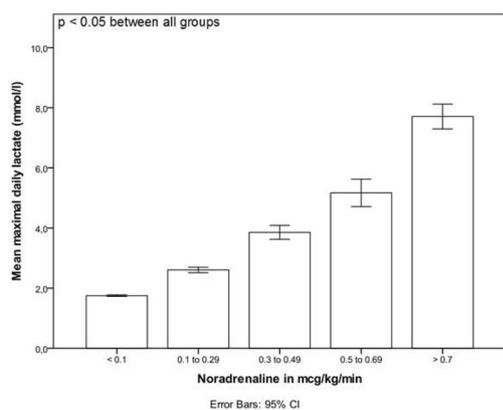


Fig. 2 A Δ SOFA_{total} > 5 was associated with a significant increase in lactate (Figure 3)

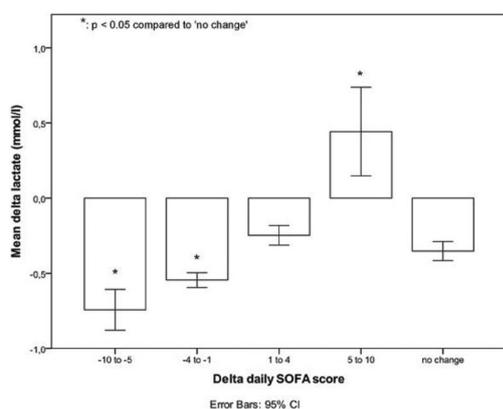


Fig. 3 The proportion of patients with unfavorable evolution of SOFA score was significantly higher in patients with an increase in lactate levels (90.6 % vs. 9.4 %, $p < 0.001$)

Increase in lactate	Increase in SOFA score	
	No	Yes
No	59.1 %	9.4 %
Yes	40.9 %	90.6 %
Total number of scores	72,341	79,069

[Table 1]

CONCLUSIONS. Consecutive assessment of lactate levels during 96 h of ICU admission could identify critically ill patients with a more severe organ dysfunction. In addition, High L_{max} is associated with severity of illness regardless of organ system dysfunction.

0409

VALIDATION OF ONE PROGNOSTIC SCORE FOR MORTALITY IN ELDERLY PATIENTS ADMITTED TO MEXICAN INTENSIVE CARE UNITS

B. Tejada-Huezo¹, L.A. Sánchez-Hurtado^{1,2}, A. Angeles-Velez¹, T. Juárez-Cedillo³

¹Instituto Mexicano del Seguro Social Hospital de Especialidades Centro Medico Nacional La Raza, Intensive Care Unit, Mexico, Mexico, ²Instituto Nacional de Cancerología, Intensive Care Unit, Mexico, Mexico, ³Instituto Mexicano del Seguro Social, Centro Médico Nacional Siglo XXI, Unidad de Investigación Epidemiológica y en Servicios de Salud, Área de Envejecimiento, Mexico, Mexico

INTRODUCTION. With the steady increase in life expectancy of the elderly, the prevalence of pathological conditions that require attention within the ICU is also changing, increasing demand for care in these services. Severity scoring systems have been widely used in studies with heterogeneous populations to characterize patients in terms of the severity of disease. The performance of a prognostic score must be evaluated prior to being used in a particular group of patients; however none have been made with newer models and specifically in the elderly population. The Simplified Acute Physiology Score 3 (SAPS 3) has an appropriate calibration and discriminative performance, in general population admitted to an ICU. However its performance in a population with particular characteristics, such as geriatric patients, has not been evaluated.

OBJECTIVES. The aim of the present study was to evaluate the SAPS 3 score predictive ability of hospital mortality in elderly patients admitted to intensive care units (ICU).

METHODS. Prospective cohort study.

SETTING. Two important ICU in the Hospitals Specials CMN Siglo XXI and La Raza IMSS in Mexico. Patients: Two hundred and eleven consecutive elderly patients included in the period from February 2012 to October 2013.

Interventions: None.

Measurement: We compared directly the predictive accuracy of two prognostic models, SAPS 3 and APACHE II. Evaluation of discrimination through area under curve (aROC) and calibration by Hosmer-Lemeshow goodness-of-fit test (HL).

RESULTS. The median age of 68 years (63-74). The main reasons for ICU admission were postoperative care (50 %), sepsis (21 %), postoperative hemorrhagic shock (13 %), and aortic pathology (10 %). The ICU and hospital mortality rates were 12.8 % and 35.5 %, respectively. The mean value of SAPS 3 62.54 ± 12.51 and for APACHE II was 17.46 ± 6.77 . The hospital mortality predicted by APACHE II was 24.98 ± 19.96 and for standard SAPS 3 equation 41.18 ± 22.34 , for North American equation 35.29 ± 17.681 and for Central and South American equation 51.90 ± 24.75 . The discrimination for APACHE II aROC = 0.70 (0.63-0.78) and for SAPS 3 was aROC = 0.68 (0.62-0.75). The calibration, APACHE II with HL 10.127 $p = 0.256$, and standard SAPS 3 equation HL 7.204 $p = 0.515$, North American SAPS 3 equation HL 6.927 $p = 0.544$ and for Central and South American SAPS 3 equation HL 6.849 $p = 0.553$.

CONCLUSIONS. In this study, the SAPS 3 score was not found to be accurate in predicting mortality in patients geriatric requiring ICU admission.

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0410

ASSESSMENT OF SOFA AND AGE TO PREDICT HOSPITAL MORTALITY OF ICU PATIENTS

E. Aguilar-Alonso¹, C. Lopez-Caler², M.D. Arias-Verdu², E. Castillo-Lorente³, J. Carpio-Sanz⁴, G. Quesada-García⁴, J. Moreno-Quintana⁵, R. Rivera-Lopez⁶, C. De La Fuente-Martos⁶, P. Lara-Aguayo⁶, R. Rivera-Fernández²

¹Infanta Margarita Hospital, Cabra, Spain, ²Carlos Haya University Hospital, Malaga, Spain, ³Neurotraumatological Jaen Hospital, Intensive Care Unit, Jaen, Spain, ⁴Santa Ana Hospital, Motril, Spain, ⁵Virgen de las Nieves University Hospital, Cardiology, Granada, Spain, ⁶Infanta Margarita Hospital, Intensive Care Unit, Cabra, Spain

INTRODUCTION. Prognostic systems with SOFA are very little studied in the ICU patients

OBJECTIVES. To evaluate the usefulness of the SOFA score to predict the hospital mortality in ICU patients.

METHODS. Prospective cohort observational multicentre study. Data were collected during two periods of two months in Carlos Haya Hospital (Malaga,Spain), Infanta Margarita (Cabra, Cordoba, Spain), Neurotraumatological (Jaen, Spain) and Santa Ana Hospital (Motril, Granada, Spain). The three first hospitals between 2011-2012 and the last one between 2006-2007. Data were collected to develop SAPS 3 and SOFA prognosis system. Data were expressed as mean \pm standard deviation for continuous variables and with frequencies and percentages for qualitative variables. Student's t was used for comparison of two means. ANOVA and Newman-Keuls tests were used for multiple comparisons. The Chi squared test was used to compare proportions. Predictive models were generated with multivariable logistic regression. The area under the ROC curve was used to assess discrimination. $p < 0.05$ significant.

RESULTS. The study cohort evaluated 1938 patients, mean age was 61.61 ± 16.07 years, SAPS 3 score 60.39 ± 16.02 and SOFA score 2.69 ± 3.10 points.

Dead patients (299 cases) were older (68.31 ± 14.78 vs 60.39 ± 16 años; $p < 0.001$), with higher SOFA score (5.9 ± 4.02 vs 2.10 ± 2.49 , $p < 0.001$) and higher SAPS-3 score (61.36 ± 13.82 vs 45.38 ± 13.49 ; $p < 0.001$).

Multivariable analysis with logistic regression shows complementarity between SOFA score and age. OR for SOFA was 1.42 (1.36-1.48) and for age 1.04 (1.03-1.05). The discrimination evaluated with ROC area for SOFA was 0.79 (0.76-0.82), for SAPS-3 was 0.85 (0.83-0.88) and for a model with SOFA and age was 0.82 (0.80-0.85).

CONCLUSIONS. SOFA score at ICU admission is useful to classify the patients according to mortality risk. Discrimination of SOFA score was lower than SAPS-3 system. The SOFA score presents complementarity with the age. Predictive model with both variables (SOFA score and age) shows similar discrimination than SAPS-3 scale.

0411

PROGNOSTIC VALUE OF LACTATE INDICES AND REGIONAL OXYGEN SATURATION INDEX (RSO2) IN CRITICALLY ILL PATIENTS

L. Claverias¹, J. Marín-Corral¹, M. Mari González¹, I. Oliva¹, C. Solé¹, I. Leache¹, V. Blázquez¹, G. Moreno¹, M. Magret¹, M. Bodí², A. Rodríguez²

¹Joan XXIII University Hospital, Critical Care, Tarragona, Spain, ²Joan XXIII University Hospital/URV/IISP/CIBERES, Critical Care, Tarragona, Spain, ³Joan XXIII University Hospital/URV/IISPV/CIBERES, Tarragona, Spain

INTRODUCTION. Lactate has been associated to the prognostic of critically ill patients. However, alterations of the tissue oxygenation might be earlier indicators of outcome.

OBJECTIVES. To determine the prognostic value of lactate GAP 0-24 h (LG0-24), Lactate clearance (LC0-24) and regional oxygen saturation index (rSO2) in critically patients.

METHODS. Secondary analysis of a prospectively collected database. Severity illness (APACHE II) and level of dysfunction (SOFA) were determined. Demographic characteristics, type of admission (medical or surgical), need of mechanical ventilation (MV), presence of sepsis and global hemodynamic variables were registered. Serum lactate level (baseline [L] and 24 h [L24]), LG0-24, LC0-24 and rSO2 value (baseline and 24 h) in brachioradialis were recorded. Differences were assessed using Chi square and "t" test. Discriminatory power was assessed using ROC curves and its association with mortality with binary logistic regression.

RESULTS. We included 77 patients. Mean age was 64.3 years and 77 % were men. Global mortality was 32.5 % (n = 25). Non-survivors were older (69.0 ± 8.3 vs. 62.0 ± 15 , $p = 0.03$), had greater APACHE II score (23.7 ± 7.8 vs. 14.5 ± 6.6 , $p < 0.01$) and more need of mechanical ventilation (96 % vs. 38.5 %, $p < 0.01$). The L24 was greater (4.8 ± 4.9 vs. 2.2 ± 3.0 , $p = 0.02$) and LG0-24 was lower (-1.9 ± 5.0 vs. 0.27 ± 2.9 , $p = 0.01$) in non-survivors. LC0-24 was no different between the groups. The value of rSO2 was lower in non-survivors both at admission (53.8 ± 11.3 vs. 66.5 ± 9.5 , $p = 0.001$) and at 24 h (58.9 ± 9.5 vs. 65.4 ± 11.4 , $p = 0.03$). Table 1 shows the discriminatory power of each variable.

Variable AUC ROC 95 %CI p-value
Lactate baseline 0.59 0.45-0.72 0.19

Lactate 24 h 0.70 0.56-0.84 0.004

LG0-24 0.67 0.53-0.80 0.01

LC0-24 0.60 0.47-0.74 0.12

rSO₂ baseline 0.80 0.68-0.91 0.001
 rSO₂ 24 h 0.70 0.55-0.82 0.01

Multivariate analysis showed that only the need of mechanical ventilation (OR = 21.9; p = 0.007) and rSO₂ value at admission (OR = 0.90; p = 0.01) were independently associate with mortality. LC0-24 (OR = 1.0; p = 0.15) and LG0-24 (OR = 1.07; p = 0.48) were variables not associates with mortality.

CONCLUSIONS. Our results suggest that early rSO₂ determination might be earlier indicator than lactate indices to evaluate prognosis in critically ill patients.

GRANT ACKNOWLEDGMENT. Partially supported by FIS PI10/01538 and PI13/02011

0412

ARE THE DATA USED TO CALCULATE THE HOSPITAL STANDARDISED MORTALITY RATIO (HSMR) IN THE UNITED KINGDOM FIT FOR PURPOSE IN MAJOR VASCULAR SURGERY?

K. Richardson¹, P. Hayden¹, G. Sanders¹

¹Medway Maritime Hospital, Anaesthesia & Intensive Care, Gillingham, United Kingdom
INTRODUCTION. Our hospital received an HSMR alert from the Dr Foster organisation for excess mortality in patients having elective abdominal aortic aneurysm (AAA) repair in late 2013. The Critical Care team were asked to investigate.

OBJECTIVES. To review each death and compare mortality risk generated by the Dr Foster HSMR methodology [1] with that from in-house mortality risk assessment using either cardiopulmonary exercise testing (CPET) or the V-POSSUM score.

METHODS. A thorough case review of all deaths was carried out by two Consultant Intensivists.

Forty-six patients had elective abdominal aortic aneurysm (AAA) repair at Medway Maritime Hospital in 2013 (27 Open, 19 EVAR). Of these, 36 received a CPET that provided an individualised mortality risk for surgery using an established CPET risk stratification tool [2]. Patients that did not have CPET (for various reasons) had their mortality risk assessed using the V-POSSUM score [3]. Paired samples t-tests were used to compare the CPET or V-POSSUM predicted mortality risk (CPETV) versus the Dr Foster (DrF) predicted mortality risk. All data were analysed using SPSS version 21.

RESULTS. There was a significant difference in CPETV (mean = 5.65 %, SD = 6.06 %) and DrF predicted mortality risk (mean = 2.33 %, SD = 1.45 %); t (45) = 3.899, p = < 0.0005. Four patients died in the 30 days post-operatively, equating to an actual mortality rate of 8.7 %. The predicted mortality risk for those that died was 7.78 ± 7.71 % (from CPET) and 2.63 ± 1.92 % (from Dr Foster). Case review of the four deaths revealed no issues with the quality or delivery of care.

Risk Prediction	n	Predicted Mortality	Actual Mortality
CPET/V-POSSUM	46	5.65 ± 6.06 %	8.7 %
Dr Foster	46	2.33 ± 1.45 %	8.7 %

[AAA Mortality Risk Prediction]

CONCLUSIONS.

(1) For our population, the Dr Foster HSMR significantly underestimated the mortality risk, particularly in high risk patients.

(2) Actual risk was higher than predicted (CPETV and Dr Foster), though this did not reach statistical significance. This was based on a small pool of patients and a larger study is required to ascertain whether CPET is superior to the Dr Foster methodology for predicting mortality risk.

(3) For all high risk patients in our unit, an individualised mortality risk is calculated using CPET and the patient informed of the risk of AAA rupture vs. the risk of surgery.

REFERENCE(S). [1] <http://drfosterintelligence.co.uk/hospital-guide-2013-methodology-and-rationale-documents-for-acute-trusts/>. [2] Carlisle JB. <https://sites.google.com/site/informrisk/>. [3] <http://www.riskprediction.org.uk/vasc-index.php>

Subarachnoid haemorrhage: 0413–0426

0413

GOAL DIRECTED THERAPY AFTER SUBARACHNOID HEMORRHAGE

E. Isotani¹, SAH PiCCO Study Group

¹Tokyo Women's Medical University Medical Center East, Emergency and Critical Care Medicine, Tokyo, Japan

INTRODUCTION. SAH PiCCO study which began in October, 2009 is finished in April, 2012, and the results have been reported on couples of journals.

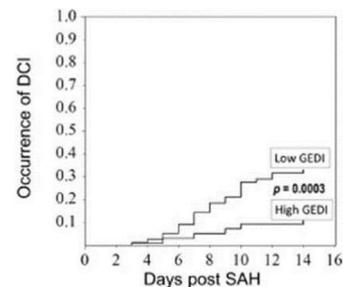
OBJECTIVES. This study was performed to review triple H therapy for the prevention of delayed cerebral ischemia (DCI), and replace the triple H therapy (HHH) to the novel goal directed therapy. I will report the summary of the hemodynamic change after the subarachnoid hemorrhage that became clear by SAH PiCCO study.

METHODS. A multicenter prospective observational research.

RESULTS. HHH did not show either hemodynamic benefit nor any effect for the DCI prevention. In the seriously ill example, it became afterload mismatch cardiac failure (AMCF) just after the onset and is at increased risk to develop ARDS just after the operation. When the anterior (ACA) or middle cerebral artery (MCA) aneurysm ruptures, the cardiogenic pulmonary edema just after the onset was easy to occur and, by the analysis according to the ruptured cerebral aneurysm site, in the case of the internal carotid artery (ICA) ruptured aneurysm, was easy to produce cardiogenic pulmonary edema during the spasm period. In the case of ACA aneurysms, it was easy to produce AMCF during the spasm period. Vertebralbasilar artery (VA) aneurysms brought about hyperdynamic state which resembled warm shock during the spasm period. We have to be cautious about the onset of the ARDS just after the clipping. As a risk factor of delayed cerebral ischemia, multivariate analysis indicated low cardiac index, high systemic vascular resistance index, low global endodiastolic volume index (GEDi). It was necessary to keep GEDI more than 822 ml/m² for the prevention of DCI (Graph 1), and to maintain below GEDI 922 ml/m² for the prevention of the seriously ill edema of the lungs (Graph 2).

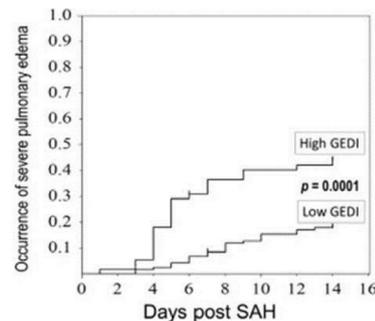


Novel Goal Directed Therapy to prevent DCI



Kaplan-Meier plots demonstrating the cumulative prevalence of delayed cerebral ischemia (DCI) within 14 d post-subarachnoid hemorrhage (SAH) for patients who were categorized using low (< 822 mL/m²) and high (> 822 mL/m²) global end-diastolic volume index (GEDi).

Goal of GEDI to prevent DCI



Kaplan-Meier plots demonstrating the cumulative prevalence of severe pulmonary edema within 14 d post-subarachnoid hemorrhage (SAH) for patients who were categorized using low (< 922 mL/m²) and high (> 922 mL/m²) global end-diastolic volume index (GEDi).

Goal of GEDI to prevent DCI]

CONCLUSIONS. As a result of SAH PiCCO study, we recommend the novel goal directed therapy to adjust GEDI more than 822 ml/m² and less than 922 ml/m² (Graph 3).

REFERENCE(S). Yoneda H, Nakamura T, Shirao S, et al. Multicenter prospective cohort study on volume management after subarachnoid hemorrhage: hemodynamic changes according to severity of subarachnoid hemorrhage and cerebral vasospasm. Stroke. 2013 Aug;44(8):2155-61. Tagami T, Kuwamoto K, Watanabe A, et al. Optimal Range of Global End-Diastolic Volume for Fluid Management After Aneurysmal Subarachnoid Hemorrhage: A Multicenter Prospective Cohort Study. Crit Care Med. 2014 Jan 3. [Epub ahead of print] Tagami T, Kuwamoto K, Watanabe A, et al. Effect of triple-H prophylaxis on global end-diastolic volume and clinical outcomes inpatients with aneurysmal subarachnoid hemorrhage. Neurocrit Care 2014, in press.

GRANT ACKNOWLEDGMENT. Research funds from Japanese Ministry of Education, Culture, Sports, Science and Technology science (No. 20592117).

0414
ASSOCIATION OF BLOOD GAS TENSIONS WITH OUTCOME AFTER ACUTE SUBARACHNOID HEMORRHAGE

M. Lang¹, R. Raj², M. Skrifvars³, T. Koivisto⁴, H. Lehto⁵, R. Kivisaari⁵, M. Fraunberg⁴, M. Reinkainen⁶, S. Bendel⁷

¹Kuopio University Hospital, Intensive Care Unit, Kuopio, Finland, ²University of Helsinki, Helsinki, Finland, ³Helsinki University Central Hospital, Intensive Care Unit, Helsinki, Finland, ⁴Kuopio University Hospital, Neurocenter, Kys, Finland, ⁵Helsinki University Central Hospital, Neurosurgical Unit, Helsinki, Finland, ⁶North Karelia Central Hospital, Intensive Care Unit, Joensuu, Finland, ⁷Kuopio University Hospital, Intensive Care Unit, Kys, Finland

INTRODUCTION. Promising results from oxygen based therapies on surrogate markers of brain tissue oxygenation have been published. However, hyperoxemia is also associated with cerebral vasoconstriction and free radical damage. Hypocapnia is a potent vasoconstrictor and predisposes brain tissue to ischemia. The synergistic effects of oxygen and carbon dioxide tensions on cerebral blood flow and oxygenation are complex.

OBJECTIVES. A retrospective cohort study to investigate the association between blood gases during the first 24 h at the ICU and 3-month neurological outcome (GOS) and mortality in patients with acute SAH.

METHODS. Patients who were mechanically ventilated for 24 h following admission were included. All arterial blood gas (ABG) samples obtained during that period were included in statistical analyses, an average of 5.0 ABGs (SD ± 1.6) were obtained per patient. Patients were categorized into low (<13 kPa), intermediate (13-20 kPa) and high oxygen (> 20.0 kPa) groups based upon the 24-hour time weighted average (TWA-PaO₂). For carbon dioxide patients were divided into low (< 4.5 kPa), intermediate (4.5-5 kPa) and high (> 5 kPa) categories. Primary endpoint was neurological outcome assessed favorable (GOS 4-5) or unfavorable (GOS 1-3), secondary outcome was mortality.

RESULTS. We included 432 patients. The overall 3-month unfavorable outcome was 52 % (n = 248) and mortality 28 % (n = 134). The median TWA-PaO₂ was 16.8 kPa (IQR 13.0-21.7), TWA-O₂ values were higher in those with unfavorable outcome 18.2 kPa (IQR 13.8-22.3) vs. 15.7 kPa (IQR 12.0-20.7). No differences in TWA-CO₂ values were observed. In univariate analyses, a higher proportion of patients with GOS 4-5 were in the high oxygen group (p < 0.010) and a higher proportion of patients with GOS 1-3 in low oxygen group (p < 0.010). No mortality differences were seen between the oxygen groups (p = 0.77). In multivariate analyses, adjusted for illness of severity, oxygenation had no effect on neurological outcome: intermediate vs low, OR 1.04 (95 % CI 0.54-2.03, p = 0.90); intermediate vs high, OR 1.24 (95 % CI 0.69-2.28, p = 0.47). Oxygenation had no effect on mortality: intermediate vs low, OR 0.64 (95 % CI 0.30-1.36, p = 0.24); intermediate vs high, OR 0.84 (95 % CI 0.45-1.58, p = 0.06). CO₂ had no independent effect on neurological outcome or mortality. Neurological outcome: intermediate vs low OR 0.77 (95 % CI 0.41-1.43, p = 0.77) and intermediate vs high 0.58 (95 % CI 0.31-1.08, p = 0.88). Mortality: intermediate vs low OR 1.35 (95 % CI 0.70-2.25) and intermediate vs high OR 0.64 (95 % CI 0.32-1.28). No differences in the adjusted outcome ratio (AOR) (i.e. observed/predicted) for neurological outcome or mortality neither for oxygenation or carbon dioxide tension were found (Figure 1).

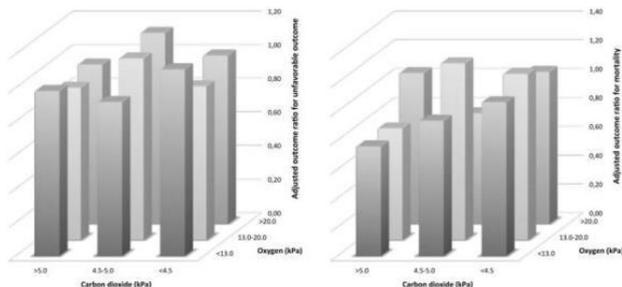


Fig. 1

CONCLUSIONS. After illness of severity adjustment we could not confirm any association of blood gas tensions and 3-month outcome.

0415
INTRACRANIAL PRESSURE-TIME DOSE AND OUTCOME IN SUBARACHNOID HEMORRHAGE

F. Magni¹, M. Pozzi¹, G. Trincheri¹, M. Rota², A. Bronco¹, A. Confalonieri³, G. Citerio³

¹Università degli Studi di Milano Bicocca, Dipartimento di Scienze della Salute, Monza, Italy, ²IRCCS - Istituto di Ricerche Farmacologiche 'Mario Negri', Dipartimento di Epidemiologia, Milan, Italy, ³Azienda Ospedaliera San Gerardo, UOS Terapia Intensiva Neurochirurgica, Monza, Italy

INTRODUCTION. Intracranial pressure-time dose (PTD_{ICP}) is an analytical method to quantify the burden and the time spent above a defined threshold of intracranial pressure (ICP). Relationship between PTD_{ICP} and outcome has been already evaluated in severe traumatic brain injury cohorts. Nevertheless, PTD_{ICP} has never been evaluated in an aneurysmal subarachnoid hemorrhage (aSAH) population neither its relationship with long term outcome.

OBJECTIVES. To evaluate PTD_{ICP} and its relationship to functional outcome in an aSAH population.

METHODS. Retrospective analysis of digital data prospectively collected over a 3-yr period (September 2010-13) on an aSAH cohort. ICP was monitored with an intraparenchymal catheter (Codman Microsensor) and recorded through a real-time automated high-resolution (minute-by-minute) system connected to Computerized Patient Record System (Innovian, Draeger). Demographic and clinical data were collected by charts review. Outcome was assessed through Extended Glasgow Outcome Scale (GOS-E) at hospital discharge and at 6 months. Pressure-time dose (expressed as mmHg*hr) > 20 mmHg (PTD₂₀) describes both the cumulative amplitude and duration of episodes above the threshold and was computed for each patient from admission to day 7. We excluded values recorded after ICP progressively increased above 50 mmHg to exclude terminal data. PTD₂₀ was categorized into 3 groups: no dose (0 mmHg*hr), low dose (0-5 mmHg*hr) and moderate to high dose (> 5 mmHg*hr). A multivariate logistic regression analysis was

fitted to the data to investigate the effect of PTD₂₀ adjusted for age, sex and Hunt-Hess score with reference to a poor outcome (GOS-E ≤ 4).

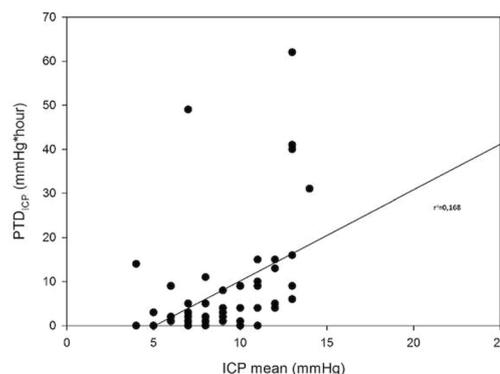
RESULTS. 55 patients were enrolled (67 % female) and mean age was 58 (44-81) years. 42 patients (76 %) presented with a poor clinical grade (Hunt-Hess IV-V). Overall mortality was 17 % at hospital discharge and 34 % at 6 months. Median ICP was 10 mmHg (IQR 7-12 mmHg), while median PTD_{ICP} and ICP mean. 7 (13 %) patients had no PTD₂₀, 24 (43.5 %) had low PTD₂₀ and 24 patients (43.5 %) had moderate to high PTD₂₀. Although not statistically significant, low and moderate to high PTD₂₀ had an increased risk of poor outcome at hospital discharge (ORs 2.98 and 2.42) and at 6 months (ORs 9.52 and 6.34). See Table for analysis.

CONCLUSIONS. In patients with aSAH PTD₂₀ was not related to functional outcome. A wider population is warranted to better define the relationship of PTD₂₀ and outcome at 6 months.

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	Poor Outcome at Hospital Discharge (GOS-E ≤ 4)			Poor outcome at 6 months (GOS-E ≤ 4)		
	OR	95 % IC	p	OR	95 % IC	p
PTD20 0-5 mmHg*hr	2.98	0.37-24.13	0.31	9.52	0.83-109.16	0.07
PTD20 > 5 mmHg*hr	2.42	0.32-18.36	0.39	6.34	0.58-68.85	0.13
Age	1.04	0.97-1.12	0.30	1.01	0.94-1.09	0.72
Sex - M	7.04	1.34-36.93	0.02*	1.52	0.34-6.70	0.58
H&H 3	5.92	0.16-215.60	0.33	13.48	0.45-404.20	0.13
H&H 4	19.71	1.47-264.89	0.02*	6.23	0.50-77.67	0.16
H&H 5	16.69	1.48-188.25	0.02*	15.13	1.53-149.66	0.02*

[Table 1: Multivariate logistic regression analysis]



Graph 1: Relationship between PTD_{ICP} and mean ICP

0416
INCIDENCE OF SYSTEMIC IMMUNE RESPONSE SYNDROME(SIRS) IN PATIENTS WITH SUBARACHNOID ANEURYSMAL HAEMORRHAGE (SAH) AND ITS ASSOCIATION WITH MORBIDITY AND MORTALITY

J. Cárdenas¹, A. Cuadrado¹, L. Medina¹, J. Cánovas¹, L. Rosado¹

¹Hospital General Universitario de Alicante, Intensive Care Unit, Alicante, Spain

INTRODUCTION. Patients suffering SAH can develop SIRS, which is clearly recognized as a poor outcome factor in various pathologies, but there are few reports concerning SAH and, in addition, it is not well known if there is any direct association between this phenomenon and other complications such as vasospasm or hydrocephalus.

OBJECTIVES. Determination of the incidence of SIRS in those patients admitted in the context of SAH and its association with morbidity, defined as the development of vasospasm, acute cerebral injury, acute lung injury (ALI), neurological deficit and with mortality.

METHODS. Observational retrospective study through a chart review of 91 patients who were admitted due to SAH in the ICU in a third level university hospital between March 2012 and July 2013. SIRS parameters were measured during the first 48 h after admission, considering a diagnosis of SIRS when patients had at least two of the following criteria: Temperature > 38 °C or < 36 °C, heart rate > 90 beats per minute, respiratory rate > 20 per minute or pCO₂ < 32 mmHg, leukocyte count > 12000/mm³ or < 4000/mm³. Neurological outcome was evaluated according to the Glasgow Outcome Scale (GOS) based on clinical status at three months after onsets. Data on variables associated with SIRS, such as development of vasospasm, cerebral infarction, ALI, neurological outcome and mortality was analysed on a univariate and multivariate basis.

RESULTS. 91 patients were included: 46 M (50.5 %) y 45 F (49.5). The mean age was 56 ± 13.3. The incidence of SIRS during the first 48 h was 36 %. SIRS was significantly associated with the development of hydrocephalus and cerebral infarction, whereas vasospasm and neurological outcome three months after clinical onset was not related with SIRS.

	Chi2	p
DIABETES MELLITUS	4.3	0.04
CEREBRAL INFARCTION	13.3	0.001
HYDROCEPHALUS	5.2	0.022
WFNS 4-5	4.16	0.05

[Bivariate Analysis]

	B	ODDS(95 %CI)	p
SIRS 48 H			
WFNS 4-5	1.1	3(0.9-10.4)	0.06
CEREBRAL INFARCTION	1.7	5.4(1.8-16)	0.002
CEREBRAL INFARCTION			
GOS	1.9	6.12(1.34-32.4)	0.02
HYDROCEPHALUS	1.5	4.6(1.08-19.5)	0.03

[Multivariate Analysis]

CONCLUSIONS. SIRS presence was associated with the development of hydrocephalus or cerebral infarction, as well as poor results in Fisher scale and poor World Federation of Neurological Surgeons (WFNS) grade, while it was not related with the development of vasospasm or the neurological status after SAH.

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0417

EARLY ELEVATED SERUM LACTATE AND GLUCOSE LEVELS DURING ADMISSION IN PATIENTS WITH SEVERE ANEURYSMAL SUBARACHNOID HEMORRHAGE AND PROGNOSIS

C. Engel¹, I.C. van der Horst¹, M.W. Nijsten¹

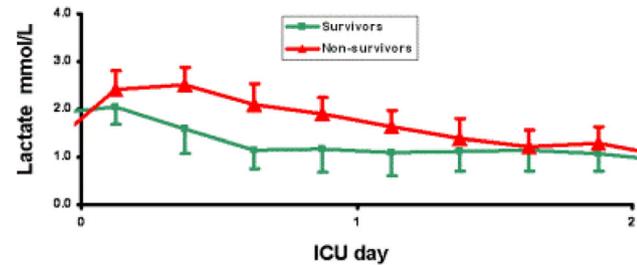
¹UMC Groningen, ICU, Groningen, Netherlands

INTRODUCTION. In many categories of critically ill patients, lactate and glucose are associated with outcome - irrespective of oxygen delivery¹. Adrenergic stress is increasingly seen as the key mediator of hyperlactatemia as well as hyperglycemia². In subarachnoid hemorrhage (SAH), tissue levels of lactate and glucose have been associated with severity of the SAH. But neither the time course of circulating lactate nor its relation with circulating glucose and outcome have yet been studied in detail in patients with SAH.

OBJECTIVES. To establish whether lactate levels are elevated in patients with SAH and whether lactate is related with prognosis as well as glucose levels.

METHODS. Patients admitted with aneurysmal SAH to our neurosurgical ICU between 2007 and 2011 were included. Hospital survival and long-term survival was known in all patients. SAH was defined as an aneurysmal bleeding pattern on CT of the cerebrum in combination with an aneurysm on CT-angiography. Arterial lactate levels (reference values 0.9 to 1.4 mmol/L) were regularly determined together with glucose levels with a Radiometer series 800 analyzer in order to perform computerized glucose control with the GRIP system. The time course of lactate and glucose levels for the first two days after admission was determined for six-hour intervals. Levels in survivors and non-survivors were compared with a 2-sided t-test with the Bonferroni-correction.

RESULTS. We included 279 patients with a mean age of 56 years (SD ± 13) in which 1721 lactate and glucose levels were determined during the first two ICU days after ICU admission. In hospital mortality was 20 %. Mean lactate increased to 2.2 (SD ± 1.4) mmol/L directly after admission and decreased to 1.1 ± 0.5 mmol/L 2 days thereafter.



Early lactates and survival status

Lactate was higher in non-survivors compared to survivors at 9 h: 2.5 ± 1.4 vs. 1.6 ± 0.8 (p = 0.001); at 15 h: 2.1 ± 1.1 vs. 1.1 ± 0.6 (p < 0.0001); at 21 h: 1.9 ± 1.2 vs. 1.2 ± 0.7 (p < 0.0001); and at 27h: 1.6 ± 1.2 vs. 1.1 ± 0.7 mmol/L (p < 0.0001).

Glucose levels displayed a very similar response to lactate levels.

CONCLUSIONS. Patients admitted to the ICU for SAH treatment present with mildly elevated lactate levels. Furthermore, lactate levels during the first ICU day were higher in non-survivors than in survivors.

We hypothesize that elevated lactate and glucose reflects adrenergic stress that is related with the severity of SAH, and not global hypoxia per se. Analysis of the temporal changes in lactate and glucose in relation with adrenergic responses may help to further elucidate the underlying mechanisms.

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0418

SAFETY OF SUPPLEMENTAL PARENTERAL NUTRITION IN CRITICALLY ILL PATIENTS WITH INTRACRANIAL HEMORRHAGE

J. Titova¹, S. Petrikov¹, E. Klychnikova¹, E. Tazina¹, M. Godkov¹, A. Solodov¹, V. Krylov¹, A. Rysk¹

¹Skifosovsky Research Institute for Emergency Medicine, Moscow, Russian Federation

INTRODUCTION. Safety of supplemental parenteral nutrition (SPN) is one of the main conditions to manage nutrition support in critically ill patients (pts) with intracranial hemorrhage (ICH).

OBJECTIVES. To determine safety of SPN in critically ill pts with ICH in the early postoperative period (PP).

METHODS. We observed 20 pts with ICH and Glasgow Coma Scale 4-13 (age 46.8 ± 10.0; male - 13 (65 %), female - 7 (35 %)) in the early PP. Mortality rate was 50 %. We provided standard intensive care, early enteral nutrition (EN) from the 1st day in intensive care unit after neurosurgical operative procedure. We used nitrogen balance estimation to determine protein metabolism. Energy expenditure was calculated on the basis of 160 nonprotein kcal per 1gr of nitrogen intake. SPN was started on the 2-8th day of PP when EN was impossible or insufficient. We used "three-in-one" parenteral nutrition Smofkaben enriched with omega-3-acids and olive oil (Fresenius Kabi Deutschland GmbH) 1477 or 1970 ml according to energy and protein expenditure with lipid emulsion rate 0.03 - 0.04 g/kg/h. SPN duration was 18 h, than 6 h without any nutrition (from 05.30 to 11.30 a.m.). We analyzed dynamics of urea, triglyceride (TG) (normal range < 1.71 mmol/L), glucose serum levels (GLU) (valid range up to 10 mmol/L) and arterial oxygen tension to oxygen fraction in inhaled gas mixture ratio (PaO₂/FiO₂ ratio (P/F)) to determine safety of SPN in 1-10 day of SPN in PP. Urea serum concentration was defined daily. TG, GLU and P/F were measured 4 times per day: before SPN was started (Sample 1 at 11.30 a.m.), 2 h of SPN (Sample 2 at 13.30 p.m.), 12 h of SPN (Sample 3 at 23.30 p.m.) and 18 h of SPN (Sample 4 at 05.30 a.m.).

RESULTS. TG did not increase significantly in 1-10 day of SPN (maximal TG 1.91 (1.19; 2.47) mmol/L at 2 h of SPN on 6th day). Urea serum level increased in 5-10 day of SPN up to 10.1 (9.0; 12.0) mmol/L (p < 0.05 as compared with 1st day), but kidney insufficiency required renal replacement therapy was not revealed in observed pts. P/F did not change significantly during 1-10 day of SPN. P/F was stable during 24 h in pts with P/F > 300 (Sample 1 - 365 (343; 451) (n = 88), Sample 2 - 382 (341; 434) (n = 82), Sample 3 - 371 (312; 453) (n = 82), Sample 4 - 365 (301; 449) (n = 78)). In pts with P/F < 300 before SPN it increased and normalized during 24 h (Sample 1 - 246 (200; 273) (n = 37), Sample 2 - 270 (214; 328) (p < 0.05 as compared with Sample 1, n = 37), Sample 3 - 289 (219; 338) (p < 0.05 as compared with Sample 1, n = 34), Sample 4 - 324 (255; 382) (as compared with Sample 1, p < 0.05, n = 35).

We revealed hyperglycemia up to 11.1 (8.9; 14.9) mmol/L just in sample 2 (2 h of SPN) (p < 0.05 as compared with Sample 1, n = 15) in day 2-4 of SPN.

CONCLUSIONS. SPN is safe method of nutrition support in pts with ICH. SPN administration didn't alter lung gas exchange, triglycerides and glucose metabolism and could be accompanied by slight serum urea increase.

0419

SPONTANEOUS SUBARACHNOID HAEMORRHAGE: A COMPARISON BETWEEN PATIENTS OVER AND UNDER 65 YEARS ADMITTED TO AN INTENSIVE CARE UNIT

J. Palamidessi Domínguez¹, B. Balandín Moreno¹, S. Alcántara Carmona¹, R. Fernández Rivas¹, I. Fernández Simón¹, B. Lobo Valbuena¹, N. Martínez Sanz¹, P. Galdos Anuncibay¹

¹Puerta de Hierro Hospital, Intensive Care Unit, Madrid, Spain

INTRODUCTION. Mortality of patients ≥ 65 years diagnosed of spontaneous subarachnoid haemorrhage (SAH) is not very well known, and highly variable according to the different published series (between 9 and 23 %) ^{1,2}. There are also no studies that address the differences in clinical outcomes between patients < 65 and ≥ 65.

OBJECTIVE. To study the different outcomes of patients, gathered by age (group A ≥ 65 and B < 65), with SAH admitted to an Intensive Care Unit.

METHODS. Retrospective study (October 2008-October 2013). Age, sex, severity scales [Hunt - Hess (HH), HIJDRA and Fisher Revised (FR)], etiology, treatment and complications (rebleeding, vasospasm, hydrocephalus, seizures and salt wasting syndrome) were evaluated. Days of mechanical ventilation (MV), ICU and hospital stay, Glasgow Outcome Score at discharge (GOS-D), at six months (GOS-6) and mortality were also collected. Statistical analysis: χ² and Mann-Whitney U test. Statistical significance: p < 0.05.

RESULTS. Ninety-six patients were included: 22 in group A (72.6 ± 5.7 years; 63.6 % women) and 74 in group B (47.7 ± 8.8 years; 64.9 % women). Distribution of patients according to severity scales is listed on Table 1. Arteriography was performed in > 95 % of both groups, and was positive in 85.7 % and 68.5 % respectively (p 0.12). The anterior communicating artery was the most frequent location of the aneurism and embolization was the preferred treatment in both groups (85.7 % vs 56.8 %; p 0.052). There were no significant differences in the incidence of complications between groups (Table 2). Group A had more days of MV [median 15 (8-37) vs 8 (1-33); p 0.015], ICU stay [15 (1-59) vs 7 (1-60); p 0.010] and hospital stay [29.5 (12-188) vs 21 (1-181); p 0.013].

There was no difference in functional recovery, founding favorable grades of GOS-D (IV-V) in 61.9 % of group A and 78.4 % of B (p 0.125), and favorable GOS-6 in 61.1 % and 81.1 % respectively (p 0.134) (Table 3). Regardless of the group, a high score on the HH scale (IV-V) was associated with worse grades of GOS (I-II-III). There were no differences in mortality at 6 months (13.6 % vs 13.5 %).

CONCLUSIONS. The incidence of complications and functional recovery was similar in both groups, although patients ≥ 65 years required longer hospital stay. Only the initial neurological status determined the quality of life in long-term.

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Group	Hunt-Hess			HIJDRA		Fisher Revised	
	I-II	III	IV-V	< 15	≥ 15	I-II	III-IV
A	10 (45.5%)*	6 (27.3%)*	6 (27.3%)	4 (22.2%)*	14 (77.8%)*	1 (4.5%)	21 (95.5%)
B	51 (68.9%)*	5 (6.8%)*	18 (24.3%)	39 (52.7%)*	35 (47.3%)*	14 (18.9%)	80 (81.1%)

Table 1 * p < 0.05

Group	Rebleeding		Vasospasm		Hydrocephalus		Seizures		Salt wasting	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
A	2 (9.1%)	20 (90.9%)	6 (27.3%)	16 (72.7%)	10 (45.5%)	12 (54.5%)	1 (4.8%)	20 (95.2%)	3 (13.6%)	19 (86.4%)
B	4 (5.4%)	70 (94.6%)	19 (25.7%)	55 (74.3%)	19 (25.7%)	55 (74.3%)	3 (4.1%)	71 (95.9%)	14 (18.9%)	66 (81.1%)

Table 2

Group	GOS-D		GOS-6	
	I, II, III	IV, V	I, II, III	IV, V
A	8 (38,1%)	13 (61,9%)	7 (38,9%)	11 (61,1%)
B	16 (21,6%)	58 (76,4%)	14 (18,9%)	60 (81,1%)

Table 3

0420

NON-TRAUMATIC SUBARACHNOID HEMORRHAGE: CLINICAL OUTCOMES IN PATIENTS OVER 65 YEARS OLD ADMITTED IN INTENSIVE CARE UNIT

R. Fernández Rivas¹, J. Palamidessi Dominguez¹, B. Balandín Moreno¹, S. Alcántara Carmona², B. Lobo Valbuena¹, N. Martínez Sanz¹, I. Fernández Simón¹, L. Pérez Pérez¹, A. Pérez Lucendo¹

¹Hospital Universitario Puerta de Hierro, Intensive Care Unit, Madrid, Spain

INTRODUCTION. Subarachnoid hemorrhage (SAH) represents a dramatic disease with an exceedingly high mortality and morbidity. The embolization of elderly patients with aneurysmal SAH remains questionable and large series are relatively scarce.

OBJECTIVES. The aim of this study was to analyze the clinical outcomes of patients older than 65 years diagnosed with non-traumatic SAH admitted to a 22-bed Intensive Care Unit in a tertiary University Hospital.

METHODS. Observational study (January 2003 - May 2013). We collected the following data: age, sex, Charlson Comorbidity Index (CCI), Hunt & Hess (HH), Hijdra and Modified Fisher (MF) scales, etiology, treatment [endovascular coiling (EVC) or surgical clipping (SC)] and complications such as hydrocephalus, vasospasm, rebleeding, seizures, salt wasting syndrome and cardiopulmonary alterations. Glasgow Outcome Score (GOS) was evaluated at hospital discharge (GOS-HD) and at 6 months (GOS-6 M).

RESULTS. Forty-three patients were included, 70 % women, mean age 72 ± 5 years, with a CCI of 3.76 ± 1.28 . HH was I-II in 15 patients (35 %), III in 10 (23 %) and IV-V in 18 (42 %). Twenty-nine patients (67 %) had a Hijdra > 15 and FM was III-IV in 40 (93 %). Arteriography was positive for aneurysm in 31 (72 %), arteriovenous malformation in 2 (5 %) and negative in 6 (14 %). Endovascular coiling was performed in 49 % and surgical clipping in 11 %. Complications rates were: hydrocephalus 44.2 %, vasospasm 37.2 %, rebleeding 16.3 %, seizures 7 %, salt wasting syndrome 16.3 % and cardiopulmonary alterations 19 %. The average hospital stay was 27 days (14-46). At hospital discharge 19 patients presented with GOS IV-V (moderate/low disability), 11 with GOS III (severe disability) and 10 with GOS I-II (Vegetative state/death). At 6 months 18 patients (50 %) presented with GOS IV-V of which 11 had received EVC and three SC. The overall mortality at six months was 34.2 %; 69.2 % in patients who had not received any treatment. A statistically significant relation was found between initial HH and GOS-HD and GOS-6 M ($p < 0.05$).

CONCLUSIONS. Non-traumatic subarachnoid hemorrhage has a high incidence of complications. Patients who received endovascular or surgical treatment had a better prognosis. However the initial neurological status is the factor that determines the quality of life in the long term.

0421

NOVEL OPTICAL INVESTIGATION OF CEREBRAL OXYGENATION, HEMODYNAMICS AND METABOLISM FOLLOWING FAILURE OF CEREBRAL AUTOREGULATION

D. Highton¹, C.E. Elwell², M. Smith¹

¹University College London Hospital NHS Foundation Trust, Neurocritical Care, London, United Kingdom, ²University College London, Department of Medical Physics and Bioengineering, London, United Kingdom

INTRODUCTION. Following acute brain injury (ABI) autoregulation of cerebral blood flow (CA) is frequently impaired and associated with adverse outcome¹. Impaired CA may be related to metabolic dysfunction and vasoparesis and can result in hypoperfusion and secondary ischemia. CA oriented therapy aims to improve metabolic and flow coupling but there are no clinically proven methods for reliably assessing CA or thresholds for metabolically "optimal" CA. Time resolved near infrared spectroscopy measures absolute oxy/deoxy-hemoglobin concentrations and light scattering. This allows quantification of absolute cerebral oxygenation with clear theoretical benefits. Further, light scatter may be a novel marker of cellular/mitochondrial injury². Understanding the relationship between cerebral metabolism and CA may guide hemodynamic manipulation following ABI. The aim of this research is to investigate the effects of impaired CA on cerebral oxygenation, hemodynamics and metabolism using novel non-invasive bedside optical techniques.

METHODS. 20 ventilated, sedated patients with ABI were investigated using in-house multi-distance broadband and time resolved (TRS-20, Hammamatsu Photonics) spectroscopy systems. Multimodal monitoring of CA was performed using previously suggested indices of CA derived from blood pressure and neuromonitoring: Mx-from transcranial Doppler flow velocity in the middle cerebral artery, PRx-from intracranial pressure, TOx/THx from spatially resolved spectroscopy¹. Absolute hemoglobin saturation (SO₂), total cerebral hemoglobin (HbT) and tissue scattering (at 834 nm) were measured bilaterally over frontal cortex. Average data from both sides is reported. SO₂, HbT and scatter were compared between patients with impaired CA (any CA index > 0.3) and intact CA using Student's t-test.

RESULTS. Nine patients had impaired CA, and this was not associated with differences in ROS (intact 68 %, impaired 70 % $p = 0.20$) or HbT (intact 57 $\mu\text{mol/L}$, impaired 60 $\mu\text{mol/L}$ $p = 0.54$). However there was a significant difference in tissue scattering (intact CA 8.5/cm vs. impaired CA 7.2/cm $p = 0.02$) suggesting underlying tissue injury.

CONCLUSIONS. CA is not related to changes in SO₂ or HbT suggesting cerebral haemodynamics are appropriately coupled to metabolism even when vascular reactivity is impaired. Reduced light scattering may indicate underlying tissue injury, and could represent mitochondrial swelling [2] and metabolic failure. The relationship between impaired CA and outcome may thus be a marker of underlying tissue injury rather than causal. Although further work is required to elucidate the pathophysiology of reduced optical scattering, time resolved spectroscopy may be uniquely placed to investigate the optimal treatment windows in the progression of ABI to loss of CA and tissue infarction.

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0422

RELATIONSHIP BETWEEN PUPILLARY ABNORMALITIES ON ADMISSION AFTER SUBARACHNOID HEMORRHAGE IN A CRITICAL CARE UNIT AND HOSPITAL MORTALITY

I. Macías-Guarasa¹, M.D. Arias-Verdu¹, J.E. Barrueco-Fancioni¹, R. Rivera-Fernandez¹, A. Martín-Gallego², L. Romero-Moreno², B. Marquez-Marquez², M.A. Arraez-Sanchez²

¹Carlos Haya University Hospital, Intensive Care Unit, Malaga, Spain, ²Carlos Haya University Hospital, Neurosurgical Department, Malaga, Spain

OBJECTIVE. To evaluate the links between pupillary abnormalities on admission after subarachnoid hemorrhage, SAH, and hospital mortality in our critical care unit.

METHODS AND MATERIALS. Patients with SAH between 2008 and 2013. We analyzed demographic variables, gravity, mortality and treatment. T-Student was applied for continuous variables and χ^2 for qualitative variables.

RESULTS. N = 340. Mean Age was 54.16 ± 13.03 , gravity according to APACHE II score, 14.82 ± 7.72 . Glasgow Coma scale score(GCS) on admission 11.84 ± 4.15 . ICU mortality 13.2 %, hospital mortality 16.8 %. Patients who died in hospital presented no significant statistical differences with regard to age 54.27 ± 13.02 as opposed to 53.79 ± 13.28 years ($p = 0.81$). Patients who died were more likely to have worse scores: APACHE II, 21.4 ± 7.85 vs 13.60 ± 7.07 points ($p < 0.001$) and GCS, 7.17 ± 4.45 vs 12.7 ± 3.56 ($p < 0.001$). Of the 53 patients who died in hospital 31 (58.5 %) presented pupillary abnormalities on admission. And of the 58 patients who presented pupillary abnormalities on admission 31 died (53.4 %), and of the 280 who presented normal pupils, 22 (7.9 %) died ($p < 0.001$). The multivariable analysis showed that hospital mortality was linked with pupillary abnormality, OR: 4.70 (2.11-10.45) and GCS on admission, OR 0.82 (0.75-0.89). Neither APACHE II nor age were included in the model. Discrimination evaluated under the ROC curve of this model was 0.83 (0.76-0.9). APACHE II was 0.77 (0.70-0.84) and the GCS scale was 0.81(0.74-0.88).

CONCLUSIONS. In patients with SAH the presence of pupillary abnormalities on admission to ICU is a significant predictor of mortality. Its accuracy is significantly higher than APACHE II and GCS, both of which complement each other in their predictive function.

0423

TRENDS IN MORTALITY AND NEUROLOGICAL OUTCOME IN PATIENTS ADMITTED TO INTENSIVE CARE WITH NON-TRAUMATIC SUBARACHNOID HAEMORRHAGE

J.C. Sturrock¹, R. Macfadyen¹, G. Foggo¹

¹Western General Hospital, Intensive Care Unit, Edinburgh, United Kingdom

INTRODUCTION. Subarachnoid haemorrhage (SAH) is a devastating neurological condition which frequently occurs in a relatively young healthy population [1]. SAH is associated with high mortality and significant neurological morbidity impacting on activities of daily living and quality of life [2].

OBJECTIVES. To determine neurological outcome amongst patients admitted to our ICU with a diagnosis of non-traumatic SAH. In addition to determine whether the origin or grade of SAH, predicted quality of life in those who survived to hospital discharge.

METHODS. This was a retrospective study of patients admitted the ICU at Western General Hospital, Edinburgh from 1st January to 31st December 2011. Patients were identified from Wardwatcher (Critical Care Audit Ltd, Yorkshire, UK) and demographic data was collected, as were details of SAH aetiology, grade, course of ICU stay and hospital discharge. All survivors were identified and sent a standardised questionnaire (Modified Rankin Score Q9) to assess their functional status. This study was approved by the NHS Lothian Caldicott Guardian, and approval from the local Research Ethics Committee was sought but not required.

RESULTS. Forty-one patients were identified over a 1 year period, with the majority of the cohort being female (68.3 %) with a mean age of 56.2 (12 SD) years. Twenty-seven (65.9 %) of the SAH studied occurred in the anterior circulation, with 14.7 % (n = 6) being posterior, 9.6 % (n = 4) being basilar and in 9.6 % of cases the origin was unknown or not recorded. The majority of the patients received radiological intervention, with 60.9 % receiving coiling, only 1 patient required clipping and 2 having surgical evacuation. Three patients received no surgical or radiological intervention, however these were associated with grade 1 or 2 disease. Of the remaining patients, 8 were treated palliatively and since died in ITU or on discharge to the ward. Of the group studied, 12 patients died during the ITU stay (29.2 %), with 3 further patients dying post discharge. Of those followed up, a further 2 patients could not be located. The remaining 24 patients were sent a Modified Rankin Score (MRS) Q9 Questionnaire, with 17 responding (70.8 %). The median time to follow up was 871 days.

Site	Median SAH Grade	Response Rate	Median MRS score (range)
Anterior (n = 27)	3	12 of 15	1 (0-5)
Posterior (n=6)	2	3 of 4	2 (2)
Basilar (n = 4)	4	2 of 3	0.5 (0-1)
Unknown (n = 4)	4	0 of 1	n/a

[Table 1. SAH grade and site with the median MRS]

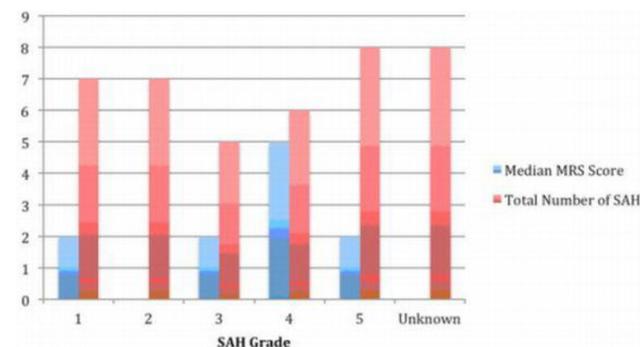


Fig. 1 The median MRS for each SAH grade

CONCLUSIONS. Our data confirms that SAH is associated with high mortality within a relatively young population. For those who survived, we found that those with posterior circulation SAH were associated with poorer functional outcome. We also found this to be the case in patients presenting with grade 4 SAH, but not with grade 5 presentations. This may be due to inconsistencies in GCS assessment at presentation.

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0424
SHORT-TERM OUTCOME IN ANEURYSMAL SUBARACHNOID HEMORRHAGE (ASAH) AFTER REPAIR TREATMENT (CLIPPING OR COILING) OF RUPTURED INTRACRANIAL ANEURYSM

M. Gero Escapa¹, S. Ossa Echeverri¹, M. Montero Baladía¹, A. Zabalegui Pérez¹, J.L. López López², E. Portugal Rodríguez¹, S. Puerto Corrales¹, M. Del Valle Ortiz¹, M.E. Perea Rodríguez¹, R. Vara Arlanzón¹, C. Carbajales Pérez¹, E. Martínez Barrio¹, A. Berrazuela Sánchez de Vega¹, D. Iglesias Posadilla¹, S. Calvo Simal³

¹Hospital Universitario de Burgos, Intensive Care Unit, Burgos, Spain, ²Hospital Universitario de Burgos, Vascular Radiology, Burgos, Spain, ³Hospital Universitario de Burgos, Investigation Unit, Burgos, Spain

INTRODUCTION. aSAH is a significant cause of morbidity and mortality throughout the world. Last decades case-fatality rates are falling, and increasing data suggest that early aneurysm repair, together with aggressive management of complications is leading to improved functional outcomes.

OBJECTIVES. Analysis of outcome and complications in patients with aSAH during two different periods after implantation of endovascular treatment (EVT) protocol.

METHODS. Descriptive, retrospective and observational study. Including aSAH admissions in ICU, over four years (2010 to 2013). Two study periods: Group A 2010-2011 (without EVT in our hospital) and Group B 2012-2013. Different variables were analyzed: epidemiological, aneurysm location and size, repair treatment, complications, ICU and hospital length of stay and morbidity.

RESULTS. Sample size: 57 patients (69 analysed, 12 excluded due to transfer another hospital).

Group A: 22 and Group B: 35 patients (Every dates represented A/B). Baseline characteristics of both groups populations are summarized in Table 1.

	GROUP A	GROUP B
AGE	61,2	56,6
WOMEN	63,6 %	65,7 %
HBP	27,3 %	40 %
DM	4,5 %	0 %
DYSLIPIDEMIA	27,3 %	25,7 %

[Table 1]

Severity scales: APACHE II 14/12; GCS 10/11; Hunt-Hess 5 : 31,8 %/22,9 %; Fisher 4: 45,5 %/60 %; WFNS 5: 31,8 %/25,7 %. Aneurysm location: anterior comunicant 36,4 %/45,7 %; internal carotid artery- posterior comunicant 31,8 %/14,3 %; middle cerebral artery 27,3 %/22,9 %; other 4,5 %/17,1 %. Aneurysmal sack diameter: small (< 15 mm) 100 %/88,6 %, large (15-25 mm) 0 %/8,6 %. Repair treatment: surgical 68,2 %/11,4 %, EVT 0 %/71,4 % and conservative 31,8 %/17,1 %. Group B has 25,8 % less risk of surgery. Time admission-repairment: 3,95/2,51 days. Complications: vasospasm 22,7 %/34,3 %, rebleeding 27,3 %/5,7 % (p 0,045, 37 % less risk in Group B), hydrocephalus 13,6 %/17,1 %, seizures 9,1 %/5,7 % and ventriculitis 9,1 %/14,3 %. Length of stay : ICU 15,2 days (SD 3,39)/10,3 (SD 1,28) and hospital 24,6 days (SD 3,90)/21,1 (SD 3,99). Morbidity using GOS scale: 1 = 31,8 %/28,6 %; 2 = 4,5 %/2,9 %; 3 = 13,6 %/14,3 % 4: 0 %/17,1 % 5: 45,5 %/37,1 %. We separated two GOS groups: bad prognosis (grade 1-2-3 included) 52,4 %/45,7 % y good prognosis (4-5) 47,6 %/54,3 %.

CONCLUSIONS. In this study differences about short-term outcome are not found. In second period, rebleeding decreases and vasospasm and ventriculitis increase. No statistical significance in length of stay. EVT indication grows up when we have this technique, on the other hand other treatments rates come down.

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0425
SPONTANEOUS SUBARACHNOID HEMORRHAGE (SAH) OUTCOMES ACCORDING TO TREATMENT USED

F. Pino-Sánchez¹, E. García-Bautista², F. Guerrero-López¹, M. Redondo-Orts¹, R. Lara-Rosales¹, E. Fernández-Mondéjar¹

¹H. U. Virgen las Nieves, Neurointensive Care Unit, Granada, Spain, ²H. U. Virgen las Nieves, Interventional Neuroradiology, Granada, Spain

INTRODUCTION. It is important to analyze results in a prevalent and high impact disease as SAH. To know if treatment performed conditions these outcomes is essential.

OBJECTIVES. To assess evolution of patients with SAH according to the type of treatment used to exclude the bleeding responsible aneurysm.

METHODS. Cohort of patients admitted to intensive care unit with SAH from 1996-2013 with complete hospitalary monitoring (we excluded transferred patients to other acute hospital). We collected basic epidemiological data, general severity parameters, and SAH admission data, type of aneurysm treatment, admission time and outcomes, mainly GOS and mortality. Basics statistics with SPSS 20.0, we considered significance if p < 0.05.

RESULTS. 963 patients were admitted in intensive care unit during study period with a SAH. After aneurysm treatment 236 were transferred to their precedence hospitals and they were excluded of analysis, so 727 remained with complete monitoring to hospital discharge. 13 survivors had not a reliable GOS collected, so analysis sample remain in 714 patients.

Aneurysm treatment used was surgical in 27 %, coiling in 55.4 %, while in 17.3 % of the patient no treatment was performed. In the table 1 we expose characteristics and outcomes, regarding patients discharge GOS, grouped according to treatment that had been used for the bleeding responsible aneurysm exclusion.

	Surgery	Coiling	No treatment	p
Bad initial Hunt-Hess (3-5)	51.2 %	53.3 %	79.5 %	< 0.001
Bad initial FMNC (3-5)	37.3 %	37.1 %	68.5 %	< 0.001
Bad initial Fisher (3-4)	80.1 %	83.7 %	91.5 %	< 0.001
Mechanical Ventilation	41 %	40.7 %	75 %	< 0.001
Hydrocephalus	25 %	35 %	61 %	< 0.001
Vasospasm	25 %	19 %	15.9 %	n.s
Rebleeding	9.6 %	8.3 %	31.7 %	< 0.001
Stroke	27 %	21 %	21 %	n.s.
Bad discharge GOS (1-3)	30.8 %	34.2 %	87 %	< 0.001

[Table 1. Characteristics and Outcomes]

Hospital mortality was 8.7 % for surgical treated patients, 12.6 % in coiling, and 71.5 if no treatment was used.

CONCLUSIONS. Patients with spontaneous subarachnoid hemorrhage in which no treatment was offered had more complications during evolution and poorer results than surgical and coiling patients. Moreover those patients had worse initial clinic situation and more severe hemorrhage.

0426
AN INVESTIGATION INTO THE BARRIERS OF THE IMPLEMENTATION OF HAEMODYNAMIC OPTIMISATION FOR INTUBATED SAH PATIENTS

E.L. Rankin¹, V.G. Robinson-Barnes¹, R. Gor¹

¹Kingston University and St George's, University of London, Neuro ITU 2nd floor AMW, London, United Kingdom

INTRODUCTION. Fluid management is an imperative component in the care of subarachnoid haemorrhage patients. Too little fluid, and the chance of the patient developing vasospasm rises. Too much fluid, and these patients are up to 26 % more likely to develop pulmonary oedema, 30 % increased chance of hyponatremia, and of these hyponatremic patients, 60 % of them will die. New guidelines target euvoalaemia, and ensure the haemodynamic status in these patients is monitored (Pringle et al. 2012).

AIM. To identify current use haemodynamic guidelines and describe the barriers to the implementation of haemodynamic management for SAH patients.

METHODS. Two stage process: 1) Data collection in 50 consecutive patients between March to September 2013. 2) Survey the knowledge base of the nurses working in the intensive care unit; via anonymous questionnaires after the analysis of stage 1. A historical research audit of past patients, analysing their fluid balance and haemodynamic status data. Finally, analysing the documentation of the fluid boluses given to the patients along with clinical reasons for the fluid challenge.

RESULTS.

Stage 1 Patient's Fluid management:

Number of Patients 50 % who had haemodynamic monitoring 56 % (28 patients) Average number of haemodynamic data recorded over 3.6 sets % of fluid challenges given with pre and post 27 % (66 challenges) % of fluid challenges given with SBP < 120 mmHg 23 % (56 fluid challenges) % of fluid challenges given with no documentation or low SBP 50 % (121 challenges)

Stage 2 Survey: Nursing questionnaire results on 28 nurses Barriers reported by the nurse N % Lack of sufficient training 90 % Lack of haemodynamic monitoring knowledge 46 % Lack of awareness of new SAH guidelines 65 %

CONCLUSION. Only 27 % of patients had the appropriate documentation and fluid management. The most important barriers were lack of awareness of new guidelines and how to interpret the haemodynamic data to improve the management of these patients.

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Ventilatory modes: 0428-0440

0428
NEURALLY ADJUSTED VENTILATORY ASSIST AND PROPORTIONAL ASSIST VENTILATION: BOTH IMPROVE PATIENT VENTILATOR INTERACTION

M. Schmidt^{1,2}, F. Kindler², J. Cecchini¹, E. Morawiec^{1,2}, R. Persichini², T. Similowski^{1,2}, A. Demoule^{2,3}

¹Sorbonne Universités, UPMC Univ Paris 06 and INSERM, UMR_S 1158, Neurophysiologie Respiratoire Expérimentale et Clinique, Paris, France, ²Groupe Hospitalier Pitié-Salpêtrière, Pneumologie et Réanimation Médicale, Paris, France, ³Sorbonne Universités, UPMC Univ Paris 06 and INSERM, UMRS 974, Thérapies du Muscle Strié, Paris, France

RATIONAL. Pressure support ventilation (PSV) delivers a constant level of assistance whatever the intensity of the patient's respiratory effort is. As opposed, proportional modes of ventilation deliver a level of assistance that is proportional the intensity of the patient inspiratory effort. There are two main proportional modes of ventilation: proportional assist ventilation (PAV), which adjusts the level of assistance to the activity of respiratory muscles estimated with an algorithm, and neurally adjusted ventilatory assist (NAVA) that enslaves ventilator assistance to the electromyographic activity of the diaphragm (EAdi), a surrogate of central respiratory activity. To date, PAV and NAVA have been individually compared to PSV but not to each other.

OBJECTIVE. To compare the impact of three assistance levels of NAVA, PAV and PSV on 1) breathing pattern, 2) respiratory drive, 3) breathing pattern variability, 4) patient ventilator asynchrony, and 5) blood gas.

METHODS. Cross-over, prospective, randomized controlled trial in mechanically ventilated patients conducted in a ten-bed intensive care unit. In 16 intubated patients, PSV, NAVA and PAV were set to obtain a tidal volume (VT) of 6-8 ml/kg (PSV₁₀₀, NAVA₁₀₀ and PAV₁₀₀). The assistance was further decreased by 50 % (PSV₅₀, NAVA₅₀ and PAV₅₀) and then increased by 50 % (PSV₁₅₀, NAVA₁₅₀ and PAV₁₅₀) with both modes. The three modes were randomly applied. Airway flow and pressure, electrical activity of the diaphragm (EAdi) and blood gas were measured. Were calculated: VT, peak EAdi, the coefficient of variation of VT and EAdi, and the prevalence of the main patient-ventilator asynchronies.

MAIN RESULTS. 1) PAV and NAVA prevented the increase of VT with high level of assistance (respectively 7.4 (5.7-10.1) ml.kg⁻¹ and 7.4 (5.9-10.5) ml.kg⁻¹ with PAV₁₅₀ and NAVA₁₅₀ vs. 10.9 (8.9-12.0) ml.kg⁻¹ with PSV₁₅₀, p < 0.05); 2) EAdi was higher with PAV than with PSV in level₁₀₀ and level₁₅₀; 3) The coefficient of variation of VT was higher with NAVA and PAV (respectively 19 (14-31) % and 21 (16-29) % with NAVA₁₀₀ and PAV₁₀₀ vs. 13 (11-18) % with PSV₁₀₀, p < 0.05); 4) The prevalence of ineffective triggering was lower with PAV and NAVA than with PSV (p < 0.05), but the prevalence of double triggering was higher with NAVA than with PAV and PSV (p < 0.05); 5) Blood gases remained unchanged.

CONCLUSIONS. NAVA and PAV have a similar impact on breathing pattern. Compared to PSV, these two modes restore the natural variability of breathing and improve patient-ventilator synchrony.

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0429

CLOSE LOOP VENTILATION IN ICU: A RANDOMIZED TRIAL OF WORKLOAD, SEDATION AND OUTCOMES

A. Garnerio^{1,2}, D. Novotni³, T. Laubscher³, G. Corneo², L. Ducros², A. Berric², J.-M. Arnal^{2,3}

¹Australian and New Zealand Intensive Care Research, Epidemiology and Preventive Medicine, Monash University, Melbourne, Australia, ²Hopital Sainte Musse, Reanimation Polyvalente, Toulon, France, ³Hamilton Medical, Medical Research, Bonaduz, Switzerland

INTRODUCTION. IntelliVent-ASV is a novel ventilation mode adjusting automatically CO₂ removal and oxygenation parameters for passive and spontaneously breathing mechanically ventilated patients.

OBJECTIVES. This monocentric randomized controlled parallel group study compared the number of manual settings (primary outcome), the dose of sedation, the duration of ventilation, and the easiness to use ventilation mode between IntelliVent-ASV and conventional ventilation in mechanically ventilated ICU patients.

METHOD. This study was performed in the general ICU of Hôpital Sainte Musse, Toulon, France. Eligible participants were adult aged 18 or over, invasively ventilated for less than 24 h at the time of inclusion with an expected duration of mechanical ventilation of more than 48 h. Exclusion criteria were broncho-pulmonary fistula, ventilation drive disorder and moribund patients. Patients were allocated to IntelliVent-ASV group or to conventional group (volume assist or pressure control and pressure support modes) using blocked randomization. All ventilation variables, manual settings (alarm settings excluded), and sedation were continuously recorded. The easiness to use ventilation mode was assessed during each shift by the nurse and the physician in charge using a visual analogic scale (VAS).

RESULTS. 60 patients were included between December 2012 and November 2013 (age = 64 ± 14 years, SAPS II = 53 ± 14), 30 in each group. The total number of manual settings and the number of manual settings per day were significantly reduced in IntelliVent-ASV group (11 [4-24] versus 34 [13-79] total manual settings per patient (p < 0.001) and 3 [1-5] versus 7 [5-14] manual settings per day per patient (p < 0.001)). The total dose of midazolam (152 [34-319] versus 223 [16-497] mg; p = 0.578) and sufentanil (787 [240-1810] versus 1124 [79-2636] µg; p = 0.547), the duration of invasive ventilation (6 [3-8] versus 5 [4-10] days; p = 0.699) and ventilator-free days at day 28 (18 [0-24] versus 18 [0-21] days; p = 0.910) were not different between IntelliVent-ASV group and conventional modes group. IntelliVent-ASV was easier to use than conventional modes for nurses (VAS = 0.2 [0.0-0.5] versus 1.3 [0.7-2.2]; p < 0.001) and physician (VAS = 0.4 [0.0-1.0] and 2.2 [1.3-3.0]; p < 0.001). There was no important adverse event in either group.

CONCLUSION. IntelliVent-ASV required less manual settings than conventional ventilation modes with similar sedation use and ventilation duration. IntelliVent-ASV was easier to use for the nurses and physicians.

The trial is registered at ClinicalTrials.gov, number NCT01781091.

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0430

THE POTENTIAL HAZARDS OF PRESSURE-CONTROL VENTILATION

I. Asua¹, S. McKechnie², E. Patrick²

¹Oxford University Hospitals, AICU, Oxford, United Kingdom, ²Oxford University Hospitals, Oxford, United Kingdom

INTRODUCTION. Lung protective ventilation (LPV), is an accepted standard of care for patients with the acute respiratory distress syndrome (ARDS). A growing body of evidence supports LPV in patients with other forms of acute respiratory failure and in patients with structurally normal lungs. The evidence for LPV is largely based upon studies that have used mandatory volume-controlled modes of ventilatory support. The role of controlling tidal volumes in spontaneously ventilating patients remains controversial.

OBJECTIVES. To establish if the use of pressure-controlled mandatory ventilatory support (Bi-level) and/or the use of pressure support in spontaneously ventilating patients results in the delivery of tidal volumes consistent with LPV for a general intensive care population.

METHODS. A Bi-level/pressure support-based nurse-led ventilation strategy is the default for all patients in our unit, with patients generally switched to pressure support as soon as able. We retrospectively analysed data extracted from electronic patient records in 200 mechanically ventilated patients sequentially admitted to ICU for mechanical ventilation during a six month period (November 2013 to April 2014) The tidal ventilation administered was determined by averaging the hourly tidal volume recorded over the first 24 h of admission. The "ideal" tidal ventilation (6 ml/kg) was based on ideal body weight.

RESULTS. The average age of the study population was 58, with an average duration of mechanical ventilation of 4.1 days and an ICU length of stay of 6.1 days. 20 % of patients had ALI/ARDS on admission. 5 % had community acquired pneumonia. 43 % were admitted post-operatively. 29 % of patients were ventilated for neurological reasons. The

mean tidal volume recorded in the first 24 h of admission was 536 ± 40, which represents an excess of 88.2 ± 30 ml over the ideal lung protective volume. In patients with ALI/ARDS, the tidal volume delivered was 544 ml ± 30, which represents an excess of 95 ± 25 ml. The ARDS subpopulation had an average admission Pa/FiO₂ of 156, with an observed ICU mortality of 64 %.

CONCLUSIONS. These data demonstrate that, in our institution, a pressure control-based ventilatory strategy resulted in tidal volumes significantly greater than the recommended 6 ml/Kg. This effect was observed in both mandatory (Bi-level) and spontaneous (pressure support) modes of ventilation. While the effect of restricting tidal volumes to 6 ml/Kg in spontaneously ventilating patients remains controversial, the high mortality observed in the subgroup of patients with ARDS in this study may suggest an effect of ongoing volutrauma and the perpetuation of lung injury in self-ventilating patients receiving > 6 ml/Kg.

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0431

MANUAL ASV VS. INTELLIVENT-ASV FOR PATIENTS AFTER CARDIAC SURGERY

T. Watanabe¹, Y. Onodera¹, N. Nakamura¹, R. Akimoto¹, H. Suzuki¹, M. Nakane¹, K. Kawamae¹

¹Department of Anesthesiology and Intensive Care Medicine, Yamagata University Faculty of Medicine, Yamagata, Japan

INTRODUCTION. Automated ventilators like INTELLiVENT-ASV, with which physicians only need set target P_{ET}CO₂ and SpO₂ levels, were developed to provide more appropriate ventilation to patients and reduce medical staff workloads. Ventilator settings are critical for patients after cardiac surgery. However, INTELLiVENT-ASV use for these patients has not been thoroughly investigated. Thus, we compared ventilator setting adjustments made by INTELLiVENT-ASV and those made by manual ASV after cardiac surgery.

OBJECTIVE. To assess the feasibility of using INTELLiVENT-ASV for patients after cardiac surgery.

METHODS. We enrolled patients who underwent elective cardiac valve surgery from July 2013 to April 2014. After ICU admission, patients were randomized into two groups (10 patients per group): INTELLiVENT-ASV and ASV. With INTELLiVENT-ASV, SpO₂ target shift was fixed to +3 and P_{ET}CO₂ target shift was adjusted for PaCO₂ of 35-45 mmHg. Ventilator settings were automatically adjusted until a spontaneous breathing test was given. With ASV, PEEP, F_iO₂ and %minute volume were initially decided by ICU physicians. PEEP and %minute volume were physician adjusted and F_iO₂ was adjusted by ICU nursing staff based on an arterial blood gas analysis protocol (Fig. 1). Ventilator settings (PEEP, F_iO₂, %minute volume), P/F ratio and PaCO₂ were recorded each hour after ICU admission for 24 h. Group comparisons for ventilator settings and P/F ratios were made by Mann-Whitney U tests, and p-values of < 0.05 were considered significant.

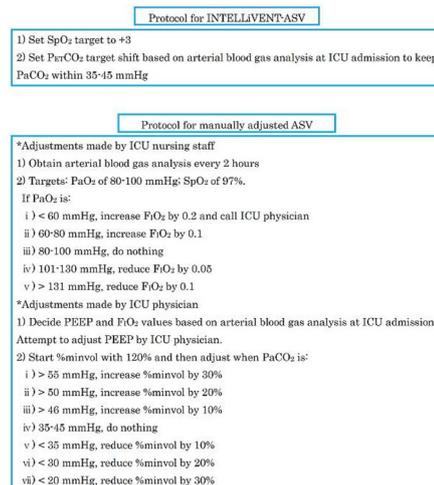


Fig. 1

RESULTS. APACHE II scores (INTELLiVENT-ASV vs. ASV: 11.1 ± 3.1 vs. 11.9 ± 3.8), PEEP values (6.5 ± 1.7 cmH₂O vs. 8.1 ± 2.6 cmH₂O), %minute volumes (115 ± 25 vs. 114 ± 15) and P/F ratios (304 ± 49 vs. 300 ± 88) did not significantly differ between these groups. F_iO₂ levels at 1, 2, 3 and 6 h with INTELLiVENT-ASV were significantly lower than with ASV (Fig. 2).

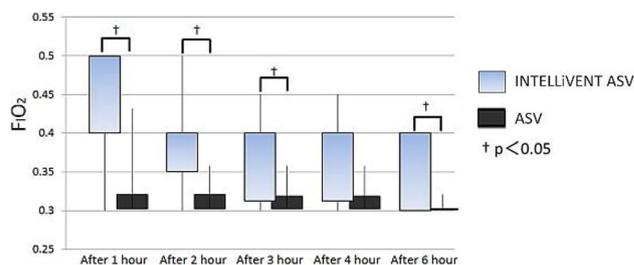


Fig. 2 FIO₂ changes in ASV and INTELLiVENT-ASV

CONCLUSION. Automated INTELLiVENT-ASV ventilator adjustments were not much different compared with manually controlled ASV settings. F_{iO_2} during early ventilation was set lower by INTELLiVENT-ASV, although oxygenation was not different. Thus, INTELLiVENT-ASV use may be feasible for patients after cardiac surgery.

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COMPARISON OF VARIABLE PRESSURE SUPPORT VENTILATION, NEURALLY ADJUSTED VENTILATORY ASSIST, AND PROPORTIONAL ASSIST VENTILATION ON BREATHING PATTERN VARIABILITY AND PATIENT VENTILATOR INTERACTION

E. Morawiec^{1,2}, F. Kindler², M. Schmidt^{1,2}, J. Delemazure², C. Rolland-Debord², T. Similowski^{1,2}, A. Demoule^{1,2,3}

¹Sorbonne Universités, UPMC Univ Paris 06 and INSERM, UMR_S 1158, Neurophysiologie Respiratoire Expérimentale et Clinique, Paris, France, ²Groupe Hospitalier Pitié-Salpêtrière, Pneumologie et Réanimation Médicale, Paris, France, ³Sorbonne Universités, UPMC Univ Paris 06 and INSERM, UMRS 974, Thérapies du Muscle Strié, Paris, France

INTRODUCTION. Breathing in healthy humans is characterized by a cycle to cycle variability that proceeds from the complexity of the breathing command. Reduced variability is often observed in mechanically ventilated patients, and is associated with negative outcomes. Restoring the natural variability of breathing during mechanical ventilation could therefore be an important issue. "Proportional" modes of ventilation restore some of the intrinsic variability of breathing. With proportional assist ventilation (PAV), the level of assistance is proportional to the activity of the respiratory muscles as estimated by a mathematical algorithm. With neurally adjusted ventilatory assist (NAVA), the level of assistance is proportional to the electromyographic activity of the diaphragm (EAdi). Both modes increase breathing pattern variability, prevent overdistension and improve patient-ventilator interaction. Variable PSV (V-PSV) is a mode of ventilation in which the level of assistance varies randomly, on a cycle-by-cycle basis, regardless of the patient's respiratory efforts. Animal studies suggest that V-PSV improves gas exchanges and reduces alveolar damage. The effects of such an extrinsic variability of pressure support on breathing pattern and on the patient-ventilator interaction are not known, and have never been compared to the effects of PAV and NAVA.

OBJECTIVES. To compare the impact of PSV, NAVA, PAV and two levels of V-PSV (NOISY30 % and NOISY 80 %) on:

- 1) breathing pattern,
- 2) breathing pattern variability,
- 3) patient ventilator asynchrony, and
- 4) prevalence of VT > 10 ml/kg

METHODS. Cross-over, prospective, randomized controlled trial conducted in a ten-bed intensive care unit. In 12 intubated patients, PSV, NAVA and PAV were set to obtain a tidal volume (VT) of 6-8 ml/kg. Two conditions of V-PSV were also studied by applying a variability level of 30 and 80 % (V500, Dräger) to the chosen level of PSV. The five modes were randomly applied. Airway flow and pressure, electrical activity of the diaphragm (EAdi) were measured. Were calculated: VT, inspiratory time (Ti), peak EAdi, the coefficient of variation (CV) of VT, Ti and EAdi, and the prevalence of the main patient-ventilator asynchronies.

RESULTS. 1) Breathing pattern was similar in the 5 conditions 2) The variability of the breathing pattern increased in NOISY80 %, NAVA and PAV ($p < 0.05$), in a similar range 3) 3) The overall prevalence of asynchronies was low. The prevalence of double triggering was higher in NAVA and NOISY80, and lower in PAV, compared to PSV ($p < 0.05$), the prevalence of ineffective efforts was unchanged. 4) 4) There was a trend towards a lower prevalence of VT > 10 ml/kg with the three variable modes compared to PSV ($p = 0.061$). **CONCLUSIONS.** NOISY80 % induces the same increase in breathing pattern variability than NAVA and PAV, without inducing more patient -ventilator asynchrony, or the proportion of VT > 10 ml/kg.

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NEURALLY ADJUSTED NON-INVASIVE VENTILATION IMPROVES PATIENT-VENTILATOR INTERACTION IN COPD

J. Doorduyn¹, C. Sinderby^{2,3}, J. Beck^{3,4}, J.G. van der Hoeven¹, L. Heunks¹

¹Radboud University Medical Center, Critical Care, Nijmegen, Netherlands, ²St-Michael's Hospital, Critical Care Medicine, Toronto, Canada, ³St-Michael's Hospital, Keenan Research Centre for Biomedical Science, Toronto, Canada, ⁴University of Toronto, Pediatrics, Toronto, Canada

INTRODUCTION. Delivering synchronous assist during non-invasive ventilation (NIV) is challenging with pneumatically controlled ventilators, especially in patients with chronic obstructive pulmonary disease (COPD). Neurally adjusted ventilatory assist (NAVA) uses the electrical activity of the diaphragm (EAdi) to control the ventilator instead of pressure or flow waveforms.

OBJECTIVES. To evaluate patient-ventilator interaction in patients with COPD during NIV with pressure support ventilation (PSV) and NAVA.

METHODS. Twelve COPD patients underwent three 30-min trials: 1) PSV with a dedicated NIV ventilator (NIV-PSV_{vision}), 2) PSV with an ICU ventilator (NIV-PSV_{Servo-I}), and 3) during NIV-NAVA. EAdi, flow, and airway pressure were recorded. Patient-ventilator interaction was determined with a new automated index (NeuroSync index), that calculates timing errors between airway pressure and EAdi.

RESULTS. The NeuroSync index was higher (larger error) for NIV-PSV_{vision} (24 [15-30] %) and NIV-PSV_{Servo-I} (21 [15-26] %) compared to NIV-NAVA (5 [4-7] %; $p < 0.001$). Wasted efforts, trigger delays and cycling-off errors were less with NAVA ($p < 0.05$ for all). The NeuroSync index and the number of wasted efforts were strongly correlated ($r^2 = 0.84$), with a drastic increase in wasted efforts after timing errors reach 20 %.

CONCLUSIONS. In COPD patients, NIV-NAVA improves patient-ventilator interaction compared to PSV, delivered either by a dedicated or ICU ventilator. In addition, increasing mismatch between neural effort and pneumatic timing is associated with wasted efforts.

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AUTOMATIC TUBE COMPENSATION (ATC) VERSUS PRESSURE SUPPORT VENTILATION (PSV) DURING WEANING FROM MECHANICAL VENTILATION

R. El-Sherif¹, M. Abdulfatah¹, M. Hamdy¹, N. Ismail¹

¹Cairo University, Cairo, Egypt

INTRODUCTION. Tolerance of a spontaneous breathing trial is an evidence-based strategy to predict successful weaning from mechanical ventilation (MV). We hypothesized that providing dynamic ventilatory support (ATC) may be superior to constant inspiratory support (PSV) in predicting extubation outcome.

OBJECTIVES. To compare the effect of spontaneous breathing trial with ATC or PSV on mechanical ventilation extubation outcome in patients with acute respiratory failure (ARF). **METHODS.** 60 patients with ARF fulfilling the criteria for weaning according to the current guidelines were included⁽¹⁾. Each underwent a 1-hour spontaneous breathing trial. In the ATC group, patients breathed through the ventilator circuit with flow triggering (1 L/min), and PEEP of 5 cmH₂O with ATC set at 100 %. ATC was provided by commercially available ventilator (Puritan-Bennett 840). In the PSV group, patients breathed through the ventilator circuit with flow triggering (1 L/min) and PEEP of 5 cmH₂O with the addition of 7 cmH₂O of pressure support. In both modes, the FIO₂ was initially set with the same level required before the breathing trial. Successful extubation was defined as the ability to maintain spontaneous breathing for 48 h after discontinuation of MV and extubation.

RESULTS. The ATC group included 35 patients (mean age 57.7 ± 12.7 years, 51.4 % males), and PSV group, included 25 patients (mean age 57.5 ± 14.1 years, 64 % males). No significant difference between both groups in any of the baseline characteristics. There was a higher incidence of bronchopneumonia in ATC group versus PSV group (31.4 % versus 16 %, respectively), and a higher incidence of acute exacerbation of COPD in PSV versus ATC (44 % versus 22.9 %, respectively) with non significant p-value. Successful weaning occurred in 58.3 %. In the ATC group; 57.1 % were able to tolerate the SBT trial and were successfully extubated versus 60 % in the PSV group, ($p = 0.7$). For prediction of successful weaning, ATC showed a sensitivity of 80.4 % with a positive predictive value (PPV) of 90.1 % and a specificity of 79.7 % with a negative predictive value (NPV) of 81.3 %, while PSV showed a sensitivity of 76.4 % with a PPV of 88.7 % and a specificity of 80.4 % with a NPV of 71.4 %. Significant improvement in SPO₂, PaO₂, PaO₂/FIO₂ ratio, dynamic compliance, airway resistance and auto PEEP was observed in ATC group compared to PSV group at the end of the trial. Predictors of successful weaning were higher baseline values of PaO₂, PaO₂/FIO₂, and dynamic compliance with p 0.02, 0.02 and 0.04 respectively.

CONCLUSIONS.

- Automatic tube compensation is almost as effective as PSV in predicting successful extubation.

- Higher baseline values of PaO₂, PaO₂/FIO₂, and dynamic compliance were predictors of successful weaning.

REFERENCE(S). 1- MacIntyre NR, Cook DJ, and Ely EW, et al. Evidence-based guidelines for weaning and discontinuing ventilatory support. Chest 2001;120 (6 Suppl): 375S-395S.

0437

REDUCTION OF THE TIME SPENT ON WEANING OF TRACHEOSTOMIZED PATIENTS USING BILEVEL THROUGH A SPECIFIC PROTOCOL

F. Domingues¹, A.C. Barroco¹, R.L.R. Bocchile¹, J.A.D.S. Junior¹, K.T. Timenetsky¹, R.A. Caserta¹

¹Hospital Israelita Albert Einstein, Critically Ill, Sao Paulo, Brazil

INTRODUCTION. Patients that need prolonged mechanical ventilatory support are becoming more and more frequent due to the advances in support for the critical patient and the seriousness of their diseases. Many of them need to get tracheostomy in up to 15 days. Today it is known that protocol guided weaning achieves a reduction on the time spent to interrupt mechanical ventilation (MV). Anyway, these protocols have not been applied to tracheostomized (TQT) patients.

OBJECTIVE. To evaluate if a standard protocol can reduce the time spent on weaning in TQT patients under Bilevel MV.

METHODS. This study has been conducted in a prospective way in the semi-intensive care unit of Hospital Albert Einstein involving TQT patients classified as difficult and prolonged weaning under Bilevel MV. Patients that use MV as support for life and in terminality have been excluded. In order to evaluate the effectiveness of the implementation of a protocol in the weaning process, we have initially performed a follow-up process to measure the time spent on weaning with no interference in the regular proceedings from the respiratory therapists team. This follow-up process, named control sample, was performed for 7 months (January to July 2012). After this, a weaning protocol was created and the team was trained on it for a correct proceeding. This protocol consists of a daily evaluation form in order to identify the possibility of weaning based on clinical condition and exams related to infectious causes, cardiovascular function, gas exchange and respiratory mechanics. If the patient does not present any impeditive factor, we initiate the weaning through the T tube. The patient progressively remains with no ventilator support for 1, 3 and 6 h in the morning and afternoon periods in consecutive days. The final step is the complete removal of MV. If, in any moment, the patient presents any change on clinical and gasometrical conditions, MV is retaken and the cause of the failure is investigated. We have followed the weaning processes for 8 months (August 2012 to April 2013) and named this group the post-intervention sample. In both samples, we analyzed age, sex, main diagnostic, seriousness level (SOFA), and weaning period.

RESULTS. In the control sample, 15 cases were followed and, in the post-intervention sample, 18 cases. No relevant age difference was observed (75 x 82, $p = 0.947$, respectively). No differences related to sex were also observed, nor SOFA (3 x 2, $p = 0.391$, respectively). We have observed relevant time reduction on weaning after intervention compared to the control sample (4 days, range from 2 to 14 x 11 days, range from 3 to 33, $p = 0.003$, respectively).

CONCLUSION. Weaning guided by protocol lowers the time spent on it in difficult and prolonged TQT patients under Bilevel MV.

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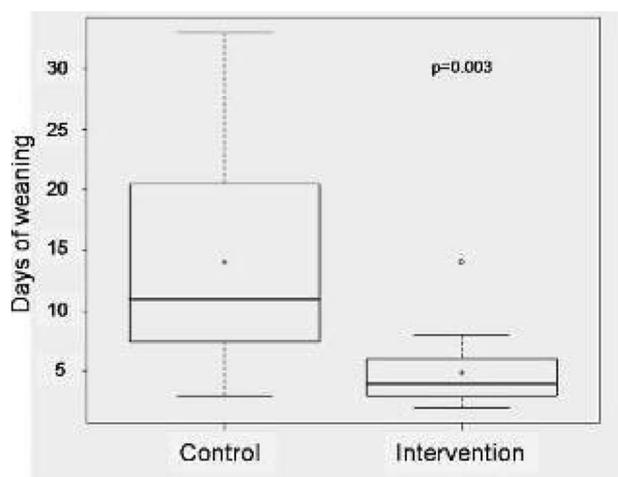


Figure 1 – Difference in weaning days, of tracheostomized patients under Bilevel positive airway pressure, between the control (n=15) and intervention (n=18) group.

0439 AUTOMATIC WEANING AND ASSESSMENT FUNCTION OF SBT WITH INTELLIVENT-ASV MODE IN POST-OPERATIVE PATIENTS OF ESOPHAGEAL CANCER

Y. Kashiwa¹, Y. Koyama¹, M. Uji¹, T. Yoshida¹, A. Uchiyama¹, Y. Fujino¹

¹Osaka University Hospital, Intensive Care Unit, Suita-shi, Japan

BACKGROUND. Intellivent-ASV mode is a closed-loop ventilation mode that automatically adjusts ventilatory settings by monitoring of patient's breathing status, lung mechanics, $E_T\text{-CO}_2$ and SpO_2 . It is also available for automatic weaning and programmed assessment of spontaneous breathing trial (SBT).

PURPOSE. The safety and feasibility of Intellivent-ASV mode were retrospectively examined in post-operative patients of esophageal cancer.

METHODS. After December 2013, we applied Intellivent-ASV mode with Quick Wean function to patients who were admitted to a 14-bed medical and surgical ICU of Osaka University Hospital after the operation. Intellivent-ASV mode was started just after the admission. The automatic SBT assessment function was planned to start at 6:00 a.m. in the next morning. When SBT was successfully completed, the ventilator was changed to CPAP mode. The extubation was finally decided by ICU physicians according to the SBT results and other patients' status. We collected data of the ventilatory and circulatory status from the patients' clinical records in thirteen consecutive patients.

RESULTS. All the patients could be ventilated under Intellivent-ASV mode without serious problems. In 8 patients, SBT started automatically and successfully completed. All of these patients were extubated, and 1 was re-intubated 12 h after because of hypoxia. In 5 patients, SBT didn't start automatically due to instability of spontaneous breathing. In 3 of these patients, SBT could be started manually and successfully completed in 2, but failed due to hypercapnia in 1. In this patient, CPAP + PSV mode didn't work and the mode of ventilator was changed to SIMV, and the patient was subsequently extubated. In 2 patients, SBT could not be started manually due to apnea, the mode of ventilator were changed to SIMV, and then changed to CPAP + PSV after spontaneous breathing appeared, and the patients were extubated afterward.

CONCLUSION. In post-operative patients of esophageal cancer, weaning with Intellivent-ASV is safe and feasible, without frequent handling of the ventilator settings.

REFERENCE. Areal JM et al. Safety and efficacy of a fully closed-loop control ventilation (Intellivent-ASV[®]) in sedated ICU patients with acute respiratory failure: a prospective randomized crossover study. *Intensive Care Med* 2012; 38: 781-787

0440 PRESSURE CONTROL INVERSE RATIO VENTILATION AS A RESCUE THERAPY FOR SEVERE ACUTE RESPIRATORY DISTRESS SYNDROME

S. Katayama¹, T. Kotani¹, Y. Sato¹, S. Fukuda¹, Y. Miyazaki¹, M. Ozaki¹

¹Tokyo Women's Medical University, Tokyo, Japan

INTRODUCTION. Lower tidal volume ventilation (LTV) is recommended in the management of acute respiratory distress syndrome (ARDS) to minimize the adverse effects of mechanical ventilation; however, in some cases LTV cannot maintain adequate oxygenation. Although inverse ratio ventilation (IRV) increases mean airway pressure without increasing peak airway pressure above that of a conventional ventilation mode, the therapeutic benefits and safety of IRV have not been fully investigated.

OBJECTIVES. To assess the efficacy and safety of pressure controlled (PC)-IRV and to evaluate it could be a rescue therapy for ARDS patients.

METHODS. We undertook a retrospective review of the medical records of patients who received PC-IRV in our institution between January 2007 and August 2013. Oxygenation and outcome data were collected.

RESULTS. Ten patients diagnosed with ARDS underwent PC-IRV. Ventilation modes prior to PC-IRV were A/C (n = 7) and APRV (n = 3). The mean Murray score of seven of the patients who had received A/C mode was 3.3. After PC-IRV was initiated, peak inspiratory pressure, positive end expiratory pressure, and arterial partial pressure of oxygen to fraction of inspired oxygen ratio ($\text{PaO}_2/\text{F}_i\text{O}_2$) significantly improved from 28.0 cmH_2O to 35.5 cmH_2O , 13.5 cmH_2O to 18.0 cmH_2O , and 66.7 mmHg to 203.7 mmHg, respectively. The mean duration of PC-IRV was 7.9 days and the 90-day mortality was 30%. Hemodynamic instability was observed in one case. None of the patients was diagnosed with pneumothorax. All patients were sedated with a combination of fentanyl, dexmedetomidine and propofol, but no neuromuscular blocking agents were administered to facilitate mechanical ventilation.

CONCLUSIONS. PC-IRV provided better oxygenation without apparent complications, suggesting that it can be used as a rescue therapy when severe ARDS does not respond to conventional treatments.

	Before PC-IRV	During PC-IRV	P-value
pH	7.307 ± 0.104	7.346 ± 0.111	0.423
P/F ratio (mmHg)	78.7 ± 31.8	203.0 ± 77.5	0.0002
PaCO ₂ (mmHg)	42.7 ± 12.7	38.8 ± 4.1	0.523
HCO ₃ ⁻ (mmol/L)	21.3 ± 4.6	21.5 ± 3.5	0.914
Lactate (mmol/L)	4.3 ± 3.9	4.6 ± 4.6	0.883

[Outcomes of blood gas analyses]

Oral Sessions Abstract award winning session: 0441-0444

0441 VASOPRESSIN OR NOREPINEPHRINE IN VASOPLEGIC AFTER CARDIAC SURGERY (VANCS STUDY): A RANDOMIZED, DOUBLE-BLIND AND CONTROLLED STUDY

L.A. Hajjar¹, J.L. Vincent², A. Rhodes³, F. Galas⁴, J.T. Fukushima⁴, E.A. Osawa⁴, S.M. Grande⁴, J.P. Almeida⁴, S. Zefferino⁴, L. Camara⁴, F.B. Jatene⁴, R.K. Filho⁴

¹University of Sao Paulo, Heart Institute, Intensive Care, Sao Paulo, Brazil, ²Universite Libre de Bruxelles, Hospital Erasmus, Intensive Care, Brussels, Belgium, ³St George's Hospital, Intensive Care, London, United Kingdom, ⁴University of Sao Paulo, Heart Institute, Sao Paulo, Brazil

INTRODUCTION. Vasoplegic syndrome is a common complication after cardiac surgery, with negative impact on patient outcomes and hospital costs. Pathogenesis of vasodilatory phenomenon after cardiac surgery remains a matter of controversy. Loss of vascular tone can be partly explained by the depletion of neurohypophyseal arginine vasopressin stores. Vasopressin is commonly used as an adjunct to catecholamines to support blood pressure in refractory septic shock, but its effect on vasoplegic shock is unknown.

OBJECTIVES. We hypothesized that the use of vasopressin would be more effective on treatment of shock after cardiac surgery than norepinephrine, decreasing the composite endpoint of mortality and severe morbidity.

METHODS. In this prospective and randomized, double-blind trial, we assigned patients who had vasoplegic shock to receive either vasopressin (0.01 to 0.06 U/minute) or norepinephrine (10 to 60 µg/minute) in addition to open-label vasopressors. All vasopressor infusions were titrated and tapered according to protocols to maintain a target blood pressure. The primary endpoint was major morbidity according to STS (30-day mortality, mechanical ventilation > 48 h, mediastinitis, surgical re-exploration, stroke, acute renal failure). Secondary outcomes respiratory, cardiovascular, neurological, renal and infectious complications, intensive care unit and hospital stay, plasma vasopressin levels, occurrence of adverse events and 90-day mortality.

RESULTS. A total of 330 patients underwent randomization, and 300 patients were infused with the study drug (149 patients received vasopressin, and 151 norepinephrine), and were included in the analysis. Patients who received vasopressin had a lower rate of 30-day mortality and severe complications (55% vs. 75.5%, $P < .001$) as compared with the norepinephrine group. Vasopressin group as compared to norepinephrine had a lower incidence acute kidney injury (34.5% vs. 62.9%, $P < .001$), dialysis needing (2.7% vs. 13.9%, $P < .001$), and atrial fibrillation (63.8% vs. 82.1%, $P < .001$) in 30 days. Also, vasopressin group reduced length of intensive care unit and hospital stay, without increasing adverse effects.

CONCLUSIONS. Vasopressin reduces major morbidity after cardiac surgery as compared with norepinephrine among patients with cardiac surgery with vasoplegic shock.

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0442 VITD@ICU: CORRECTION OF VITAMIN D DEFICIENCY IN CRITICALLY ILL PATIENTS - A RANDOMIZED PLACEBO-CONTROLLED TRIAL

K. Amrein¹, C. Schnedl¹, K.B. Christopher², T.R. Pieber¹, H. Dobnig¹, VITD@ICU Study Group

¹Medical University of Graz, Division of Endocrinology and Metabolism, Graz, Austria, ²Harvard Medical School, Renal Division, Brigham and Women's Hospital, Boston, United States

INTRODUCTION. There is a strong association between low vitamin D levels and adverse outcomes in the general population and in critically ill patients [1-3]. We previously showed that a large vitamin D3 loading dose may rapidly correct vitamin D deficiency in an intensive care setting [4].

OBJECTIVES. It currently remains unclear if this relationship is causal. We therefore aimed to test the hypothesis that cholecalciferol (vitamin D3) treatment leads to clinical benefits.

METHODS. This was a randomized, double-blind, placebo-controlled trial in 5 mixed intensive care units. 480 adult patients with vitamin D deficiency (≤ 20 ng/ml) received either oral high-dose vitamin D or placebo. Vitamin D3 was given at an oral loading dose of 540,000 IU followed by 5 monthly maintenance doses of 90,000 IU [5].

RESULTS. The primary endpoint, length of hospital stay, was comparable between groups (median 20.1 vs. 19.3 days, $P = 0.98$). Hospital- and 6-month mortality rates were not significantly different between the two groups [HR 0.81 (95%CI 0.58-1.11), $P = 0.18$ and HR 0.78 (0.58-1.04), $P = 0.09$, respectively].

In the predefined subgroup analysis of patients with severe vitamin D deficiency at baseline [≤ 12 ng/ml or 30 nmol/l, $n = 200$], hospital- and 6-month mortality rates were significantly lower in the vitamin D group [HR 0.56 (95 % CI 0.35-0.90), $P = 0.01$ and HR 0.60 (0.39-0.93), $P = 0.02$, respectively]. Adverse events were similar in both groups.

CONCLUSIONS. This is the first large randomized controlled vitamin D trial in critical care. Although the primary endpoint, length of hospital stay, was comparable between both groups, vitamin D3 led to a significant reduction in 6-month mortality (relative -40 %/ absolute -15 %) in patients with severe vitamin D deficiency at baseline (≤ 12 ng/ml or 30 nmol/l). In patients with less severe vitamin D deficiency (> 12 to 20 ng/ml), there was no survival benefit, but some morbidity parameters were improved at 6 months. Our study suggests a relevant treatment benefit in acute illness by using high-dose vitamin D in a truly deficient population that typically comprises ~1 % of hospitalized patients but causes > 10 % of hospital costs and is at high risk of death. (ClinicalTrials.gov number: NCT01130181).

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0443

DELAY TO ADMISSION TO CRITICAL CARE AND MORTALITY AMONG DETERIORATING WARD PATIENTS IN 49 UK HOSPITALS - RESULTS FROM (SPOT)LIGHT: A MULTI-SITE, PROSPECTIVE, OBSERVATIONAL COHORT STUDY

S.K. Harris¹, K. Rowan², M. Singer³, C. Sanderson¹

¹London School of Hygiene and Tropical Medicine, Health Services Research and Policy, London, United Kingdom, ²Intensive Care National Audit & Research Centre, London, United Kingdom, ³University College London, Bloomsbury Institute of Intensive Care Medicine, London, United Kingdom

INTRODUCTION. The UK is ranked 24 of 28 European countries with respect to per capita provision of Intensive Care Unit (ICU) beds.[1] This places strain on the capacity to admit from the ward because of high ICU occupancy. Such delay may cause harm.

OBJECTIVES. To quantify delays to admission to ICU for deteriorating ward patients, and via ICU occupancy, to investigate its effect on mortality.

METHODS. Data were collected prospectively on consecutive, adult, ward referrals to ICU (excluding repeat visits, cardiac arrests and planned admissions). Physiology, organ support, and decision making at the first bedside assessment by ICU or Outreach were recorded. Each report was linked to the Intensive Care National Audit & Research Centre Case Mix Programme Database (ICNARC CMPD) to define fact and timing of ICU admission, and ICU bed occupancy at referral. Early ICU admission was defined as being within 4 h of referral. We used the proportion of eligible CMP records linked to reported referrals to quality control the study, and excluded study-months with < 80 % linkage. Patients with good reason for delay (urgent surgery), or unlikely ever to be admitted (treatment limitation orders) were excluded.

Selection bias complicates studies of ICU admission timing - sicker patients are admitted earlier. To avoid this, we used ICU occupancy as a natural experiment assuming that ICU occupancy should only affect mortality of (non-ICU) ward patients by preventing or delaying admission. This Instrumental Variable (IV) model (specified as bivariate probit) estimates, causally, the population effect of delay on 28-day mortality.[2].

RESULTS. Forty-nine hospitals reported 21,137 visits over 446 study-months. 6,038 visits (28.7 %) were excluded: 2,447 repeat visits; 2,933 with treatment limits; and 953 admitted via theatre. 67 study-months did not pass quality control excluding another 2,013 (9.5 %) visits. 13,086 patients were recruited to the study, and 12,678 (96.9 %) had complete follow-up. For 3,061 (24 %) patients accepted to ICU at first assessment, the median delay was 2 h (IQR 1-4), rising to 13 h (IQR 5-32) for the 1,567 (12 %) patients initially refused admission. The ICU was fully occupied with no discharges pending for 6.1 % of the time. Early admission (< 4 h) occurred for 9 % (69 patients) of referrals when the ICU was full compared to 21.1 % (2,402 patients) when beds were available, and median delay to admission increased from 3 (IQR 1-9) to 6 (IQR 3-22) hours. 28-day mortality was significantly reduced by early admission (probit coefficient -0.6, 95 % CI -1.0 to -0.2); this is equivalent to a population-averaged reduction in 28-day mortality of 4.5 % (95 % CI 1.1-7.8 %).

CONCLUSIONS. Early admission to ICU reduces mortality for deteriorating ward patients, but depends on accurate triage and bed availability.

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0444

CYTOMEGALOVIRUS REACTIVATION IN CRITICALLY ILL PATIENTS WITH ACUTE RESPIRATORY DISTRESS SYNDROME

D. Ong¹, C. Spiton¹, P. Klein Klouwenberg¹, F. Verduyn Lunel¹, M. Schultz², M. Bonten¹, O. Cremer¹

¹University Medical Centre Utrecht, Utrecht, Netherlands, ²Academic Medical Center, Amsterdam, Netherlands

INTRODUCTION. Cytomegalovirus (CMV) reactivation frequently occurs in intensive care unit (ICU) patients, even in those without known prior immune deficiency. Patients with acute respiratory distress syndrome (ARDS) are thought to be at particular risk. CMV reactivation is associated with a prolonged stay in the ICU and an increased mortality. However, it remains uncertain whether these associations are causal, because previous studies have not adequately adjusted for all possible sources of bias.

OBJECTIVES. To estimate the attributable risk of CMV reactivation on the duration of mechanical ventilation and mortality in immune competent critically ill patients with ARDS

who were latent carriers of the virus and remained mechanically ventilated beyond day four of ICU admission.

METHODS. We prospectively included consecutive patients with ARDS who were admitted to the ICUs of two tertiary care hospitals in the Netherlands and who were mechanically ventilated for at least 4 days. Immunocompromised Patients with known immunocompromise and those receiving antiviral treatment prior to ICU admission were excluded. CMV serostatus was determined by an enzyme immuno assay. Subsequently, in seropositive patients only, a real-time Taqman CMV-DNA polymerase chain reaction was used to determine the viral load in plasma on a weekly basis. CMV reactivation was defined as a load > 100 IU/mL. We used competing risk and time-varying survival analyses, fitting CMV reactivation status as a time-dependent variable, while adjusting for baseline markers of disease severity.

RESULTS. Between January 2011 and March 2013, 306 ARDS patients were included, of whom 209 were CMV seropositive. CMV reactivation occurred in 53 (26 %) of these cases. Patients in whom reactivation occurred, had a longer duration of mechanical ventilation and higher mortality than non-reactivated patients: 15 (IQR 10-27) versus 8 (IQR 6-11) ($p < 0.001$) and 30 % versus 17 % ($p = 0.03$), respectively. After adjustment for APACHE IV score, presence of sepsis, use of high dose corticosteroid therapy, and blood products transfusion, patients with CMV reactivation had lower successful weaning rates (adjusted cause-specific hazard ratio (CSHR) 0.48 95 % C.I. 0.32-0.73) but not increased fatality rates (adjusted CSHR 0.74 95 % C.I. 0.38-1.45). However, when taking competing risks into account, CMV reactivation was associated with increased mortality (subdistribution hazard ratio 2.2 95 % C.I. 1.0-4.8). The increased length of mechanical ventilation caused by CMV reactivation was 4 (IQR 1-6) days.

CONCLUSIONS. CMV reactivation increases the risk of dying in the ICU by prolonging the need for mechanical ventilation rather than by a direct effect on the daily risk of death.

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Respiratory assessment & monitoring: 0445-0448

0445

CT-SCAN AND ULTRASOUND COMPARATIVE ASSESSMENT OF LUNG AERATION IN ARDS

S. Mongodi^{1,2}, I. Algieri³, F. Mojoli^{1,4}, D. Chiumello⁵, M. Cressoni³, G. Via⁴, A. Braschi^{1,4}

¹University of Pavia, Foundation Policlinico San Matteo IRCCS, Dpt of Clinical, Surgical, Diagnostic and Pediatric Sciences Section of Anesthesia, Intensive Care and PainTherapy, Pavia, Italy, ²University of Pavia, Foundation Policlinico San Matteo IRCCS, PhD Program in Experimental Surgery and Microsurgery, Pavia, Italy, ³Università degli Studi di Milano, Dipartimento di Fisiopatologia Medico-Chirurgica e dei Trapianti, Milano, Italy,

⁴Fondazione IRCCS Policlinico San Matteo, Anesthesia and Intensive Care Division I, Emergency Dpt, Pavia, Italy, ⁵Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Dpt of Anesthesia, Rianimazione e Emergenza Urgenza, Milano, Italy

INTRODUCTION. CT-scan quantitative analysis (qCT) represents the gold standard to assess lung aeration in ARDS patients; Lung Ultrasound (LUS) has been proposed as bedside non-irradiating alternative.

OBJECTIVES. To compare two LUS methods (comprehensive scan and single spot) and qCT in the assessment of lung aeration in ARDS patients.

METHODS. LUS and CT-scan were performed on ARDS sedated, paralyzed, mechanically ventilated patients. LUS was performed considering 6 areas for each lung, with a comprehensive scan of the intercostal spaces in each area; the scan obtained in the center of each area was also considered separately as "single spot". We assigned to each area a score of aeration [1]: 0 (normal lung), 1 (≥ 3 non-coalescent B-lines), 2 (≥ 3 coalescent B-lines), 3 (consolidation). Two cumulative LUS scores (LUSS, ranging from 0 to 36 for the two lungs) were obtained as sum of all areas' individual scores, being each area's score the average of all pertaining findings (LUSSav), or the "single spot" one (LUSSs). Time required for LUSSav and LUSSs was also measured.

RESULTS. We studied 2 conditions (PEEP +5 and +15 cmH₂O) in 11 patients (8 males, age 57.3 \pm 19yrs, BMI 23.8 \pm 4.9 kg/m², PaO₂/FiO₂ 172 \pm 73, tidal volume 420 \pm 138 ml, RR 14 \pm 3.7 breaths per minute). In the 22 conditions evaluated, median LUSSav was 22.3 (IQR 16.5-25.2); non-aerated tissue progressively increased and well-aerated tissue progressively decreased with the increase of LUSSav (fig. 1). No significant differences were found between LUSSs and LUSSav; at Bland-Altman analysis bias was 0.5 and precision 3.2 points (Fig. 2). LUSSav and LUSSs non-aerated areas correlated with non-aerated tissue at qCT ($p = 0.0007$ and $p = 0.001$, respectively; Spearman's coefficient of correlation (ρ) = 0.664 [CI 0.337-0.848] and $\rho = 0.645$ [CI 0.308-0.839], respectively). LUSSav and LUSSs well-aerated areas correlated with well-aerated qCT tissue ($p = 0.0006$ and $p = 0.001$, respectively; $\rho = 0.676$, [CI 0.356-0.854] and $\rho = 0.651$ [CI 0.316-0.841], respectively). Time required was 31 \pm 5' for LUSSav and 11 \pm 3' for LUSSs ($p < 0.0001$).

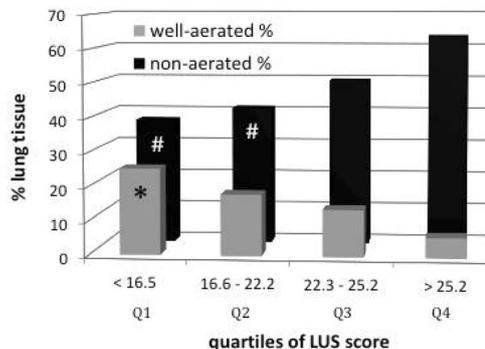


Fig.1 well-aerated and non-aerated lung tissue at qCT vs. LUS score
* $p < 0.05$ vs. Q4; # $p < 0.05$ vs. Q4.

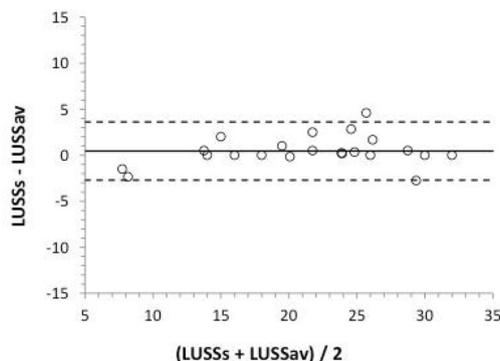


Fig2. LUSS average vs LUSS single spot: Bland-Altman analysis (bias 0.5, precision 3.2)

CONCLUSIONS. Both with single spot and comprehensive technique, LUS could be an accurate tool to assess lung aeration at the bedside, avoiding the risks related to CT-scan.
REFERENCE(S). Bedside Ultrasound Assessment of Positive End-Expiratory Pressure-induced Lung Recruitment. Bouhemad et al. AJRCCM 2011.

0446 HIGH-FLOW NASAL OXYGEN CANNULA VERSUS CONVENTIONAL OXYGEN THERAPY TO PREVENT POSTEXTUBATION LUNG AERATION LOSS: A MULTICENTRIC RANDOMIZED CONTROL LUNG ULTRASOUND STUDY

S. Perbet^{1,2}, A. Gerst¹, R. Chabanne³, A. Soummer⁴, J.-S. Faure⁵, J. Pascal¹, B. Pereira⁶, J.-J. Rouby⁴, J.-M. Constantin^{1,2}

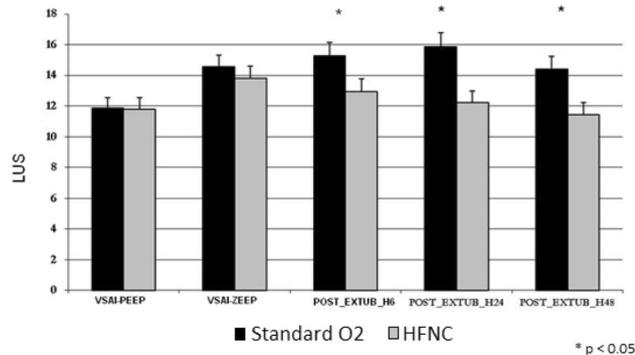
¹University Hospital of Clermont-Ferrand, ICU, Clermont-Ferrand, France, ²Université d'Auvergne, R2 D2, EA 7281, School Medicine, Clermont-Ferrand, France, ³University Hospital of Clermont-Ferrand, NeurolCU, Clermont-Ferrand, France, ⁴Pitié-Salpêtrière Hospital, University Paris 6, Polyvalent ICU, Paris, France, ⁵University Hospital of Clermont-Ferrand, Polyvalent ICU, Clermont-Ferrand, France, ⁶University Hospital of Clermont-Ferrand, Biostatistics, Clermont-Ferrand, France

INTRODUCTION. Bedside lung ultrasound allows to evaluate lung aeration loss and to predict postextubation distress during weaning test (WT). High-flow nasal cannula (HFNC) oxygen therapy generates a low-dependent positive airway pressure and improves oxygenation by increasing end-expiratory lung volume, thus suggesting a possible alveolar recruitment.

OBJECTIVES. To compare the effects of HFNC oxygen therapy with conventional oxygen therapy on lung aeration variation based on the Lung Ultrasound Score (LUS), dyspnea, postextubation distress incidence in subjects in the post-extubation settings.

METHODS. A multicentric randomized controlled study was conducted in 4 intensive care units of 2 university hospitals. Eighty mechanically ventilated subjects were randomized after extubation to either applied for 48 h HFNC (group "H"), or standard oxygenation (group "S"). LUS was analysed at the end of weaning trial, at H6, H24 and H48 in each group.

RESULTS. One hundred and two patients were screened. Among the 80 patients included, intention-to-treat analysis showed that LUS score was significantly different at 6-H, at 24-H and at 48-H (Fig 1).



LUS BEFORE SBT, END OF SBT AND POST EXTUBATION

Fourteen (35 %) patients in the group "S" and 10 (25 %) in the group "H" presented a postextubation respiratory distress ($p = 0.33$). In the group "S", 7 patients required NIV during 8 (2-5) days (median [first-third]). Among them, 3 were finally reintubated before 48 h following their extubation. Seven others patients were straightaway reintubated during this period, thus a total of ten patients were reintubated for 4 (2-5) additional days. In the group "H", one patient required NIV during 5 days without reintubation and 9 were straightaway reintubated for 4 (3-8) additional days. Mean delay of reintubation was 1711 ± 934 min in the group "C" and 994 ± 1191 min in the group "H", without significant difference but with a low statistical power with 19 patients ($p = 0.16$). Finally, no changes in clinical respiratory and cardiovascular variables were detected in different groups. ICU and in hospital mortalities were not significantly different (10 % in the group "C" vs 7.5 % in the group "H", $p = 0.69$; and 10 % vs 7.5 %, $p = 0.69$, respectively).

After extubation, lung derecruitment was significantly lower in the group "H" in lateral regions.

CONCLUSIONS. HFNC applied after a successful weaning trial may prevent lung aeration loss. Postextubation lung derecruitment was significantly lower in the group "H" in lateral regions. HFNC does not significantly reduce the incidence of post extubation distress, but delay of reintubation was lower with HFNC compared with therapeutic NIV.

0447

ULTRASOUND VERSUS ELECTRICAL THORACIC BIOIMPEDANCE TECHNIQUE IN ASSESSMENT OF EXTRAVASCULAR LUNG WATER AND CARDIAC PERFORMANCE DURING WEANING FROM MECHANICAL VENTILATION

D.H. Zidan¹, A.S. Okasha², M.M. Megahed¹, R.M. Ibrahim³, A.A.A. Mahrous¹

¹Alexandria University Main Hospital, Critical Care, Alexandria, Egypt, ²Alexandria University Main Hospital, Anaesthesia and Surgical Intensive Care, Alexandria, Egypt, ³Alexandria University Main Hospital, Radiodiagnosis, Alexandria, Egypt

INTRODUCTION. Bioimpedance is a measure to quantify lung water. As intrathoracic water increases, electrical conductance across the lung improves and impedance decreases. Chest ultrasonography is a possible tool to quantify extravascular lung water (EVLW) at bedside.

OBJECTIVES. To compare between ultrasound techniques (lung ultrasound, echocardiography) and thoracic electrical bioimpedance in evaluation of EVLW and cardiac performance (stroke volume, cardiac output, cardiac index) during weaning from mechanical ventilation.

METHODS. 45 mechanically ventilated patients were enrolled after being eligible for weaning. Patients examined for 5 successive days for the following measurements: Counting B-lines in both lung fields by lung ultrasound, thoracic fluid volume index (TFVI) by electrical thoracic bioimpedance, Stroke Volume (SV), Cardiac Output (CO) and Cardiac index (CI) measured by thoracic bioimpedance and echocardiography.

RESULTS. There was a significant positive correlation between ultrasound lung comets and TFVI during the 5 days of the study (correlation coefficient(r) = 0.868, $p < 0.001$). There was a significant correlation between SV measured by echocardiography and bioimpedance during the 5 days of the study ($r = 0.967$, $p < 0.001$). Bland-Altman plot showed an excellent degree of agreement between the two methods (Mean of the differences = 1.5 ml, Standard deviation = ± 8.3 ml). There was significant correlation between ultrasound and bioimpedance in measuring CO ($r = 0.738$, $p < 0.001$). Bland-Altman plot showed an excellent degree of agreement between the two methods (Mean of the differences = 0.14 L/min, Standard deviation = ± 0.71 L/min). There was a significant correlation between ultrasound and bioimpedance measuring the cardiac index ($r = 0.903$, $p < 0.001$). Bland-Altman plot showed an excellent degree of agreement between the two methods (Mean of the differences = 0.07 L/min/m², Standard deviation = ± 0.37 L/min/m²). Receiver Operating Characteristic (ROC) curves were depicted to compare prediction of successful weaning by the two methods. The ultrasound lung comets showed significantly larger area under ROC curve (AUC) than the TFVI (AUC: 0.954 versus 0.877, $p = 0.044$).

CONCLUSIONS. Among mechanically ventilated Patients Lung Ultrasound is a useful tool to quantify EVLW, and it is a good predictor of weaning.

0448

AGE AND LIMB WEAKNESS ARE ASSOCIATED WITH WEAK COUGH AT EXTUBATION

P. Beuret¹, C. Roux¹, N. Pelletier¹, J.-C. Chakarian¹, B. Philippon-Jouve¹, X. Fabre¹, M. Kaaki¹

¹Centre Hospitalier, Intensive Care Unit, Roanne, France

INTRODUCTION : Numerous studies have shown that a weak cough strength is a strong predictor of extubation failure. However, the methods used to measure cough strength and cut-off values vary among the different studies.

OBJECTIVES. This prospective study aimed to identify clinical factors associated with a weak cough strength at extubation, here evaluated by the measure of peak cough expiratory flow (PCEF).

METHODS. The PCEF was measured with an electronic flowmeter, the Piko-1 (Ferraris Respiratory, Hertford, UK) by the respiratory therapist at extubation for the patients mechanically ventilated for more than 24 h and who passed successfully a spontaneous breathing trial of 30 min of pressure support at 8 cm H₂O. The limb muscle strength was measured using the Medical Research Council (MRC) score at awakening as soon as the patient could cooperate and at extubation. The factors associated with cough strength were compared between the group of patients with a weak cough strength defined by a PCEF ≤ 35 l/min (cut-off value identified by a previous study [1]) and the group of patients with a PCEF > 35 l/min.

RESULTS. 151 patients were studied. The measure of PCEF was impossible to achieve because of lack of understanding in 9 patients (5.9 %). 42 patients (27.8 %) exhibited a low PCEF. There was no significant difference between the two groups regarding anthropometric data like sex, size and body mass index, medical or surgical admission, the presence of an underlying COPD, the severity of the patients evaluated by the SPAS II at admission and the number of organ failures developed during the ICU stay, the duration of sedation or mechanical ventilation before extubation and the size of endotracheal tube. Conversely, two factors were significantly associated with a low PCEF before extubation: age (67.8 ± 13.4 in patients with a low PCEF vs 61.2 ± 16.3 in the group with PCEF > 35 l/min; $p = 0.013$), and MRC score at extubation (42.5 ± 9.5 vs 48.2 ± 9.2 ; $p = 0.002$). When analysing specifically the patients ventilated 7 days or more, weak cough strength was also associated with limb weakness (MRC score 41 ± 8.7 for patients with PCEF ≤ 35 l/min vs 45.9 ± 9.2 in the group with PCEF > 35 ; $p = 0.02$). For the 50 patients where MRC was available at awakening and at extubation, MRC score increased from awakening until extubation in a similar proportion in the two groups (Delta MRC = 14.9 ± 13.6 in the low PCEF group vs 12.3 ± 9.7 in the group with PCEF > 35 ; NS).

CONCLUSIONS. In patients mechanically ventilated for more than 24 h and ready for extubation, age and limb muscle weakness are associated with a weak cough strength. Moreover, this study shows that persistent ICU-acquired weakness doesn't preclude the ability to breathe spontaneously but may alter severely the cough strength.

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New findings in cardiovascular dynamics: 0451–0454

0451

CORRELATION BETWEEN RENAL DOPPLER RESISTIVE INDEX AND SVO₂ IN EARLY POST-OPERATIVE CARDIAC SURGERY PATIENTS

A. Vezzani¹, T. Manca¹, F. Benassi¹, B. Borrello¹, A. Agostinelli¹, I. Spaggiari¹, C. Brusasco², F. Corradi³

¹Azienda Ospedaliera Universitaria di Parma, Parma, Italy, ²Università degli Studi di Genova, Genova, Italy, ³Ente Ospedaliero Ospedali Galliera, Genova, Italy

INTRODUCTION. Renal Doppler resistive index (RDRI) seems to be a promising tool in critical care, but so far there is limited knowledge on its use in mechanically ventilated patients. RDRI has been shown to be able to detect tissue hypo-perfusion and oxygenation due to occult hemorrhagic shock in hemodynamically stable polytrauma patients and to correlate with levels of arterial standard base excess, expression of tissue hypoxia.¹ Animal studies have shown that renal Doppler resistive index is dependent on perfusion pressure and is increased by hypotension in the presence of hypovolemic or normovolemic anemia.² Mixed-venous oxygen saturation (SvO₂) has been shown to be a warning sign of substantial hemodynamic deterioration, extubation failure during weaning, development of arrhythmias and also a predictor of mortality.³

OBJECTIVE. This study investigated the relationships between RDRI and the main hemodynamic indexes in mechanically-ventilated coronary bypass recipients.

METHODS. The study included 26 consecutive patients admitted to cardiac surgery intensive care unit after coronary artery bypass grafting and having a pulmonary artery catheter in place as per clinical indications. Clinical data, cardiac index (CI), heart rate (HR), pulmonary capillary pressure (PCP), mean arterial pressure (MAP), central venous pressure (CVP), arterial oxygen saturation (SaO₂), mixed-SvO₂ and Doppler ultrasound measurements of the inter-lobar arteries were obtained and collected at ICU admission.

RESULTS. RDRI was significantly correlated with mixed-SvO₂ ($r = -0.66$, $p < 0.001$), CI ($r = -0.51$, $p < 0.001$), CVP ($r = 0.28$, $p = 0.046$), HR ($r = 0.31$, $p = 0.028$), but not MAP ($r = 0.14$, $p = 0.338$) and PCP ($r = 0.18$, $p = 0.216$). RDRI had low sensitivity (63%) but high specificity (100%) in the prediction of mixed-SvO₂ < 60% with a positive predictive value of 100% and a negative predictive value of 85%.

CONCLUSION. RDRI may represent an easy and non-invasive method to obtain clinically relevant information on tissue hypoxia in critically-ill recipients of coronary artery by-pass grafting.

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0452

EARLY PERIPHERAL PERFUSION TARGETED FLUID THERAPY LEADS TO LESS FLUID ADMINISTRATION IN PATIENTS WITH SEPTIC SHOCK: A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL

M.E. van Genderen¹, N. Engels¹, A. Lima¹, E. Klijn¹, J. Bakker¹, J. van Bommel¹

¹Erasmus MC University Medical Center, Department of Intensive Care, Rotterdam, Netherlands

INTRODUCTION. Impaired peripheral perfusion is a better predictor of poor outcome after resuscitation in septic shock patients, compared to systemic hemodynamic variables. However, end points to guide fluid resuscitation are still based on systemic hemodynamic parameters. Little is known about the use of the peripheral tissue perfusion parameters as a direct target for resuscitation. We therefore performed a randomized controlled study comparing early goal directed fluid resuscitation based on clinical assessment of peripheral perfusion with standard therapy in patients with septic shock.

OBJECTIVES. To assess the feasibility of early peripheral perfusion targeted fluid management and to evaluate the effect on fluid balance in patients with septic shock admitted to the intensive care unit.

METHODS. Thirty patients with septic shock randomized to either the control group (control) (n = 15) or the intervention group (Peripheral Perfusion Targeted Fluid Management - PPTFM group) (n = 15). In both groups, fluid resuscitation was performed using fluid challenges. In the PPTFM group, fluid resuscitation was targeted at improvement of the peripheral perfusion for the initial 6 h of resuscitation. In the control group, fluid challenges were administered until the patient was fluid unresponsive (stroke volume increase $\leq 10\%$) during this time period.

All systemic hemodynamic variables and peripheral perfusion parameters were collected for the first 6 h of resuscitation and until 72 h thereafter. Peripheral perfusion was assessed using a combination of capillary refill time (CRT), peripheral perfusion index (PPI), forearm-to-fingertip (Tskin-diff) body temperature gradient, and tissue oxygen saturation (StO₂).

RESULTS. During the first 6 h of resuscitation patients in the control group received 1.8 liters more fluid ($P = 0.39$) than patients in the PPTFM group and in the subsequent observation period (7 to 72 h), patients in the control group received 2.4 liters more fluid than patients in the PPTFM group ($P = .08$). Looking at the magnitude of changes over time of fluids being administered, we observed a trend toward less fluid administration in patients assigned to the PPTFM group, with a significant difference on 48 and 72 h after study inclusion ($P < 0.05$) compared to the control group. Using linear mixed-model analysis we observed no difference in systemic hemodynamic parameters over time between groups. Although there was no difference in outcome, patients in the control group stayed longer in the hospital compared to patients assigned to the PPTFM group ($P = .05$).

CONCLUSIONS. In septic shock patients, early peripheral perfusion targeted fluid management was feasible, safe, and decreased the amount of fluids administered. The findings of this small study need to be regarded with caution. Further investigation of the effect of peripheral perfusion targeted resuscitation on outcome in septic shock patients is warranted.

0453

VA ECMO IN THE MANAGEMENT OF NON-SURGICAL PATIENTS WITH CARDIOGENIC SHOCK AND CARDIAC ARREST

P. Ostadal¹, A. Kruger¹, D. Vondrakova¹, P. Kmonicek¹, M. Mates¹, M. Skabradova¹, S. Horačkova¹, P. Jehlicka¹, D. Doubek¹, K. Kopriva¹, M. Janotka¹, P. Neuzil¹

¹Na Homolce Hospital, Prague, Czech Republic

INTRODUCTION. Veno-arterial extracorporeal membrane oxygenation (VA ECMO) has been introduced in the management of critical conditions caused by severe cardiac failure. However, literary evidence for the use of VA ECMO in non-surgical patients remains insufficient. **OBJECTIVES.** To analyze a group of non-surgical patients with cardiogenic shock and refractory cardiac arrest treated with VA ECMO in cardiovascular center.

METHODS. Between January 2006 and April 2014 one hundred and thirty patients were treated in our institution with mini-invasive active circulatory support or VA ECMO for circulatory failure. We analyzed data from a subgroup of 74 primarily non-surgical patients (mean age 60 (31-84) years, 81% were males), treated by VA ECMO.

RESULTS. The major indication for circulatory support therapy was cardiogenic shock, followed by refractory cardiac arrest, arrhythmic storm, and support of high-risk interventions. Median duration of circulatory support was 3 days, maximum 60 days. The all-cause 30-day mortality in our group was 33.8%; in the subgroup of patients with severe cardiogenic shock the 30-day mortality was 48.6%. In patients with refractory cardiac arrest, where ECMO was introduced during continuous chest compressions, 4 individuals from 16 treated survived with good neurological outcome. We found significant survival differences between subgroup with urgent circulatory support introduction and patients with semi-urgent support (30-day mortality 44.0% vs. 5.3%, $P < 0.001$). We did not find any significant differences between survivors and non survivors in the major characteristics including age or left-ventricle ejection fraction. We evaluated also the role of cerebral/peripheral near-infrared spectroscopy (NIRS) oximetry in the non-invasive monitoring of global circulatory status in patients with mini-invasive circulatory support. Moreover, we focused on the management of limb ischemia, brain hypoxia or left ventricle distension. **CONCLUSIONS.** VA ECMO is a promising tool in the management of severely compromised patients with rapidly progressing cardiogenic shock or refractory cardiac arrest. Frequently the circulatory support therapy in these high-risk patients represents the last chance to survive.

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0454

DISSOCIATION OF SUBLINGUAL AND GUT MICROCIRCULATION IN SEPTIC PATIENTS

V.S. Kanoore Edul¹, C. Ince², N. Navarro³, L. Prevgigliano³, A. Riso Vazquez³, N.P. Rubatto³, A. Dubin^{1,3}

¹Facultad de Ciencias Médicas, Universidad Nacional de La Plata, Cátedra de Farmacología Aplicada, La Plata, Argentina, ²Academic Medical Center, Department of Translational Physiology, Amsterdam, Netherlands, ³Sanatorio Otamendi y Miroli, Servicio de Terapia Intensiva, La Plata, Argentina

INTRODUCTION. Experimentally, the behavior of villi microcirculation in response to fluid expansion might differ from that of sublingual microcirculation¹. Moreover, in patients with abdominal sepsis, there is no correlation between sublingual and intestinal microvascular perfusion².

OBJECTIVES. To describe the response of sublingual and gut microcirculation to a fluid challenge.

METHODS. We studied 22 septic patients in the first postoperative day of an intestinal surgery, in which an ostomy was constructed. Patients were included if they had any evidence of tissue hypoperfusion. Sublingual and gut microvascular beds were evaluated by means of a SDF device, before and 20 min after the administration of 10 mL.kg⁻¹ of 6% HES 130/0.4.

RESULTS. In the whole group, fluid administration increased cardiac index (2.6 ± 0.5 vs. 3.3 ± 1.0 L.min.kg⁻¹, $P < 0.01$) and mean arterial blood pressure (68 ± 11 vs. 82 ± 12 mm Hg, $P < 0.0001$). There were no significant changes in sublingual (15.2 ± 2.9 vs. 16.1 ± 1.2 mm/mm², $P = 0.08$) and gut (12.3 ± 6.7 vs. 13.0 ± 6.7 mm/mm², $P = 0.25$) perfused capillary density (PCD). We found no correlation between basal sublingual and gut PCD, and between their changes in response to volume expansion (Figure 1).

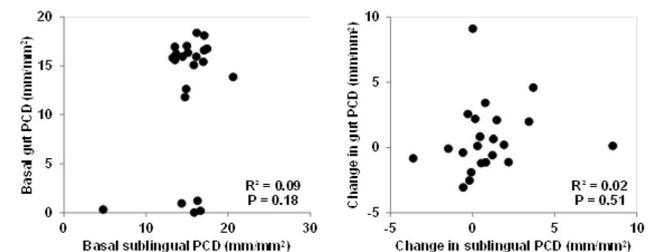


Fig. 1

Individual changes in sublingual PCD correlated with changes in cardiac index ($R^2 = 0.25$, $P = 0.02$) and with basal PCD ($R^2 = 0.82$, $P < 0.0001$). Individual changes in gut PCD did not correlate with changes in cardiac index ($R^2 = 0.08$, $P = 0.23$) or with basal PCD ($R^2 = 0.04$, $P = 0.40$).

CONCLUSIONS. In this series of septic patients, neither the basal state of sublingual and gut microcirculation nor their responses to fluid challenge were correlated. Our findings suggest that the different microcirculatory territories were completely dissociated.

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Fungal infections: 0455–0459

0455

CANDIDA INFECTION IN NON-NEUTROPENIC ICU PATIENTS: VALUE OF (1,3)-B-D-GLUCAN AND CANDIDA ALBICANS GERM TUBE ANTIBODIES

A. Loza¹, C. Castro², I. Zakariya², D. Macias¹, P. Saavedra³, S. Ruiz-Santana⁴, E. Martín-Mazuelos², C. León¹

¹University Hospital of Valme, Intensive Care Unit, Seville, Spain, ²University Hospital of Valme, Microbiology and Infectious Diseases, Seville, Spain, ³University of Las Palmas de Gran Canaria, Department of Mathematics, Las Palmas de Gran Canaria, Spain, ⁴Hospital Dr. Negrin, Intensive Care Unit, Las Palmas de Gran Canaria, Spain

INTRODUCTION. New Candida specific biomarkers are being increasingly used to enable earlier diagnosis of Candida infection.

OBJECTIVE. We assessed the value of (1,3)-B-D-glucan (BG) and Candida albicans Germ Tube Antibodies (CAGTA) in the diagnosis of Candida spp. infection in non-selected, non-neutropenic, adult critically ill patients.

METHODS. Over a 2-year period (2011-2012), a prospective study was conducted in a cohort of patients admitted to ICU for at least 7 days and followed for 4 weeks. Demographics data, type of patients, APACHE II and SOFA at ICU admission, underlying diseases, comorbidities, risk factors, antifungal treatment, and outcomes were collected. Clinical status, APACHE II, SOFA, Candida score, candida colonization cultures (rectal swabs, tracheal, pharyngeal or gastric aspirates, and urine), and serum BG and CAGTA were measured twice a week. Cut-off points for positivity were 80 pg/mL for BG and 1/160 titer for CAGTA. Patients were divided into: a) proven invasive candidiasis (IC) (candidemia and intra-abdominal candidiasis), b) Candida colonization (CC), and c) neither colonized nor infected (NCNI). Maximum values recorded for BG and CAGTA after or before the episode of IC were included in the analysis. When an episode of IC did not develop, the highest value of all observed measurements was used. In each of these groups, categorical variables were summarized as frequencies and percentages and numerical as means and standard deviations (SD) or medians and interquartile ranges (IQR) according the assumptions of normality occurred or not. The percentages were compared using the Chi square test, the means by the F-test and the medians by the Kruskal-Wallis test. Statistical significance was set at $p < .05$. The data analysis was carried out using the R-package.

RESULTS. A total of 109 patients were included and 466 determinations (4.2 per patient) were performed. There were 31 (28.4 %) patients in the NCNI group, 63 (57.7 %) in the CC, and 15 (13.3 %) in the IC (10 candidemias, 5 intra-abdominal candidiasis). (Table 1)

	Neither colonized N = 31	Colonized N = 63	Invasive candidiasis N = 15	P
(1→3) β-D-glucan, pg/mL	85 (31 / 174)	86 (31 / 450)	242 (60 / 525)	.474
CAGTA, n (%)				.219
Negative	25 (80.6)	32 (50.8)	10 (66.7)	
1/160	1 (3.2)	1 (1.6)	0	
1/320	2 (6.5)	7 (11.1)	1 (6.7)	
1/640	2 (6.5)	6 (9.5)	1 (6.7)	
1/1280	1 (3.2)	17 (27.0)	3 (20.0)	

Data are frequencies (%) or means ± SD or medians (IQR)

CONCLUSIONS. BG and CAGTA values did not show significant differences among in the three studied groups. The BG values were higher in IC patients compared to the other two groups, but this still did not show statistical significance.

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0456

CONCENTRATIONS OF MICA FUNGIN 100 MG DAILY IN PLASMA AND BURN ESCHARES IN CRITICALLY ILL PATIENTS WITH SEVERE BURN INJURIES

M.J. Asensio¹, M. Sánchez Sánchez¹, B. Galván Guijo¹, E. Herrero de Lucas¹, L. Cachafeiro Fucinos¹, A. Agriñoglo Rotaache², E. Perales Ferrera¹, S. Luque², A. García de Lorenzo y Mateos¹

¹University Hospital La Paz/IdiPAZ, Burn Unit/Intensive Care Medicine Service, Madrid, Spain, ²Hospital del Mar, Pharmacy Department, Barcelona, Spain

INTRODUCTION. Micafungin (MCF) is an echinocandin agent with broad activity against Candida spp., which are frequently isolated in blood and eschar cultures of burned patients, who present different pharmacokinetic (PK) characteristics.

OBJECTIVES. To investigate the concentrations of micafungin after the first and repeated doses in plasma and burn eschar tissues and to correlate them with patients' characteristics.

METHODS. Pharmacokinetic study of MCF during a 6 months period in ten critically ill burn patients treated with 100 mg/day by 1 h intravenous infusion for at least 5 days. MCF blood concentrations were obtained at end of the infusion (C_{max}) on day 1, before next dosing (C_{min}) on day 2 and at steady state (C_{max} and C_{min} on days 4 and 5 of therapy); and after 1-3 h of MCF infusion on day 5 in burn tissues and were measured by HPLC. Spearman's rho test or the Pearson test were used for bivariate correlations.

RESULTS. Ten patients were included (8 men; age 18-77 years). Individual patients' characteristics are shown in tables 1a, 1b and 1c. Mean MCF plasma concentrations after the initial and repeated doses were 5.5 and 6.7 mcg/ml at the peak and 0.8 and 1.2 mcg/ml at the trough, respectively, and in burn eschar tissues 0.8 mcg/g. Peak plasma concentrations of micafungin after the initial and repeated administration were inversely correlated with % burned TBSA (Spearman's rho = -0.695 and -0.750 ($p < 0.05$)), respectively. One patient (10 %) presented candidemia and the crude mortality was 40 %. No adverse events to MCF were reported.

CONCLUSIONS. This is the largest pharmacokinetic study of 100 mg/daily of MCF in severely burned critically ill patients. After the first and multiple doses, MCF levels in plasma and burn eschar tissue higher than the reported MIC90 against most clinically

important Candida species. MCF was well tolerated. A low-dose of MCF without a loading dose seems to be sufficient to achieve an optimal exposure to this echinocandin.

Patient number 1-5	TBSA (FT) %	ABSI at admission	SOFA at the beginning of MCF	LOS in BICU (days)	MCF dose (mg/kg body weight)	Plasma Cmax/Cmin after first dose (mcg/ml)	Plasma Cmax/Cmin at steady state on day 5 (mcg/ml)	Burn eschar tissue on day 5 (mcg/g)	Days from admission to the start of MCF
1	35 (20)	9	1	75	1.3	8.6/0.8	7.4/1.0	2.3	38
2	40 (35)	8	6	23	2.0	8.5/1.1	9.4/1.8	<LQ	15
3	23 (16)	8	2	17	1.3	6.4/0.8	10.3/1.2	<LQ	12
4	70 (40)	12	6	43	1.1	3.9/0.5	4.5/0.8	0.4	8
5	23 (12)	7	5	19	1.3	7.5/1.8	8.0/1.4	0.6	10

[Table 1a- Patients' characteristics (n°1-5)]

Patient number 6-10	TBSA %	ABSI at admission	SOFA at the beginning of MCF	LOS in BICU (days)	MCF dose (mg/kg body weight)	Plasma Cmax/Cmin after first dose (mcg/ml)	Plasma Cmax/Cmin at steady state on day 5 (mcg/ml)	Burn eschar tissue on day 5 (mcg/g)	Days from admission to the start of MCF
6	70 (60)	11	5	70	1.2	3.4/0.5	5.0/0.9	1.5	12
7	80 (70)	12	5	61	1.1	3.8/0.4	4.0/0.4	0.2	15
8	60 (50)	10	2	90	1.4	4.8/0.5	4.3/1.0	0.2	34
9	44 (34)	10	6	34	1.1	4.5/1.1	9.1/2.3	0.2	8
10	34 (28)	9	5	35	1.3	4.1/0.7	5.4/1.0	0.7	10

[Table 1b- Patients' characteristics (n°6-10)]

Patient No. 1-10	TBSA (FT) %	ABSI at admission	SOFA at the beginning of MCF	LOS in BICU (days)	MCF dose (mg/kg body weight)	Plasma Cmax/Cmin after first dose (mcg/ml)	Plasma Cmax/Cmin at steady state on day 5 (mcg/ml)	Burn eschar tissue on day 5 (mcg/g)	Days from admission to the start of MCF
Median	42(34.5)	9.5	5.0	39	1.3	4.6/0.7	6.4/1.0	0.5	12
Interquartile Range	31.3-70.0	7.0-19.0	8-11.3	3.5-64	22-71.3	1.1-1.4	3.9-7.5/0.5-1.1	4.5-9.1/0.9-1.4	0.3-1.1
9.5/19.8									

[Table 1c- Median patients' characteristics (n°1-10)]

NOTE. TBSA, total body surface area; FT, full thickness, ABSI, abbreviated burn severity index; SOFA, sequential organ failure assessment; LOS, length of hospital stay; BICU, burn critically care unit; LQ, limit of quantification (< 0.1mcg/ml).

0457

EVOLUTION OF ANTIFUNGAL DRUGS USE IN SPANISH INTENSIVE CARE UNITS THROUGH THE YEARS. DATA FROM 2006 -2013 ENVIN-HELICS REGISTRY

P. Olaechea¹, N. Mas², M. Palomar³, F. Alvarez-Lerma⁴, S. Uriona⁵, X. Nuvials⁶, M.P. Gracia⁷, M. Catalán⁸, B. Jimenez⁷, G. Aguilar⁸, ENVIN-HELICS study group

¹Hospital Galdakao-Usansolo, Intensive Medicine Department, Galdakao, Spain, ²Hospital Galdakao-Usansolo, Galdakao, Spain, ³Hospital Arnau de Vilanova, Lleida, Spain, ⁴Hospital del Mar, Barcelona, Spain, ⁵Hospital Vall d'Hebron, Preventive Medicine and Epidemiology, Barcelona, Spain, ⁶Hospital 12 de Octubre, Madrid, Spain, ⁷Hospital Clinico Universitario Lozano Blesa, Zaragoza, Spain, ⁸Hospital Clinico Universitario de Valencia, Valencia, Spain

INTRODUCTION. The use of echinocandins is recommended by guidelines for the treatment of severe fungal infections in unstable patients, although recent studies can cause doubts about this recommendation (1).

OBJECTIVE. To describe the antifungal drugs (AD) consumption in the Spanish ICU setting and compare the current antifungal use (years 2011-2013) to the previously reported one (years 2006-2010) (2).

METHODS. ENVIN-HELICS registry is a prospective, observational, multicenter and voluntary enrollment study. The employed methodology in this registry is available in <http://hws.vhebron.net/envin-helics/>. The amount of registered patients and units has grown through de years. In the data belonging to 211 units, the following AD were registered: Amphotericin B deoxycholate (AMBd), Amphotericin B Lipid complex (AMBLC), Liposomal Amphotericin B (LAMB), Fluconazole (FL), Voriconazole (VO), Caspofungin (CP), Anidulafungin (AN), Micafungin (MC) and others (OAD). The percentage of each AD use was calculated yearly. Results of the current use (CU) (years 2011 to 2013; n = 8,740) were compared to those obtained from a previous study (PS) (years 2006 to 2010; n = 8,359). A Chi square test was performed.

RESULTS. 17,099 prescriptions were recorded. The annual percentages of use for all indications are shown in the table:

AD/ year (n=)	2006 (884)	2007 (1283)	2008 (1742)	2009 (2140)	2010 (2317)	2011 (2843)	2012 (2942)	2013 (2955)
AMBd	0.7	0.8	0.4	0.1	0.4	0.2	0.1	0.1
AMBLC	2.5	3.4	2.4	1.4	2.7	1.9	1.6	1.5
LAMB	5.1	5.8	4.5	4.0	5.6	6.0	5.4	6.4
FL	62.5	56.0	57.6	55.6	48.7	48.4	49.6	46.6
CP	15.2	19.5	20.7	21.3	17.9	17.5	14.7	15.9
AN	0.0	0.0	0.0	5.4	12.7	12.6	12.6	13.9
MC	0.0	0.0	0.0	0.1	0.9	2.5	3.9	4.9
VO	11.7	12.3	12.0	9.8	10.1	8.1	9.4	8.3
OAD	2.5	2.3	2.4	2.3	1.1	2.8	2.7	2.9

[Table]

The most commonly used AD in the CU period are FL (48.2 %), CP (15.9 %), AN (12.7 %), VO (8.8 %), LAMB (4.9 %) and MC (3.7 %). According to the indication the AD are distributed in: 11.1 % for prophylaxis; 13.4 % for community-acquired infections; 34.6 % for non ICU hospital-acquired infections and 40.9 % for ICU-acquired infections. Comparing the CU versus (vs.) PS periods, there was a progressive decline in the use of fluconazole in every kind of indication, most significant in prophylaxis (68.8 % vs. 58.3 %; $p < 0.001$). At the same time, there was an increase in the use of echinocandins ($p < 0.001$): prophylaxis (8.9 % vs. 19.2 %); community-acquired infections (21.9 % vs. 33.7 %); hospital-acquired infections (29.2 % vs. 37.4 %) and ICU-acquired infections (25.2 % vs. 35.7 %). There was no difference in overall utilization of amphotericin B formulations but a decrease in the VO use is observed (10.9 % vs. 8.9 %; $p = 0.001$).

CONCLUSIONS. Fluconazole was the most frequently used AD in ICU, although there was a significant decrease of its consumption towards an increase in echinocandins employment. The use of amphotericin remained similar, but a decrease of voriconazole consumption was observed.

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0458

IMPACT OF ANTIFUNGAL PRESCRIPTION ON THE MAIN CANDIDA SPECIES IN THE ICU - EVOLUTION AND TRENDS OVER 10 YEARS

S. Bailly^{1,2,3}, D. Maubon^{1,2}, P. Fournier^{1,2}, H. Pelloux^{1,2}, C. Schwebel^{1,2}, C. Chapuis^{1,2}, L. Foroni^{1,2}, M. Cornet^{1,2}, J.F. Timms^{3,4}

¹CHU de Grenoble, Grenoble, France, ²Université de Grenoble, Joseph Fourier, Grenoble, France, ³INSERM UMR 1137 - IAME Team 5, Paris, France, ⁴Hopital Bichat, Paris, France

INTRODUCTION. *Candida* spp. are the most common cause of fungal infections in humans. The incidence of *Candida* spp. infections has risen over the last two decades, in parallel with the increasing use of immunosuppressive treatments and transplantation procedures. This trend is particularly observed in critically ill patients who are at high risk of opportunistic invasive fungal infections. Since 2003, several new antifungal agents have been introduced, including echinocandins and new azoles. Previous reports suggested that antifungal therapy may impact resistance profiles of strains recovered from infection.

OBJECTIVES. The objective of this study was to describe the distribution of *Candida* strains isolated from colonized and infected site and their resistance profile, and to correlate these data with antifungal consumptions within one ICU.

METHODS. Antifungal drug consumption was measured as the number of defined daily doses per 1000 hospital days (DDDs/1000HD). The distribution of *Candida* spp. over a 10 year period (2004-13) and the MICs of antifungal drugs over 2007-13 were determined. Time series analyses were performed to assess relationships between antifungal drug use, and subsequent *Candida* spp. distribution and MIC changes over time.

RESULTS. Of 30498 samples from 4512 patients, 2410 were positive for *Candida* spp. *C. albicans* predominated (53.1 %), followed by *C. glabrata* (16.2 %) and *C. parapsilosis* (7.9 %). *C. parapsilosis* increased significantly, from 5.7 % in 2004 to 8.4 % in 2013 taking into account temporal variations ($P = 0.02$). *Candin* use increased significantly between 2004 (17.9 DDDs/1000HD) and 2013 (58.8 DDDs/1000HD) ($P = 0.001$). Between 2007 and 2013, the increase in caspofungin use correlated significantly with the increase in caspofungin MICs displayed by *C. parapsilosis* ($P = 0.04$), *C. glabrata* ($P = 0.0005$) and *C. albicans* ($P = 0.04$). Polyenes consumption changed over time and correlated with an increase in amphotericin B MICs for *C. glabrata* ($P = 0.046$). Despite significant variations between year for fluconazole, there was no significant trends over time between 2004 (34 DDDs/1000HD) and 2013 (37.7 DDDs/1000 HD) ($p = 0.29$). No significant correlations between species, and MICs and fluconazole use were observed.

CONCLUSIONS. This study clearly confirms that previous history of antifungal prescription within an ICU influences MICs of antifungal agent against major *Candida* species. In particular, the significant selective pressure exerted by caspofungin and amphotericin B on *C. glabrata* susceptibility needs to be closely monitored as this species is already poorly susceptible to fluconazole. Effort to avoid misuse of antifungal is essential to limit the spread of less susceptible *Candida* spp. in ICUs.

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0459

EMERGENCE OF AZOLE-RESISTANT ASPERGILLUS IN THE ICU

A.W.M. in t Veld - van Wingerden¹, A. Russcher², E.J. Kuijper², J. van Paassen¹

¹Leiden University Medical Center, Intensive Care, Leiden, Netherlands, ²Leiden University Medical Center, Medical Microbiology, Leiden, Netherlands

INTRODUCTION. The patterns of *Aspergillus* infections are changing. Resistance to antifungal therapy with azoles is emerging (1) and data regarding the incidence of invasive aspergilliosis (IA) at the ICU is scarce (2). Due to difficulty in culturing *Aspergillus* species in vitro, the incidence of azole-resistance is even more uncertain. At the same time, evidence is growing for increasing IA in non-traditional hosts. Because of the unawareness of uncommon hosts, diagnostic delay, and probable inadequate treatment due to resistance, IA at the ICU is associated with high mortality.

OBJECTIVES. In this study we aimed to investigate the prevalence of resistant IA at our ICU and to determine patient characteristics associated with resistant IA.

METHODS. We conducted a retrospective cohort study in a tertiary university hospital in Leiden, the Netherlands. All ICU-patients receiving therapy with azoles or amphotericin-B for suspected IA from January 2010 to December 2013 were eligible. Host factors, CT reports, microbiology results, mortality and use of prophylactic anti-fungal therapy were extracted from patient records.

RESULTS. A total of 136 patients were eligible; 38 of these patients had positive cultures with *Aspergillus* (28 %, table 1). 10 of the positive *Aspergillus* cultures were resistant for itraconazole and voriconazole in a 4-well MIC-test, a resistance incidence of 26 %. In 5 of 10 patients with an azole-resistant IA, the resistance pattern was known only after the patient had deceased.

In the whole group, most patients were stem cell transplantation recipients with a haematological malignancy or patients with chronic steroid use. 5 of 28 patients (18 %) with an azole-sensitive IA had no host factor.

In the azole-resistant group, 40 % of patients received therapy with azoles before diagnosis, compared to 29 % in the azole-sensitive group.

90-days mortality in the patients with an azole-resistant IA was 100 % compared to 80 % in the patients with an azole-sensitive infection.

CONCLUSIONS. Our results show a high prevalence of azole-resistance IA in the intensive care and was associated with high mortality. No risk factors for developing IA with resistant strains can be learned from this study. It remains possible that resistance rates are overestimated as resistant isolates are perhaps more likely to be cultured when therapy is already instituted at the time of sampling.

Current changing patterns of IA call for development of adequate ICU criteria for diagnosis, development of rapid resistance tests and knowledge of local resistance rate to guide therapeutic decisions.

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	Resistant Aspergillus n = 10 (%)	Non-resistant Aspergillus n = 28 (%)
Mortality	10 (100)	24 (86)
Stem cell transplantation recipient	5 (50)	13 (46)
Chronic steroid use	5 (50)	9 (32)
Neutropenia	1 (10)	1 (4)
No host factor	0 (0)	5 (18)
Azole-prophylaxis	4 (40)	8 (29)
EORTC-proven	0 (0)	2 (7)
EORTC-probable	5 (50)	15 (54)
EORTC-unknown	5 (50)	11 (40)

[Table 1- Patient characteristics]

Management of sepsis: 0460–0464

0460

THE ADMIN-ICU SURVEY: A SURVEY ON ANTIMICROBIALS DOSING AND MONITORING STRATEGIES IN INTENSIVE CARE UNITS

A. Tabah^{1,2}, J. Roberts^{1,2}, J.J. De Waele³, J. Lipman^{1,2}, J.R. Zahar⁴, M.O. Cotta^{2,5}, G. Barton⁶, J.-F. Timms⁷

¹Royal Brisbane and Women's Hospital, Intensive Care, Brisbane, Australia, ²The University of Queensland, Burns, Trauma, and Critical Care Research Centre, Brisbane, Australia, ³Ghent University Hospital, Dept. of Critical Care Medicine, Ghent, Belgium, ⁴Université d'Angers, CHU d'Angers, UPLIN, Angers, France, ⁵Royal Melbourne Hospital, University of Melbourne, Department of Medicine, Melbourne, Australia, ⁶St Helens and Knowsley Teaching Hospitals NHS Trust, Critical Care, Liverpool, United Kingdom, ⁷Université Paris Diderot/APHU-Hopital Bichat, Réanimation Médicale et des Maladies Infectieuses, Paris, France

INTRODUCTION. Antibiotic choice and dosing is one of the cornerstones of infection management in intensive care. Recent research demonstrates variability in antimicrobial pharmacokinetics in the critically ill. There is little evidence to which is the most appropriate dosing, administration and monitoring strategy.

OBJECTIVES. To determine current practices in antimicrobial dosing, administration and monitoring strategies around the world.

METHODS. An online structured questionnaire was developed by the ESICM infection section to obtain information on local practices. Dosing was considered for a 35 year old male weighing 80 kg with normal kidney function. Participation was voluntary. The survey was sent by email to the members of the ESICM, ANZICS and local research networks.

RESULTS. 402 professionals from 328 hospitals in 252 cities and 53 countries responded. 78 % were specialists in intensive care, 11.9 % pharmacists and 7 % doctors in training. 82.6 % were primarily responsible for the choice of antimicrobials. A pharmacist was available daily in 42 %, once a week in 9.7 %, only over the phone in 20.6 % and never in 27.6 % of the ICUs. Vancomycin was the glycopeptide of choice for 88.8 %, and was used as a continuous infusion by 31.3 %. Median [IQR] daily dose 25 [18.75-30] mg/kg. Therapeutic drug monitoring (TDM) was used for all the patients by 73.6 % and everyday in 40.4 %. Piperacillin/tazobactam was used as a short fractionated infusion by 70 %, an extended infusion by 21.9 %, a continuous infusion by 7 %. Median daily dose was 15.75 [13.5-18] g. TDM was used by 7.2 %. Meropenem was the most commonly used carbapenem (80.6 %), followed by imipenem (18.7 %). An extended infusion was used by 26.8 % and a continuous infusion by 4.5 %. Median daily dose of meropenem was 3 [3-3] g/day. TDM was used by 6.3 %. Colimycin was used less than once a month by 20.6 %, more than once a month by 12.2 % and more than weekly by 13.2 % at a median daily dose of 8 [4.3-9] MU/day. A short infusion was used by 80.9 %. The most common aminoglycoside used was gentamycin (54.1 %), followed by amikacin (39.6 %) and tobramycin (4.7 %). Median daily dose was 15 [15-20] mg for amikacin and 5 [4-6] mg for gentamycin. A single daily dose was used by 91.9 %. Peak concentrations were sampled everyday by 21.1 %, only in unstable or renally impaired patients in 36.8 % and less frequently by 42.1 %. Through concentrations were sampled in all patients by 60.2 %, in cases of renal failure by 16.4 % and infrequently or never by 20.4 %. If trough level was above the target 52.7 % would resample and do not re-administer before it was below that target and 43.8 % would reduce the next daily dose.

CONCLUSIONS. We found an important variability in reported practices for dosing, administering and using therapeutic drug monitoring for some of the most commonly used antimicrobials. Research is required to define the most adequate strategies and allow for the development of guidelines to standardize practices.

0461**CRITICAL CARE MANAGEMENT OF SEPSIS: A COST-ANALYSIS FROM A HEALTH CARE PERSPECTIVE**M.E. Koster-Brouwer¹, P.M.C. Klein Klouwenberg^{1,2,3}, W. Pasma¹, T. van der Poll^{4,5}, M.J.M. Bonten^{2,3}, O.L. Cremer¹

¹University Medical Center Utrecht, Department of Intensive Care Medicine, Utrecht, Netherlands, ²University Medical Center Utrecht, Department of Medical Microbiology, Utrecht, Netherlands, ³University Medical Center Utrecht, Julius Center for Health Sciences and Primary Care, Utrecht, Netherlands, ⁴Academic Medical Center, University of Amsterdam, Center of Experimental and Molecular Medicine, Amsterdam, Netherlands, ⁵Academic Medical Center, University of Amsterdam, Division of Infectious Diseases, Amsterdam, Netherlands

INTRODUCTION. Patients with severe sepsis often require admission to an intensive care unit (ICU) and their treatment is associated with high costs. Furthermore, both the incidence of sepsis and the severity of illness upon presentation are increasing [1].

OBJECTIVES. We aimed to estimate health care costs of patients admitted to the ICU with severe sepsis or septic shock and to explain variability in costs between individuals.

METHODS. Data from an ongoing, prospective study of patients presenting with sepsis to the ICUs of two tertiary centers in the Netherlands were used to perform a cost-analysis from a health care perspective. Resource use was valued using a bottom-up micro-costing approach. Costs were estimated per day, per admission, and for subgroups of patients. A multivariable linear regression model was constructed to explain variability in costs between patients. Bootstrapping was used to estimate bias-corrected and accelerated confidence intervals (CI) and p-values to adjust for the uncertainty of the estimations due to the skewness of the cost data.

RESULTS. Overall, 651 patients were included; 294 had severe sepsis and 357 had shock upon presentation. Total costs were € 29,102 (€ 26,598-€ 31,690) per admission and € 2,250 (€ 2,235-€ 2,266) per day in the ICU. Of the total costs 74 % was related to accommodation, personnel and disposables, 12 % to diagnostic procedures and 14 % to therapeutic interventions. Patients presenting with septic shock had higher costs both per day ($p < 0.001$) and per admission ($p < 0.001$) compared to patients with severe sepsis. Survivors and non-survivors generated not significantly different overall costs ($p = 0.086$), but non-survivors had higher costs per day ($p < 0.001$). In our multivariable model, baseline patient and illness factors explained 12 % of the variance in total costs. Increased expenses were associated with septic shock, the presence of immunodeficiency, candidemia, and viremia. Decreased expenses were associated with the presence of diabetes mellitus and urinary tract infections.

CONCLUSIONS. Mean costs of critical care management for severe sepsis or septic shock are almost €30,000 per case of which the major part is fixed. This estimation is higher than estimations from studies performed with data from the 1990s, which might be caused by the changes in incidence and illness severity of sepsis since then. Baseline patient and illness characteristics explain only a small part of the variability in costs between patients.

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GRANT ACKNOWLEDGMENT. This work was supported by the Center for Translational Molecular Medicine, project MARS (grant 041-201). MB has received research funding from the Netherlands Organization of Scientific Research (NWO Vici 918.76.611).

0462**HYPOTENSIVE VERSUS NON HYPOTENSIVE COMMUNITY ACQUIRE SEVERE SEPSIS: IMPLICATIONS FOR THE DETECTION, TIME TO THERAPEUTIC MANAGEMENT AND PROGNOSIS**L. Ballester¹, J. Méndez², J. Gil², R. Martínez², F. Riera², J.A. Capdevila¹, E. Palomera³, J.C. Yébenes³

¹Hospital de Mataró, Internal Medicine, Mataró, Spain, ²Hospital de Mataró, Intensive Care Unit, Mataró, Spain, ³Hospital de Mataró, Research Department, Mataró, Spain

INTRODUCTION. Severe sepsis management and prognosis is related with early detection, resuscitation and infectious focus control. Detection could depend on the clinical presentation and clinical awareness in healthcare workers.

OBJECTIVES. To evaluate differences in the management and prognosis of patients with community acquired severe sepsis (CASS) that could be associated with the absence of hypotension at the presentation in the Emergency Room (ER) door.

METHODS. Retrospective study conducted in the Emergency Department and Intensive Care Unit of Mataró Hospital. Demographic, clinical, laboratory and treatment data in patients with CASS were collected and analyzed during the period from March 1st to September 30th between the years 2008, 2009 and 2010. Management of severe sepsis patients was standardized using a recommendations bundle called Surviving Sepsis Chain. During the study period, we compare the differences in the management of septic patients who come to our hospital with hypotension (LBP) respect those who present normal blood pressure (NBP) defined as a mean blood pressure higher than 65 mmHg. We evaluated the prognostic implications of delayed detection and therapeutic management of these patients. Statistical analysis: χ^2 test was used to compare categorical variables and t Student test to compare continuous variables.

RESULTS. We collected 154 patients with severe sepsis, 84 males (54.5 %) with mean age 73.6 \pm 1.2. Charlson score was 6.2 \pm 2.9. Urinary was the main focus 29.9 % (46 cases), followed by respiratory 26.0 % and abdominal 24.0 %. LBP was present in ER door in 57 patients (37 %). Mean lactate was measured in 55 patients, and was 5.2 \pm 3.2. Mean SOFA was 4.9 \pm 2.7. The overall in hospital mortality rate was 40.9 % (63). Time from ER door to procedures was longer in patients with NBP. Time in hours to blood cultures and antibiotic administration in LBP patients was 1.8 \pm 2.6 and 3.6 \pm 3.9 respect 2.6 \pm 3.6 and 4.4 \pm 4.2 in NBP ($p < 0.05$ in both). Time to 2000 ml volume was 6.1 h \pm 3.8 in LBP respect 8.4 \pm 4.3 in NBP. In LBP, we used noradrenalin (NA) in 14 patients (24.6 %) respect NBP (27.8 %). Time to NA was 4.9 \pm 4.5 in LBP respect 8.9 \pm 4.9 in NBP ($p < 0.05$). ICU requirement was lower in LBP (43.1 %) respect NBP (56.9 %). Mortality was related with delayed management. In surviving patients we observed a lower time to blood cultures in hours (2.2 \pm 3.2 vs 2.5 \pm 3.2, $p < 0.05$), time to antibiotic (3.3 \pm 3.0 vs 5.2 \pm 5.1 h, $p < 0.05$), time to 2000 ml (7.1 \pm 4.1 vs 8.2 \pm 4.4, $p < 0.05$) and time to NA (6.2 \pm 3.6 vs 9.7 \pm 6.3, $p < 0.05$).

CONCLUSIONS. Patients with CASS have a different management depending on the presentation form on arrival to the ER. Specifically, we detected that patients with CASS that coming to the ER with NBP have a significant delay in the onset of basic management measures and initiation of treatment. Delay to management was related with mortality.

0463**EARLY PROCALCITONIN KINETICS MAY INDICATE EFFECTIVENESS OF THE EMPIRICAL ANTIBIOTIC THERAPY IN SEPSIS WITHIN HOURS**D. Trásy¹, M.F. Németh¹, K. Tánzos¹, A. Osztrölcuzki¹, J. Fazakas², P. Hankovszky¹, E. Hajdú², Z. Molnár¹

¹University of Szeged, Department of Anaesthesiology and Intensive Therapy, Szeged, Hungary, ²Semmelweis University, Department of Transplantation and Surgery, Budapest, Hungary, ³University of Szeged, First Department of Medicine, Szeged, Hungary

INTRODUCTION. Early diagnosis of sepsis is crucial in treating septic patients. Starting appropriate antibiotic therapy in time have a significant effect on survival (1). However, there is very little to help the clinician during the first 24 h whether the administered empirical antibiotics treatment is effective or not. Procalcitonin (PCT) is a reliable sepsis marker with short half life (2) but its role in the early decision making is undiscovered.

OBJECTIVES. Our aim was to investigate the value of the 0-16-24 h PCT-kinetics after starting empirical antibiotic therapy in intensive care patients, to predict effective or ineffective antibiotic treatment.

METHODS. In this prospective observational study patients in whom the attending physician considered the need of empirical AB-therapy were recruited. PTC levels, biochemical and physiological parameters were measured immediately before the initiation of antibiotics (t_0), 8 hourly (t_8, t_{16}, t_{24}) and then daily (day_{2-5}). Based on the microbiological results patients were grouped post hoc into "effective" and "ineffective" groups by two independent experts (intensivist, infectiousist) who were blinded for PCT. Statistics were performed by using SPSS[®] 20.0 and statistical analysis was performed by χ^2 and Mann-Whitney, as appropriate.

RESULTS. Out of the 209 patients who fulfilled the inclusion criteria infection was proven in 165 cases. Therapy was found to be effective in 127 (77 %) and ineffective in 38 (23 %) cases. Procalcitonin increased in both groups, but it was significantly lower in the Effective-group between t_0 and t_{16} as compared to the Ineffective-group: 34 % vs. 264 % ($p < 0.001$). At t_{16} a PCT increase of ≥ 55 % as compared to t_0 indicated ineffective antibiotic treatment with a sensitivity = 71 % and specificity = 75 %, $p < 0.001$. Hospital mortality was significantly lower in the effective group: 35 % vs. 66 % ($p = 0.001$).

CONCLUSION. Our results indicate that in critically ill patients early kinetics of PCT, measured within the 24 h after starting antibiotic therapy, may indicate effective or ineffective empirical antibiotic therapy with good sensitivity and specificity.

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0464**INFLUENCE OF HOSPITAL ENTRANCE TIME AND CLINICAL PRESENTATION ON PROCESS INDICATORS AND OUTCOME IN SEVERE SEPSIS AND SEPTIC SHOCK PATIENTS**C. Hurtado¹, R. Zaragoza¹, S. Sancho¹, J.J. Camarena², R. González², E. Colomer², T. Galstado³, R. Balaguer³, A. Romero¹

¹Hospital Universitario Dr. Peset, Sepsis Unit/Intensive Care Unit, Valencia, Spain, ²Hospital Universitario Dr. Peset, Sepsis Unit/Microbiology Department, Valencia, Spain, ³Hospital Universitario Dr. Peset, Sepsis Unit/ED, Valencia, Spain

INTRODUCTION. The assistance provided to septic patient is influenced by several factors such as workload or the ratio of health workers.

OBJECTIVES. To describe the relationship between the hospital entrance time (HET) and lactate extraction and antibiotic administration times as process indicators; to know the influence of clinical presentation on these times and to analyze the possible impact of AT on mortality in these patients.

METHODS. A prospective analysis of patients with severe sepsis and septic shock who was attended at ED of a teaching hospital was performed using the records of an interdisciplinary sepsis unit. The study period was from November 2012 to March 2014. Delay time extraction of lactate and antibiotic administration (in minutes) were calculated taking as reference time the arrival of the patient to ED. The cases have been grouped into fractions nursing shifts (M1, from 8 to 11 h; M2, from 12 to 14 h, T1, from 15 to 18 h; T2, from 19 to 21 h; N1, from 22 to 2 h, and N2, from 2 to 7 h) and clinical presentation (severe sepsis and septic shock). Statistical analysis was performed using nonparametric tests such as the Mann-Whitney and Kruskal-Wallis test and the χ^2 test using SPSS 20.0 ($p \leq 0.05$).

RESULTS. 606 cases (56.3 % male) of severe sepsis and septic shock were detected (30.9 % septic shock). APACHE II and SOFA score were 17.63 \pm 6.48 and 4.67 \pm 2.93 respectively. The primary focus of infection was the respiratory (49.2 %). Global mortality was 19.3 %. The distribution of age, APACHE II and SOFA was the same in the different groups of shift fractions. The delay in lactate extraction time was 70.52 \pm 84.01 min. in the M1 group, 83.53 \pm 89.48 min. at M2, 159.52 \pm 76.55 min. in T1, 64.59 \pm 66.67 min. in T2, 138.78 \pm 248.90 min. in N1 and 109.56 \pm 86.03 min. in N2. Antibiotic administration was performed at 140.98 \pm 131.90 min. in the M1 group, 158.67 \pm 145.29 min. at M2, 156.64 \pm 179.49 min. in T1, 137.05 \pm 108.12 min. in T2, 212.07 \pm 252.51 min. in N1 and 146.28 \pm 126.27 min. in N2. Statistically significant differences were observed for lactate extraction time (147.90 \pm 87.63 vs. 115.03 \pm 78.13 min. $p = 0.027$) and antibiotic administration (165.09 \pm 150.16 vs. 142.51 \pm 194.36 min. $p = 0.002$) between patients with severe sepsis and septic shock. No differences in hospital mortality among nursing shift fractions were found, however there were a significant difference between clinical presentation as severe sepsis (13.36 %) or septic shock (48.8 %). ($p < 0.001$).

CONCLUSIONS. Clinical presentation as septic shock had favourable influence on process indicators but higher mortality rates in septic patients in a hospital with a sepsis team. On the contrary HET had no any impact on both variables.

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Respiratory dysfunction in sepsis: 0465–0469**0465****CYTOMEGALOVIRUS SEROPREVALENCE AS A RISK FACTOR FOR POOR OUTCOME IN ACUTE RESPIRATORY DISTRESS SYNDROME**D. Ong¹, P. Klein Klouwenberg¹, F. Verduyn Lunel¹, C. Spitoni¹, J. Frencken¹, B. Dekker¹, M. Schultz², M. Bonten¹, O. Cremer¹

¹University Medical Centre Utrecht, Utrecht, Netherlands, ²Academic Medical Center, Amsterdam, Netherlands

INTRODUCTION. Cytomegalovirus (CMV) reactivation may complicate critical illness in latent carriers of the virus, even in patients who were previously immunocompetent. As lungs are involved in the immunological control of viral infections, patients with the acute respiratory distress syndrome (ARDS) are considered to be prone for CMV reactivation, and prophylactic antiviral therapy in immune competent CMV seropositive patients with ARDS has been proposed.

OBJECTIVES. We assessed CMV seroprevalence as a risk factor for morbidity and mortality in patients with ARDS.

METHODS. In this prospective observational study we included all newly admitted patients with ARDS who received mechanical ventilation for at least 4 days in the ICUs of two Dutch tertiary care hospitals. Patients with known immunocompromise and those receiving antiviral treatment prior to ICU admission were excluded. CMV serostatus was determined by enzyme immunoassay. We used the number of days alive and free of mechanical ventilation on day 28 as a composite outcome measure, and multivariable ordinal logistic regression analyses to adjust for potential confounders.

RESULTS. 306 patients were included, 209 (68 %) of whom were CMV seropositive. One hundred patients (33 %) died or continued to be mechanically ventilated by day 28. CMV seroprevalence was not associated with the primary outcome (crude odds ratio 1.09 95 % C.I. 0.70 - 1.70; adjusted odds ratio 1.01 95 % C.I. 0.64 - 1.59). Nor was an association found in any subgroups of patients, including in those with severe sepsis. The time course of pulmonary markers in survivors was comparable between the two subgroups.

CONCLUSIONS. CMV seroprevalence is not associated with prolonged mechanical ventilation or increased mortality in critically ill patients with ARDS. Therefore, prophylactic antiviral treatment in unselected patients with ARDS who test CMV seropositive is unlikely to be effective.

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INCIDENCE, OUTCOMES AND RISK FACTORS ASSOCIATED WITH THE DEVELOPMENT OF ACUTE LUNG INJURY AND ACUTE RESPIRATORY DISTRESS SYNDROME IN PATIENTS WITH SEVERE SEPSIS AND SEPTIC SHOCK ADMITTED TO ICU. RESULTS OF A SPANISH MULTICENTER STUDY

R. Herrán Monge¹, M.M. García García¹, P. Merino García¹, A. Muriel Bombín¹, D. Andáiz², J.C. Ballesteros³, M. Martínez Barrios⁴, B. Álvarez Martínez⁵, A.M. Domínguez Berro⁶, S. Macías⁷, S. Moradillo⁸, M.M. Gobernador⁹, C. Tarancón¹⁰, J. Blanco Varela¹, Grupo de Estudio y Análisis en Cuidados Intensivos - G.R.E.C.I.A

¹Hospital Universitario Río Hortega, Intensive Care Department, Valladolid, Spain, ²Hospital Clínico Universitario de Valladolid, Intensive Care Department, Valladolid, Spain, ³Complejo Hospitalario de Salamanca, Intensive Care Department, Salamanca, Spain, ⁴Complejo Asistencial Universitario de Burgos, Intensive Care Department, Burgos, Spain, ⁵Hospital del Bierzo, Intensive Care Department, Ponferrada, Spain, ⁶Complejo Hospitalario de León, Intensive Care Department, León, Spain, ⁷Hospital General de Segovia, Intensive Care Department, Segovia, Spain, ⁸Complejo Asistencial de Palencia - H. Río Carrión, Intensive Care Department, Palencia, Spain, ⁹Complejo Hospitalario de Soria, Intensive Care Department, Soria, Spain, ¹⁰H. Virgen de la Concha, Intensive Care Department, Zamora, Spain

OBJECTIVES. 1. To determine the incidence, clinical profile and main outcomes of the development of acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) in patients with severe sepsis and septic shock admitted to the Intensive Care Unit (ICU). 2. To determine risk factors associated with the development of ALI/ARDS in these patients. 3. To build a predictive model.

METHODS. Multicenter prospective observational study conducted in 11 Spanish ICUs during 5 months in 2011. Daily screening for severe sepsis and septic shock in ICU patients was performed. Those patients under 18 years old and cardiologic diseases as cause of admission were excluded. Demographic and clinical variables; comorbidities; infection characteristics; severity scales and organ failure at admission and its evolution by sequential calculation of SOFA score and delta SOFA day 0 - day 3 and day 1 - day 3; mechanically ventilated episodes and development of ALI/ARDS; mortality and ICU and hospital length of stay (LOS) were collected. Comparison of ALI/ARDS episodes results with the ones with no ALI/ARDS by bivariate and multivariate analysis. A predictive model with the risk factors identified for development of ALI/ARDS was built by using logistic regression.

RESULTS. 231 episodes of severe sepsis in 229 patients were registered. The incidence of severe sepsis admitted to ICU obtained during study period was 14 % (95 % CI 12.5-15.17). Needed mechanical ventilation 158 (68.4 %) and developed ALI/ARDS 51 patients (22.08 %), 50 % on day 1. 70.6 % were men. There were statistically significant differences compared with No ALI/ARDS (p < .05) in: patient's category: medical (76.5 %) and trauma (11.8 %) were the most frequent; prior immunosuppression (33 %) as principal comorbidity; main infection location: lung (55 %) followed by abdominal (13.7 %); expressed as mean(SD) (CI 95 %): ALI/ARDS patients had lower age (63.4 años (2.2)(59.1-67.8) and greater severity at admission: APACHE II 23.6 (1) (21.6-25.6) and SOFA 9.5 (3.2) (8.6-10.5). They had lower reduction in delta SOFA and higher mortality intralCU (43.1 %), at 28 days (41.2 %) and hospital (47.1 %), with no difference in early mortality (48 h) (3.9 %). ALI/ARDS patients had higher ICU and Hospital LOS (Median, IQR) [31 days (22-59)]. The independent risk factors associated with development of LPA/SDRA identified in multivariate analysis are shown in the table with their Odds Ratio and 95 % Confidence Interval. The characteristics of the predictive model are shown in the figure.

CONCLUSIONS. 1. The incidence of ALI/ARDS is high and LOS and mortality are higher compared to patients who did not develop. 2. The risk factors more strongly associated with the development of ALI/ARDS are immunosuppression and liver insufficiency prior to infection and respiratory failure at admission. 3. The predictive model has good discriminative ability, good specificity and moderate sensitivity.

Risk factors	Odds Ratio (95 % CI)
Prior immunosuppression	2.78 (1.19 - 6.50)
Prior liver failure	11.61 (1.64 - 81.80)
Abdominal location of infection (regarding urinary tract infection)	0.27 (0.074 - 1.01)
Respiratory failure at admission	6.81 (2.97 - 15.55)
Renal failure at admission	0.38 (0.12 - 1.17)

[Independent risk factors associated with ALI/ARDS]

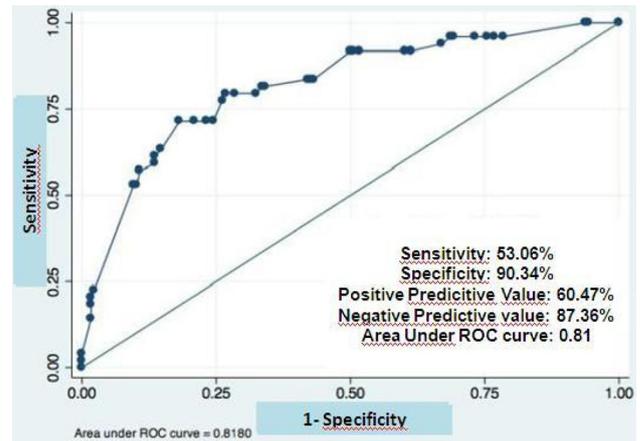


Fig. 1 Predictive model characteristics

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CHANGES OF INDUCED SPUTUM AND PLASMA STREM-1, TNF-A AND IL-10 LEVELS IN PATIENTS WITH SEVERE PNEUMONIA

Z. Tang¹, L. Tong¹, J. Wu¹, M. Zeng², J. Chen¹, X. Guan¹

¹The First Affiliated Hospital of Sun Yat-sen University, Department of Surgical Intensive Care Unit, Guangzhou, China, ²The First Affiliated Hospital of Sun Yat-sen University, Department of Medical Intensive Care Unit, Guangzhou, China

INTRODUCTION. Severe pneumonia is one of the common infectious diseases. The inflammatory response of pneumonia is co-expression and co-participation of pro-inflammatory mediators and anti-inflammatory mediators. sTREM-1, which is the soluble protein degradation product of TREM-1, can reflect the degree of inflammation and may have the effect of anti-inflammatory effect in inflammation response.

OBJECTIVES. To observe the changes of sTREM-1 and inflammatory mediators in induced sputum and plasma of patients with severe pneumonia and explore the state of local and systematic inflammatory response in severe pneumonia.

METHODS. Peripheral blood and induced sputum were collected on days 1, 4, 7 and the day of discharge or death of forty severe pneumonia patients with mechanical ventilation. The induced sputum and plasma levels of Soluble Triggering Receptor Expressed on Myeloid Cell-1 (sTREM-1), tumor necrosis factor- α (TNF- α) and interleukin-10 (IL-10) were determined. The subjects were divided into 2 groups according to the prognosis, such as survivors and non-survivors in severe pneumonia.

RESULTS. Plasma levels of sTREM-1, IL-10 and TNF- α in non-survivors were all higher than survivors (P < 0.05). The induced sputum levels of TNF- α and IL-10 in non-survivors were both higher than survivors (P < 0.05), and induced sputum levels of sTREM-1 were not different between non-survivors and survivors. Induced sputum and plasma sTREM-1, TNF- α and IL-10 Levels were gradually decreased in survivors, but maintained at higher levels even further increased in non-survivors.

CONCLUSIONS. There are excessive release of local and systematic pro-inflammatory and anti-inflammatory mediators in patients with severe pneumonia, especially in non-survivors. sTREM-1 may play a pro-inflammatory role in local and systematic inflammatory response in severe pneumonia.

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0469

SEVERE ACUTE RESPIRATORY INFECTION IN THE 2013-14 EPIDEMIC INFLUENZA PERIOD

L. Lagunes¹, S. Ramírez¹, A. Antón², T. Pumarola², J. Rello¹

¹Vall d'Hebron University Hospital, Critical Care Department, Barcelona, Spain, ²Vall d'Hebron University Hospital, Virology Department, Microbiology Section, Barcelona, Spain

BACKGROUND. There is a lot of information regarding the impact of 2009 pandemic Influenza A(pH1N1) virus infection^{1,2}. However, postpandemic information is scarce³, with a 29 % mortality rate in 2012-2013 season.

OBJECTIVE. To identify patients with SARI due to influenza and to assess the usefulness of influenza-like illness (ILI) in its diagnosis. To assess possible differences between Influenza SARI and Non influenza SARI.

METHODS. A prospective observational study was performed including patients with SARI admitted in ICU of a tertiary care Hospital during last season (from December 2013 to April 2014). Influenza infection was diagnosed by RT-PCR. Patients' demographic, clinical and radiologic features and outcomes were recorded. Data were expressed as frequency (percentage) and median (interquartile range - IQR).

RESULTS. Fifty-eight patients were diagnosed with SARI. Influenza infection was documented in 24 (41.4 %) patients; 20 with ILI and 4 with non-ILI, p < 0.01. Influenza SARI in the epidemic period was present in 15 (58 %) patients due to serotype H1N1 (40 %) and H3N2(13 %). ILI during this period was associated again in 12 (80 %) Influenza SARI patients vs 3(27 %) in Non Influenza SARI, OR (8,08(2,25-29,96)). S. pneumoniae caused 16(28 %) SARI (6(37 %) were mixed). There was no association between classical risk factors like obesity, pregnancy or immunosuppression and influenza infection. No differences were observed in mechanical ventilation days, use of vasopressors or use of CRRT. However, ICU LOS of Influenza SARI was shorter than Non-Influenza SARI (6 (IQR 4-14) vs 13 (IQR 7-22) days; p = 0.05). Overall influenza vaccination was 20.7 %, being 25 % in

influenza SARI. SARI mortality was 15.8 %, without difference in regard of influenza infection.

CONCLUSIONS. ILI was associated with the presence of Influenza infection in SARI patients. H1 infection reemerged, but Influenza infection mortality decreased compared with previous season. Vaccination strategies should be enhanced.

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Nutrition: The best new mixture! 0470-0472

0470

INCREASING CALORIE CONTENT SLOWS GASTRIC EMPTYING IN THE CRITICALLY ILL

M.P. Plummer¹, P. Kar¹, M.J. Chapman¹, C.E. Cousins², D.K. Heyland³, M. Horowitz⁴, K.L. Jones⁴, A.M. Deane¹

¹University of Adelaide, Discipline of Acute Care Medicine, Adelaide, Australia, ²Royal Adelaide Hospital, Intensive Care Unit, Adelaide, Australia, ³Queen's University, Department of Medicine, Ontario, Canada, ⁴University of Adelaide, Discipline of Medicine, Adelaide, Australia

INTRODUCTION. Feed intolerance occurs frequently in the critically ill and is usually secondary to slow gastric emptying, which is detected by large gastric residual volumes (GRVs). When large GRVs are observed, some clinicians reduce the volume of feed and increase the calorie content in the belief that lesser volumes will allow better delivery of nutrient to the small intestine. However, nutrients within the small intestine stimulate receptors that regulate gastric emptying via enterohumoral feedback mechanisms. Accordingly, increasing caloric content may well further slow gastric emptying and attenuate the potential for increased caloric delivery offered by this strategy.

OBJECTIVES. To evaluate the effect of increasing caloric concentration on gastric emptying.

METHODS. Using a parallel study design patients were fasted for four hours and then received a 100 ml 'test meal' of either Ensure[®] (1 kcal/ml, carbohydrate 68 %, fat 13 %, protein 19 %) or Twoocal[®] (2 kcal/ml, carbohydrate 43 %, fat 40 %, protein 17 %) that was radiolabelled with ^{99m}Tc sulphur colloid and infused into the stomach over 5 min. Gastric emptying was measured scintigraphically with three-minute dynamic frame acquisition until T = 240 min. Data are mean ± SE or median (IQR) as appropriate. Differences between groups were analysed with independent samples t-test, Mann-Whitney test or Chi squared test as appropriate.

RESULTS. There was no difference between groups with respect to age, sex, BMI, APACHE II score and opiate and insulin use (Table 1). Patients in the 2 kcal/ml group were studied earlier during their ICU admission and had a greater proportion of patients requiring inotropes (Table 1). There was no difference in glycaemia at baseline (p = 0.69) or for the duration of the study (P = 0.92) between groups. Over 4 h more of the 'meal' was retained in the stomach during 2 kcal/ml feed than with 1 kcal/ml feed (P < 0.05; Figure 1), which indicates that gastric emptying is dependent on energy and macronutrient content rather than volume.

CONCLUSIONS. In the critically ill, increasing the caloric content of liquid nutrient appears to be associated with slower gastric emptying and therefore has the capacity to worsen feed-intolerance. This may be due to increased fat content in such products.

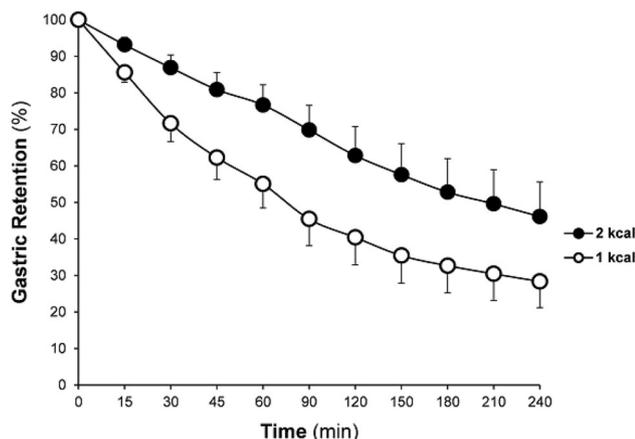
GRANT ACKNOWLEDGMENT. Dr Plummer is supported by a National Health and Medical Research Council Postgraduate Scholarship APP1075657. Associate Professor Chapman's research is supported by a National Health and Medical Research Council Project Grant 1025186.

	1 kcal (n = 22)	2 kcal (n = 18)	P
Age (years)(mean (SE))	60.2 (3.4)	54.5 (4.5)	.31
Male (n (%))	16 (73 %)	11 (61 %)	.44
BMI (kg/m2)(mean (SE))	26.7 (1.0)	29.2 (1.2)	.13
APACHE-II at admission	19.3 (1.7)	21.9 (1.7)	.29
Day in ICU when studied (median (IQR))	9.5 (2.75 - 17.0)	3.0 (2.0 - 5.25)	.02
Insulin (n (%))	11 (50 %)	7 (39 %)	.48
Diabetes (n (%))	4 (18 %)	1 (6 %)	.23
Opiates (n (%))	15 (68 %)	10 (56 %)	.41
Inotropes (n (%))	4 (18 %)	9 (50 %)	.03

Table 1 Patient characteristics by group

Figure 1: Gastric Retention

Gastric retention (%) of test meal (100 ml) over 240 min measured scintigraphically in patients receiving 2 kcal/ml feed (filled circles) and 1 kcal/ml feed (open circles).



0471

NUTRITION DAY ICU: 9,777 CRITICALLY ILL PATIENTS NUTRITIONAL PROFILE WORLD WIDE

I. Ben David¹, P. Singer¹, S. Kosak², M. Hiesmayr³

¹Institute for Nutrition Research, Critical Care, Petah Tikva, Israel, ²Nutrition Day, Vienna, Austria, ³Nutrition Day, Anesthesia and ICU, University Hospital, Vienne, Austria

OBJECTIVES. In an attempt to audit the nutritional habits of ICUs in the world and their association with outcome, the Nutrition Day questionnaire was used in various countries between 2007 and 2013.

METHODS. A one day cross sectional practice in ICUs recruited all patients in the ICU during the morning shift, excluding patients with DNR orders or staying for procedures only. The questionnaires in 17 languages collected the structure of the unit, the patient's characteristics, outcome at 60 days as well as type of nutrition according to weight. Data were analyzed using "my SQL" an open source relational database management system. Statistical analysis used SAS version 9.2.

RESULTS. 9777 patients from 880 units were included in the database between 2007 and 2013. Median age was 64 (range 15 to 91), 39 % were female, 55 % were medical patients, 40 % were admitted from the ER, 47 % were ventilated, 23 % sedated, and 6 % curarized. Outcome was as followed: 43 % were discharged, 26 % died, 20 % were transferred and 11 % were still in the hospital after 60 days. Nutritional practice showed an increase in enteral feeding from 10 % at day 1 to 50 % at day 7, oral feeding of 30 % of the patients during the first 4 days, use of Parenteral nutrition in around 10 % of the patients and no feeding mainly in the first day. Comparing nutrition practice in 2007 to 2011 and from 2012 to 2013, revealed a significant increase in enteral nutrition and a decrease in PN and SPN. Energy delivery reached 1500 kcal/day only after more than 7 days. When ideal body weight was used, patients were fed in a standard way regardless of their BMI. Administration of < 10kcal/kg in the first week was associated with increased survival while after 7 days, it was associated with an increase in mortality. Larger amount (> 20 kcal/kg) in patients with normal BMI was associated with worse outcome.

CONCLUSIONS. We conclude that nutritional therapy in severely ill patients includes oral feeding in a large population, progressively slow enteral feeding reaching low target after a week of stay and parenteral nutrition in a decrease in the recent years. Underfeeding below 10 kcal/kg in the first week was associated with better outcome mainly in overweight obese population. Below 10 kcal/kg after the first week was associated with a worse outcome. Too much caloric intake (more than 20 kcal/kg in BMI 20-25) in the first week was associated with worse outcome too.

0472

INITIAL DERIVATION AND VALIDATION OF THE LIFE (LIVER INJURY FAILURE EVALUATION) SCORE TO PREDICT OUTCOME IN CRITICALLY ILL PATIENTS

C. Edmark¹, M. Bell¹, T. Whitehouse², J. Wendon³, K.B. Christopher⁴

¹Karolinska University Hospital Solna, Anesthesiology and Intensive Care, Stockholm, Sweden, ²University Hospital Birmingham, Critical Care and Anaesthesia, Birmingham, United Kingdom, ³King's College Hospital, Critical Care Division, London, United Kingdom, ⁴Brigham and Women's Hospital, Renal Division, Boston, United States

INTRODUCTION. Abnormal liver function is a common feature of critical illness and is thought to be associated with increased mortality. The specific disease aetiologies of acute and acute on chronic liver failure in critical care are similarly associated with a high mortality. There is no valid scoring system for liver dysfunction in the ICU. The development of the RIFLE score by contrast has facilitated standardization and greater understanding of renal injury in critical care.

OBJECTIVES. We sought to develop a model to identify patients with liver dysfunction at greatest risk of 30-day mortality.

METHODS. The LiFe (Liver injury Failure evaluation) score was constructed according to a survey results obtained from ICU and liver experts. We performed a retrospective cohort study of 5,690 patients admitted to a medical or surgical ICU between 1997, and 2012, in 2 large hospitals in Boston, USA. All patients had Lactate, Total Bilirubin and INR drawn at ICU admission. The derivation cohort consisted of a random selection of 2/3 of the cohort (n = 3,793), and the validation cohort comprised the remaining 1/3 of the cohort (n = 1,897). A clinical prediction model was created based on a logistic regression model describing the risk of 30-day mortality as a function of the predictors (lactate 0-2, 2-4, 4-6, > 6 mg/dL; total bilirubin 0-2, 2-4, 4-6, > 6 mg/dL; INR 0-2, 2-4, 4-6, > 6) at ICU admission. The score for each predictor was assigned by dividing its β -coefficient by the smallest coefficient in the model and rounding up to the nearest integer. The discriminatory ability of the prediction rule in the derivation and validation groups was quantified using the C statistic. Calibration was assessed using the Hosmer-Lemeshow χ^2 goodness-of-fit test.

RESULTS. The demographics and outcomes of critical illness were similar between the derivation and validation cohorts. For the entire cohort (5,690) 30-day mortality was 29.7 %. The cohort was 53 % male, 80 % white, 37 % surgical, 4 % trauma and the mean age was 65.1 years. 41 % had sepsis and 16.6 % had chronic liver disease. The C statistic for the prediction model was 0.67 (95 %CI 0.65-0.69) in the derivation cohort and 0.68 (0.65-0.71) in the validation cohort. The Hosmer-Lemeshow P values were .95 and .42, respectively indicating good model fit. In the validation cohort, in the validation cohort 30-day mortality was 16 % with a LiFe score of 0, 34 % with LiFe 4-6 and 72 % with LiFe score > 9. Change in LiFe score between day 1 and day 3 of ICU stay was associated with 30-day mortality [LiFe score decrease more than 3, OR 0.35 (0.19-0.62); LiFe score increase more than 3, OR 1.90 (1.05-3.42)] relative to no change in LiFe score (adjusted for age, sex, race, surgical patient, and Deyo-Charlson index and LiFe score at day 1 ICU).

CONCLUSIONS. The risk of mortality in critically ill patients can be estimated using commonly available synthetic, excretion and metabolic markers of liver function on ICU admission.

Haemodynamic management of the surgical patient: 0475-0479

0475

THE EFFECT OF A "PREEMPTIVE PEEP STRATEGY" ON THE ENHANCE OF OXYGENATION AND RESPIRATORY MECHANIC IN OBESE PATIENTS DURING GENERAL ANESTHESIA WITH TRENDELENBURG POSITION AND PNEUMOPERITONEUM: THE OPERA STUDY

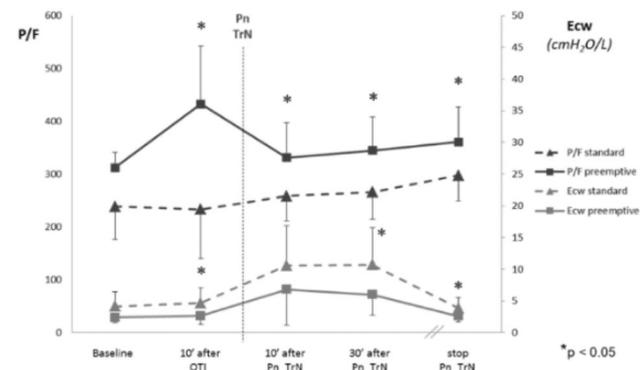
P. Terragni¹, C. Faggiano¹, I. De Domenici¹, G. Bussone¹, S. Tardivo¹, Y. Longhitano¹, L. Pattarino¹, E. Calza¹, F. Porpiglia², A. Tempia¹, V.M. Ranieri¹

¹Dipartimento di Anestesia e Rianimazione, Università degli Studi di Torino, Turin, Italy, ²SCDU Urologia, AOU S. Luigi Gonzaga Orbassano, Turin, Italy
INTRODUCTION. Respiratory function in obese patients can be compromised during general anesthesia (GA) in robotic urologic surgery that needs pneumoperitoneum (Pn) and Trendelenburg position (TrN) because of abdominal contents push diaphragm cephalad, reduce FRC and induce to atelectasis. (1) Pn and TrN also worsen the elastance of the chest wall (E_{cw}) that is already altered in the obesity condition. In this context, obese patients requiring Pn and TrN during GA represent a unique model to evaluate the role of PEEP and recruitment maneuver (RM) in healthy and completely recruitable lungs.

OBJECTIVES. We investigated the role of preemptive PEEP to improve oxygenation and respiratory mechanic in a group of obese patients during general anesthesia with Pn and TrN.

METHODS. The “OPERA” study (ClinicalTrials Identifier NCT01868347) enrolled 20 consecutive obese patients during urologic robotic surgery, ventilated with VT 8 ml/kg PBW, FIO₂ 0.5, I:E = 1:2 and respiratory rate to keep PaCO₂ between 35-42 mmHg. RM and a PEEP of 10 cmH₂O were randomly applied after (control group, 10 patients) or before (treatment group, 10 patients) Pn-TrN. Data were recorded by Draeger Zeus Infinity Empowered and managed by Gateway Plus and Patient Analyzer. Esophageal pressure was measured with nasogastric esophageal balloon placed in the mid-esophagus. Elastance of Respiratory System (ERS) was partitioned in its components: EL and E_{cw}. Transpulmonary pressure (PL) was calculated (2,3). All variables were measured at baseline, 10 min after induction of anesthesia (t0), 10 and 30 min after Pn-TrN (respectively t1 and t2) and at the end of the surgery (t3). Pn and TrN were realized after t0.

RESULTS. Results are reported in the attached figure that compares patients treated with PEEP after Pn-TrN (standard group) and before Pn-TrN (preemptive group) and shows the variation of P/F and E_{cw} over the time. Differences between groups that are statistically significant (p < 0.05) are expressed with (*).



Comparison between groups in E_{cw} and P/F

DISCUSSION. In obese patients the application of preemptive PEEP and RM before Pn-TrN increases FRC, reduces ERS and E_{cw}, and therefore improves oxygenation more effectively than if applied after induction of Pn-TrN. The improvement in elastic properties of respiratory system in patients treated with PEEP before Pn-TrN indicates that PEEP is more effective if acting on a lung with lower level of collapse.

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0476

GOAL-DIRECTED RESUSCITATION IN HIGH-RISK PATIENTS UNDERGOING CARDIAC SURGERY (GRICS) - A RANDOMISED CONTROLLED TRIAL

E. Osawa¹, A. Rhodes², J.-L. Vincent³, F. Galas¹, J. Fukushima¹, B. Pileggi¹, M. Lima¹, M. Piccioni¹, R. Chan¹, J. Almeida¹, F. Jatene¹, L. Hajjar¹

¹University of Sao Paulo/Heart Institute, Sao Paulo, Brazil, ²St George's University of London, London, United Kingdom, ³Université Libre de Bruxelles, Brussels, Belgium

INTRODUCTION. Perioperative mortality after cardiac surgery has decreased due to advances in surgical techniques and perioperative care. However, morbidity is still high and results in significant clinical complications and longer intensive care unit (ICU) and hospital stays. In non-cardiac surgeries, there is evidence showing that goal-directed therapy (GDT) may improve outcomes in high-risk patients, but there are few data in cardiac surgery.

OBJECTIVES. We investigated whether the implementation of a GDT protocol guided by LiDCOrapid in high-risk patients reduces complications after cardiac surgery. The study was conducted in the Surgical ICU of the Heart Institute, University of Sao Paulo, from December 2011 to January 2014.

METHODS. We performed a prospective study comparing a GDT protocol with standard care in patients fulfilling one of these high-risk criteria: EuroSCORE > 5, left ventricular ejection fraction (LVEF) < 50 %, redo, combined CABG and valve surgery, and recent myocardial infarction). GDT protocol involved a hemodynamic resuscitation strategy aimed to reach a cardiac index higher than 3 l/min/m² in the first 8 h after surgery. A 3 step approach was implemented: fluid therapy with bolus of 250 ml lactated Ringer's solution, dobutamine infusion up to a dose of 20mcg/kg/min and red blood cell transfusion (RBC). Complications were defined by the development of one of the following: delirium, stroke, seizure, low cardiac output syndrome, myocardial ischemia, tachyarrhythmia, infection, acute kidney injury and venous thromboembolism.

RESULTS. A total of 126 patients were included. Seventy-three percent were male and groups did not differ regarding age (66 ± 9 vs. 69 ± 9 years, p = 0.103), EuroSCORE (4 [3-6] vs. 4 [3-5], p = 0.402), LVEF (p = 0.430), Charlson comorbidity index (4 [3-5] vs. 4 [3-5], p = 0.402) and SAPS 3 score (18 [13-25] vs. 19 [15-23]). Analysis of hemodynamic interventions in the first 8 h showed that the amount of fluid administration was higher in the GDT group (1000 ml [625-1500] vs. 500 ml [500-1000], p < 0.0001), but similar doses of dobutamine (4 [3-5] vs. 4 [3-6] mcg/kg, p = 0.218) and rates of RBC transfusion (0 vs. 1.6 %, p = 0.323) were prescribed. Patients from GDT group had a shorter ICU stay

(3 days [3-4] vs. 5 [4-7], p < 0.001) and hospital stay (9 days [8-16] vs. 12 [9-22], p = 0.049) and a lower duration of inotropic (2 days [2-3] vs. 3 [2-4], p = 0.001) and vasopressor therapy (0 day [0-3] vs. 3 [0-5]) as compared to standard group. GDT patients had a lower complication rate (25 [40.3 %] vs. 41 [64.1 %], p = 0.008), due to a reduced incidence of low cardiac output syndrome (4.8 % vs. 21.9 %, p = 0.005) and infection (19.3 % vs. 43.8 %, p = 0.009). Hospital mortality was similar between groups (3 [5.2 %] vs. 5 [8.8 %] deaths, p = 0.448).

CONCLUSION. A GDT strategy in high-risk patients undergoing cardiac surgery reduced complications and ICU and hospital stay.

GRANT ACKNOWLEDGEMENT: Grants received from FAPESP 2011/19987-5.

0477

A PRAGMATIC MULTI-CENTRE TRIAL ON INTRAOPERATIVE FLUID MANAGEMENT USING PULSE PRESSURE VARIATION IN HIGH-RISK PATIENTS

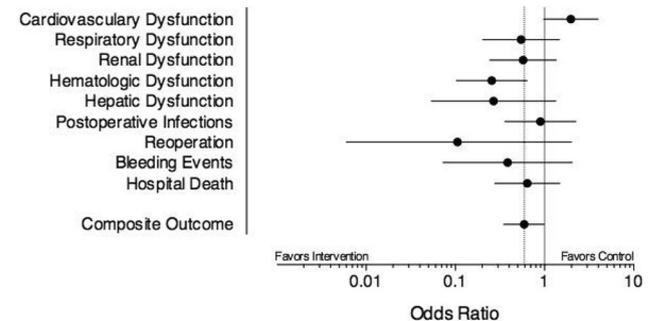
L.M.S. Malbouissin¹, J.M. Silva Jr.¹, M.J.C. Carmona¹, M.C.S. Assunção², J.L. Valiati³, M.R. Lopes⁴, C.M. Simões⁴, F. Michard⁴, J.O.C. Auler Jr.¹

¹São Paulo University, Anesthesiology, Sao Paulo, Brazil, ²Universidade Federal de São Paulo, Anesthesiology/Intensive Care, São Paulo, Brazil, ³Catanduva Medical School Hospital, Intensive Care, Catanduva, Brazil, ⁴Edwards Lifesciences, Geneva, Switzerland

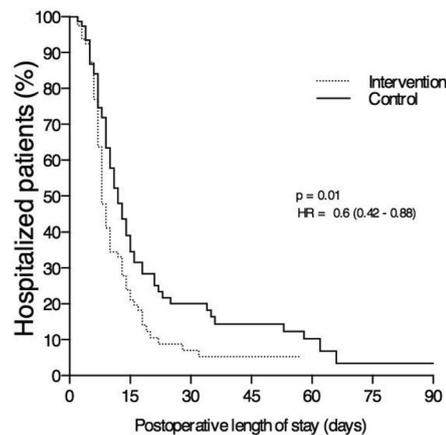
BACKGROUND AND GOALS: Inadequate intraoperative fluid management adversely affects postoperative outcomes of high-risk patients undergoing major surgeries (1) and intraoperative goal-directed fluid therapy (GDFT) targeting arterial pulse pressure variation (PPV) may improve outcome (2). Therefore, we implemented PPV-based GDFT in patients older than 60 yr and requiring ICU care postoperatively in three tertiary hospitals and investigated the effects on post surgical outcome.

METHODS. The patients were enrolled in two periods. In the first control period (Control group), 147 were included. During this phase, intraoperative fluid management was performed at the discretion of the attending anesthesiologist. After a training period, 109 surgical patients were enrolled during the GDFT period, in which intraoperative fluid management was titrated to maintain PPV < 10 % (GDFT group). A 1:1 propensity score matching was performed to ensure groups were comparable with regard to age, weight, duration of surgery and type of operation. The primary endpoint was length of stay in hospital. The total volume of intraoperative fluids, transfusion requirements, mechanical ventilation in 24 h, and a composite outcome of postoperative complications were also evaluated.

RESULTS. After matching, 84 control patients were compared to 84 GDFT patients. Baseline characteristics, duration of surgical procedure, physiological parameters evaluated at the start of surgery were similar in both groups. The volume of crystalloids (4500 mL [3200-6500 mL] vs. 5000 mL [3750-8862 mL]; p = 0.01) and the number of blood units infused during the surgery (1.7 U [0.9-2.0 U] vs. 2.0 U [1.7-2.6 U]; p = 0.01) as well as the fraction of patients transfused (13.1 % vs. 32.1 %; p = 0.003) and mechanically ventilated at 24 h (3.2 % vs. 9.7 %; p = 0.027) postoperatively were smaller in the GDFT group. Intraoperative PPV-based GDFT improved the composite outcome of postoperative complications (OR 0.59 [0.35 - 0.99]; Figure 1) and reduced postoperative length of stay (8 days [6 - 14 days] vs. 11 days [7 - 18 days]; p = 0.01) (Figure 2).



Composite outcome of postoperative complications



Postoperative length of stay

CONCLUSIONS. In high-risk patients, PPV-guided fluid management reduced intraoperative fluid and transfusion requirements, postoperative mechanical ventilation needs, overall postoperative complications and postoperative length of stay.

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0478

HIGH CENTRAL VENOUS SATURATION IS ASSOCIATED WITH INCREASED MORTALITY AND ORGAN FAILURE AFTER CARDIAC SURGERY

F. Balzer¹, M. Habicher¹, V. Mezger¹, C. von Heymann¹, M. Simon², H. Grubitzsch³, M. Sander¹

¹Charité - Universitätsmedizin Berlin, Dept of Anesthesiology and Intensive Care Medicine, Berlin, Germany. ²University Hospital Jena, Department of Anesthesiology and Intensive Care Medicine, Jena, Germany. ³Charité - Universitätsmedizin Berlin, Department of Cardiovascular Surgery, Berlin, Germany

INTRODUCTION. Low central saturations (ScvO₂) after cardiac surgery have been shown to be associated with unfavourable outcome [1]. The impact of high ScvO₂, however, has only been investigated in small patient populations [2].

OBJECTIVES. This retrospective analysis aims to study the influence of low (< 60 %), normal (60-80 %) and high (> 80 %) ScvO₂ on postoperative mortality and organ dysfunction in a large cardiac surgical ICU database.

METHODS. Single centre, retrospective, observational study at a university hospital in Germany. All patients undergoing cardiac surgery between 2006 and 2011 with admission measurements of ScvO₂ were included (n = 3,265 patients).

RESULTS. #Patients were allocated to one of three groups according to first ScvO₂ measurement after ICU admission (group L < 60 %, group N 60-80 %, group H > 80 %). Normal ScvO₂ was associated with lowest mortality (L: 7.7 %, N: 4.2 %, H: 8.5 %), shortest ICU stay (L: 6d [4;10], N: 5d [3;8], H: 6d [4;10]) and hospital length of stay (L: 14d [9;22], N: 13d [9;19], H: 14d [9;21]). Average time of ventilation ranged from 9 h [5;16] in group N to 13 h [7;24] in group H. Normal ScvO₂ had a lower incidence of renal dysfunction (defined as KDIGO stage 1 or higher) and haemodialysis (L: 15.3 %, N: 11.6 %, H: 22.4 %).

CONCLUSIONS. A ScvO₂ below 60 % on ICU admission was associated with the highest mortality compared to the other two groups. Nevertheless, a ScvO₂ above 80 % was associated with increased mortality and increased rate of renal failure. Therefore, in patients with low and high ScvO₂ it seems indicated that general or focal hypoperfusion leading to unfavorable outcome should be avoided, e.g. by advanced hemodynamic monitoring.

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GRANT ACKNOWLEDGMENT. This study was financially supported by institutional research grants of the Charité Medical School.

0479

THE EFFECT OF PREOPERATIVE EXERCISE ON POSTOPERATIVE OUTCOME IN ABDOMINAL AORTIC ANEURYSM (AAA) PATIENTS: PILOT STUDY

K. Richardson^{1,2}, G. Sanders², P. Hayden², S. Marcora¹, J. Hopker¹

¹University of Kent, School of Sport and Exercise Sciences, Gillingham, United Kingdom, ²Medway Maritime Hospital, Anaesthetics, Gillingham, United Kingdom

INTRODUCTION. AAA surgery can lead to ischaemia-reperfusion (I-R) injury, resulting from clamping the aortic artery's during surgery [1]. I-R injury can cause ventricular fibrillation and cell death [2]. Three days of exercise has proven to reduce I-R injury in animals [3] by mimicking tissue ischaemia through reduced oxygen availability in rats [4].

OBJECTIVES. To determine the effect of three days preoperative exercise on length of hospital stay (LOS), postoperative complications (Postoperative Morbidity Score(POMS)) [5] and 30 day mortality in AAA patients.

METHOD. Twenty-three open AAA surgical patients voluntarily enrolled into a single-blinded randomised controlled trial. Patients were randomised into i) usual care (CON) or ii) usual care plus preoperative exercise (EXP). Surgeons were blinded to which group patients were allocated. Patients in the EXP group cycled for 60 min at 60 % VO_{2peak} on three consecutive days immediately prior to surgery. The last exercise session was completed no more than 48 h prior to the operation.

RESULTS. To date we have 23 completed patients. There were similar complications between groups (Table 1), however,

4 CON patients died in the 30 days post-surgery. There were no mortality incidences in the EXP group. Furthermore, CON patients had a longer LOS compared to the EXP group, but this did not reach significance (Fig 1; P = > 0.05).

POMS	CON	EXP
Pulmonary	0	1
Infectious	3	3
Renal	6	8
Gastrointestinal	3	5
Cardiovascular	2	1
Neurological	2	0
Wound	2	3
Haematological	1	0
Pain	1	0

[Table 1]

Day 5 Postoperative complications

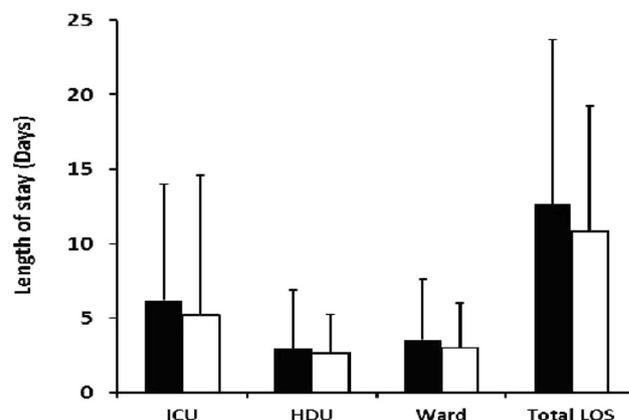


Fig. 1

Postoperative length of stay for Open AAA patients \pm SD. (CON:Black column, EXP:white column)

CONCLUSION. This pilot study has demonstrated that three days of exercise at 60 % VO_{2peak} is well tolerated with AAA patients. In addition, the current data set indicates that although the prevalence of morbidity are similar between groups as little as 3 days preoperative appears to lower incidence of mortality. However, further data is required to determine whether the effects seen in this pilot study will be reflective of the wider population of AAA patients.

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The ICU Team in its environment: 0480-0484

0480

HANDOVERS IN THE ICU: INTEROBSERVER AGREEMENT ON DIAGNOSIS AND GOALS BETWEEN DAYTIME AND NIGHTTIME INTENSIVISTS

M. Dutra¹, M.V. Monteiro¹, K.B. Ribeiro², G.P. Schettino¹, A.C. Amaral³

¹Sirio-Libanês Hospital, Critical Care Medicine, São Paulo, Brazil, ²Instituto de Ensino e Pesquisa, Sirio-Libanês Hospital, São Paulo, Brazil, ³Sunnybrook Health Sciences Centre, Critical Care Medicine, Toronto, Canada

INTRODUCTION. Handovers are essential to ensure continuity of care, however failures in communication are common and are associated with adverse events¹⁻³. Critically ill patients are highly susceptible to failures in handovers due to their complexity⁴.

OBJECTIVES. To measure the agreement on diagnosis and goals of treatment between a nighttime physician and a daytime physician after a handover. Our secondary objective was to measure the accuracy of physicians in predicting nighttime events.

METHODS. Using a semi-structured questionnaire we prospectively surveyed a cohort of physicians after a handover from the daytime to nighttime physician about diagnosis, goals and expected nighttime events for the patients in the ICU. We defined nighttime events as any new diagnostic or therapeutic interventions ordered at night. We analyzed agreement using Cohen's kappa coefficient and described accuracy using standard formulas for sensitivity and specificity.

RESULTS. We evaluated 44 handoffs, which included 352 patient-nights. Interobserver agreement was only low to moderate across all categories.

Syndromic Diagnosis	kappa	IC95 %
Acute Renal Failure (n = 133)	0,64	0,55-0,72
Respiratory Insufficiency (n = 159)	0,63	0,54-0,71
Shock (n = 153)	0,58	0,49-0,67
Altered Level of Consciousness (n = 219)	0,54	0,46-0,63
Infectious syndrome (n = 247)	0,43	0,49-0,66
Intervention Goals		
PRBC transfusion (n = 12)	0,49	0,18-0,79
Hypothermia (n = 3)	0,49	-0,10-1,09
Initiate IHD (n = 8)	-0,01	-0,02-0,00

[Interobserver agreement]

Diagnostic Goals	kappa	IC95 %
CNS Imaging (n = 7)	0,72	0,42-1,02
EEG (n = 17)	0,36	0,09-0,63
Chest Imaging (n = 12)	0,15	-0,12-0,41
Cultures (n = 17)	0,09	-0,11-0,29
Monitoring Goals		
Urine output (n = 239)	0,35	0,25-0,44
LOC (n = 192)	0,32	0,22-0,42
Respiratory pattern (n = 227)	0,26	0,16-0,36
Heart Rate Monitoring (n = 186)	-0,49	-0,14-0,06

[Interobserver agreement.]

Recommendation Goals	kappa	IC95 %
Prioritizing comfort measures (n = 33)	0,60	0,43-0,77
Wean vasopressors (n = 73)	0,46	0,33-0,59
Negative fluid balance (n = 44)	0,32	0,15-0,49
Wean inotropes (n = 14)	0,23	-0,05-0,52
Avoid benzodiazepines (n = 25)	0,05	-0,09-0,20
Avoid neuroleptics (n = 7)	-0,00	-0,01-0,00
Avoid opioids (n = 9)	-0,01	-0,02-0,00

[Interobserver agreement]

We observed 92 nighttime events, which yielded a sensitivity of 82 % (71-89 %) and 69 % (58-78 %) respectively for daytime and nighttime physicians, and a specificity of 33 % (27-38 %) and 58 % (52-63 %), respectively for daytime and nighttime physicians.

CONCLUSIONS. Agreement between physicians after a handover is low to moderate. These findings have implications for the standardization of handover.

REFERENCE(S). 1. Horwitz LI, et al. *Ann Emerg Med* 2009; 53(6): 701-710. 2. Foster S, et al. *Trends Anaesth Crit Care* 2012;2:156-160. 3. Pickering BW, et al. *Crit Care Med* 2009;37(11):2905-2912. 4. Lane D, et al. *Crit Care Med*. 2013 Aug;41(8):2015-2029.

0481

IMPACT OF RESIDENT TURNOVER ON MORBI-MORTALITY OF CRITICALLY ILL PATIENTS - A RETROSPECTIVE STUDY OF THE CUB-REA DATABASE

B.G. Chousterman¹, R. Pirracchio^{2,3}, B. Guidet⁴, P. Aegerter⁵, H. Mentec¹, CUB-Réa

¹Centre Hospitalier Victor Dupouy, Service de Réanimation Polyvalente, Argenteuil, France, ²Hôpital Européen Georges Pompidou, AP-HP, Service d'Anesthésie-Réanimation, Paris, France, ³INSERM, Centre de Recherche en Epidémiologie, U 1153, Paris, France, ⁴Hôpital Saint-Antoine, AP-HP, Service de Réanimation Médicale, Paris, France, ⁵Hôpital Ambroise Paré, AP-HP, Département d'Information Hospitalière et Santé Publique - URC, Boulogne, France

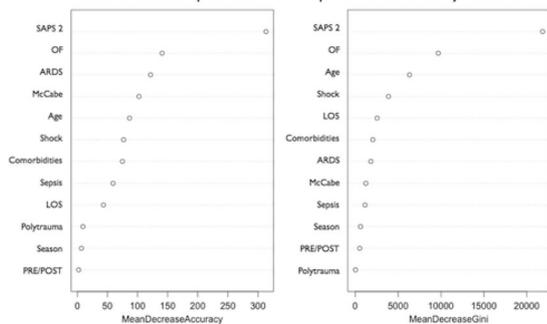
INTRODUCTION. The « July Effect » has been described as an increase in patients' morbi-mortality following the resident turnover (1). To our knowledge, the impact of this turnover had never been evaluated in the French model of closed intensive cares and 6 months resident turnover.

OBJECTIVES. Our aim was to study the effect of resident turnover on critically ill patients' morbi-mortality.

METHODS. Retrospective analysis of the CUB-REA database between 1996 and 2010 including 16 intensive care units (ICU) that are involved in residents training. Two periods were compared : before the turnover (PRE : 5th month after the arrival of the residents) and after the turnover (POST : 30 days after the arrival of the new residents). The main endpoint was ICU mortality. Secondary endpoints were the length of ICU stay (LOS), the duration of mechanical ventilation (DMV) or a score of ICU activity (the Omega score[ω]). The association between the period and the endpoints were explored in uni- and multivariate analyses after adjusting for centers, age, diagnosis for ICU admission, season, SAPS 2 score and the number or organ failures. Interactions were explored using recursive partitioning (RPART) and the relative contribution of each variable by Random Forest (RF).

RESULTS. Between 1996 and 2010, 262,772 patients were included in the database. Patients' demographic and clinical characteristics were similar between the PRE and the POST periods. Mortality in ICU were similar between the groups (PRE: 17.9 % vs POST: 18.3 %, P = 0.14). Multivariate analysis showed a small but significant increase of the mortality during the POST period (OR = 1.07, 95 % CI: 1.019-1.12, p = 0.006). However, RPART and RF (Figure) analyses showed respectively no and little correlation between the period and mortality. After adjustment, LOS (p = 0.39), DMV (p = 0.63) and OMEGA score (p = 0.72) were identical between the groups.

Relative contribution of different parameters on the prediction of death by Random Forrest



SAPS: Simplified Acute Physiology Score, OF: Number of organ failures, ARDS: Acute Respiratory Distress Syndrome, LOS: length of stay, PRE/POST: Period before or after the resident turnover.

Fig. 1

CONCLUSION. After adjustment and analyses of interactions between variables, the residents turnover doesn't seem to be associated with any substantial increase in ICU mortality nor any increase in the LOS, DMV or the intensity of ICU care.

REFERENCES. 1: *Ann Intern Med* 2011; 55 (5) : 309-15.

0482

SURFACES AND AMBIENT AIR DECONTAMINATION STUDY IN THE ENVIRONMENT OF AN ICU, USING A PORTABLE UVGI DEVICE

D. Sidiras¹, D. Karapanos², V. Aggelidou², A. Kalatzi², G. Anthopoulos²

¹Conquest Hospital, St Leonards on Sea, United Kingdom, ²251 General Air Force Hospital, Athens, Greece

INTRODUCTION. It is common knowledge, that environmental surfaces and ambient air, inside ICUs play an important role in transmission of pathogens; increasing the number of hospital induced nosocomial infections. The need of a new disinfection method which is safe, rapid and effective is required.

OBJECTIVES. To confirm previous decontamination experiments in the ICU environment and to test and evaluate the effects of the UVGI device operation with a patient in the ICU room, while a decontamination cycle is performed.

METHODS. Tru - D™ unit, an Ultra Violet Germicidal Irradiation (UVGI) device manufactured by Lumalier Corporation which utilizes UV-C irradiation (253,7 nm wavelength), was used to kill pathogens. Patients sedated and in breathing support, covered with isothermal blankets during the decontamination cycle (15-60 min depending on the microbial load of the contaminated environment). Temperature, cardiac rate, blood pressure and breathing rate were closely monitored. Microbial sample collection from targeted surfaces inside various ICU rooms, prior to and immediately after the application of UVGI, volumetric ambient air sampling for air quality testing, contact plates sampling for surface microbial testing and sedimentation plates sampling.

RESULTS. Majority of pathogens found prior to cycles were totally eliminated. Post surfaces examination showed all targeted areas were sterile. UVGI exterminated pathogens even on shadowed surfaces and helped to reduce the rooms' environmental overall microbial load by over 90 %. Ambient air microbial load reduced from 500 to 161 cfu/m³ (68 % reduction), average surface microbial load reduced from 2 to 1 cfu/plate (50 % reduction) and sedimentation plates microbial load reduced from 9-7 cfu/plate (22 % reduction)

CONCLUSIONS. UVGI device could be the new technology which will supplement efficiently the traditional cleaning and sterilization methods and perform complete decontamination of surfaces inaccessible to common methods. The reduced time required poses a huge advantage compared to traditional methods. It increases healthcare room availability, improves personnel efficiency and healthcare rooms handling

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0483

QUANTIFYING THE NON ICU COMPONENT OF THE WORKLOAD OF ICU NURSES AND DOCTORS

S. Nair¹, C. O'Connor¹, S. Burke¹, D. Finnerty¹, M. Donnelly¹, A.M. Barnes¹

¹AMNCH, Department of Anaesthesia and Intensive Care, Dublin, Ireland

INTRODUCTION. Tallaght Hospital Emergency Response System (ERS) was introduced in January 2012. The ERS comprises of the National Early Warning Score Observation chart and a rapid response team. The organisation has implemented the National Early Warning Score (NEWS) across all inpatient areas and the ED. Introduction of ERS with the existing resources has impacted on ICU duties¹⁻² of ICU doctors and nurses. Recommendations for provision of personnel for MET have been made by Jones et al³.

OBJECTIVES. To measure the time spent by the doctors and nurses out-of-ICU ERT activities from January 2013 to December 2013.

METHODS. A prospective collection of data from an on-going ICU audit at Tallaght. The following information was collected: patient demographics, location, time of ERT calls, time of decision to admit, time of arrival in ICU, time spent with patient and patient outcome.

RESULTS.

NUMBER OF ACUTE CARE REFERRALS

CRASH CALLS	246
ED DEPT. = 106 IN	
HOSP. = 131 NON ARREST = 9	
ERT CALLS	486
DIRECT CALLS	299
TOTAL NUMBER OF ACUTE REFERRALS ASSESSED	1031

[Number of acute referrals]

Total number of referral calls = 1031. 486(47 %) of these were ERT calls and 545(52.8 %) non ERT calls. The total time spent at ERT calls in 2013 equates to: Nursing Staff : 237 h; Equivalent to 19.75 working days (12 h) or 6.1 working weeks (39 h). ICU Doctors: 309 h; Equivalent to 25.75 working days (12 h) or 7.9 working weeks (39 h).

As previously mentioned the Emergency Response Team has not been provided with additional resources so it is critical to analyse the amount of time being spent by the team away from their clinical area. This data is being used as the basis for a business case for additional staff.

CONCLUSIONS. Our results indicate that being a part of the ERT team is a substantial component (47 %) of the non ICU workload for both ICU doctors and nurses. If ICU staff are absent from ICU for prolonged periods this must be accounted for in the ICU workforce.

REFERENCE(S). 1. Stachowski E, Fugaccia E. Who wants to be an intensives? *ANZCA Bulletin* 2004; 13:4. 2. Australian Medical Workforce Advisory Committee 1999: *The Intensive Care Workforce in Australia*, Sydney. 3. Jones D, Goldsmith D, Gutteridge G et al. Circadian pattern of activation of medical emergency team in a teaching hospital. *Crit care* 2005; 9 : R 303-306.

0484
COMMUNICATION WITH PRIMARY CARE: COMPARISON OF INFORMATION IN ICU & HOSPITAL DISCHARGE SUMMARIES

J. Highgate¹, R. Gray¹, O. Boyd¹

¹Royal Sussex County Hospital, Intensive Care Medicine, Brighton, United Kingdom
INTRODUCTION. It is known that survivors of intensive care are at significant risk of physical and psychological sequelae of their illness and critical care treatment¹. Furthermore, 33 % of relatives of ICU patients can also experience distress in the form of post-traumatic stress disorder². In the UK, primary care physicians (general practitioners - GPs) provide long-term continuity of care for patients and their relatives. There is increasing help for ICU survivors but little dedicated help for the relatives of ICU patients. GPs need accurate information on which they can base future medical treatment for patients and provide appropriate support for relatives.

OBJECTIVES. To compare the content of intensive care discharge summaries with hospital discharge letters sent to GPs at the Royal Sussex County Hospital.

METHODS. The content of the ICU discharge summaries were compared to that of the hospital discharge letters for patients discharged from ICU between 1st November 2013 and 1st January 2014.

RESULTS. During the study period, 130 patients were discharged from critical care. The mean length of stay in ICU was 5 days (range < 1 to 38 days) and 97 patients received ≥ 1 organ support. The ICU discharge summaries were generally detailed regarding the patients' care however 78 patients (60 %) had no detail of their ICU care included in their hospital discharge letter (26 had no hospital discharge summary, 19 had no mention of ICU and 33 mentioned a critical care admission but included no detail). Only 13 discharge summaries included all details of the ICU stay (10 %). The remainder of the hospital discharge letters (39) mentioned ICU care but included incomplete information regarding the level of support received. One patient had a protracted complicated ICU stay, including emergency surgery and full organ support, detailed fully on the ICU summary however the hospital discharge summary simply stated the patient had been in ICU post operatively. Another patient was admitted to critical care 3 times over a prolonged hospital stay and yet no mention of ICU was included in the discharge letter. Of particular concern was that important details regarding care and critical incidents, such as a cardiac arrest or iatrogenic pneumothorax, were missing or conflicting in 18 summaries.

CONCLUSIONS. There is significant discrepancy between the details on the ICU discharge summary and those on the hospital discharge letter. Currently the GP receives only the hospital discharge letter. If patients or relatives do seek help, the GP may not have all the information necessary to provide future medical or psychological care.

REFERENCE(S). 1.Hatch R et al. Psychological intervention to prevent ICU-related PTSD: who, when and for how long? Crit Care 2011, 15:141 2.Am J Respir Crit Care Med. 2005 May 1; 171(9):987-94. Epub 2005 Jan 21

Setting Up the Patient (criteria review)	Induction: 4 hours to Target Temperature	Maintain target temp for 24 hours after reaching target temp	Rewarm phase should take 12-24 hours
<p>1. Confirm arrival of patient(s) to ICU</p> <p>2. Assess patient's condition</p> <p>3. Assess patient's vital signs</p> <p>4. Assess patient's airway</p> <p>5. Assess patient's breathing</p> <p>6. Assess patient's circulation</p> <p>7. Assess patient's temperature</p> <p>8. Assess patient's neurological status</p> <p>9. Assess patient's pain</p> <p>10. Assess patient's comfort</p> <p>11. Assess patient's safety</p> <p>12. Assess patient's security</p> <p>13. Assess patient's dignity</p> <p>14. Assess patient's privacy</p> <p>15. Assess patient's confidentiality</p> <p>16. Assess patient's information</p> <p>17. Assess patient's consent</p> <p>18. Assess patient's refusal</p> <p>19. Assess patient's capacity</p> <p>20. Assess patient's best interests</p> <p>21. Assess patient's welfare</p> <p>22. Assess patient's health</p> <p>23. Assess patient's care</p> <p>24. Assess patient's treatment</p> <p>25. Assess patient's support</p> <p>26. Assess patient's care plan</p> <p>27. 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0487
THE OXYGEN COST OF REHABILITATION IN ICU

C.J. Black¹, M.P. Grocott^{2,3}, M. Singer¹

¹University College London, Bloomsbury Institute of Intensive Care Medicine, Division of Medicine, London, United Kingdom, ²University of Southampton, Integrative Physiology and Critical Illness Group, Faculty of Medicine, Southampton, United Kingdom, ³University Hospital Southampton NHS Foundation Trust, Anaesthesia and Critical Care Research Unit, Southampton, United Kingdom

INTRODUCTION. Early exercise is recommended to minimise the impact of sepsis and bed rest on nerve, cardiac and muscle dysfunction faced by patients during and following critical illness. However, little is known about the physiological load imposed on patients recovering from critical illness during such interventions. This presents a challenge to those prescribing exercise programs as the current one-size-fits-all approach may lead to over-training of some patients and undertraining others.

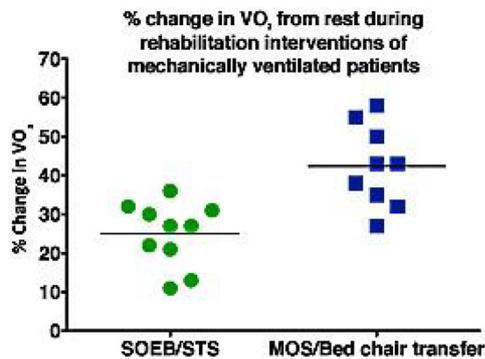
OBJECTIVES. To characterise physiological load, measured as O₂ consumption (VO₂), of rehabilitation interventions in mechanically ventilated (MV) patients.

METHODS. Fifteen MV patients were recruited provided they had been ventilated > 7 days, had a tracheostomy in situ, and would normally participate in a rehabilitation program. VO₂ and heart rate (HR) were measured continuously before, during and following normal rehabilitation sessions. These included: sitting over the edge of the bed (SOEB) ± balance exercises; sit-to-stand (STS); marching on the spot (MOS) or transferring to a chair. VO₂ was measured by the Medgraphics Ultima (MGU), a breath-by-breath gas exchange analysis system previously validated in MV patients.¹

RESULTS. 19 rehabilitation sessions were observed in 15 patients. There were no repeat observations for the same rehabilitation activity in the same patient.

Observation	Mean	Range
VO ₂ (ml/kg/min)	4.8	3.6-6.3
% change in VO ₂ from rest	33	11-58
Rehabilitation duration (min)	11	2-24
HR change (bpm)	16	4-40
Ratio of rehabilitation to recovery time	0.4	0.2-0.7

[Rehabilitation Characteristics]



% change in VO₂

CONCLUSIONS. There is considerable inter-patient variation in VO₂ during rehabilitation interventions. In some patients minimal exercise resulted in large changes in VO₂. The role of personalised rehabilitation programs merits further investigation.

REFERENCE(S). Black C, Grocott M, Singer M. Crit Care Med. 2011; 39(12 Suppl): p.90.
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0488
IS IT SAFE TO MOBILISE PATIENTS ON AN ADULT INTENSIVE CARE UNIT WHO REQUIRE CONTINUOUS INOTROPE AND/OR VASOPRESSOR INFUSIONS?

H.R. Woodbridge¹, M. Nel¹, M. Hickson¹, R.L. Grant², M. Stotz¹, G. Morgan²

¹Imperial College Healthcare National Health Service Trust, London, United Kingdom, ²Kingston University and St George's, University of London, London, United Kingdom

INTRODUCTION. Preliminary evidence suggests early mobilisation improves physical outcomes in intensive care unit (ICU) survivors. Safety concerns can limit mobilisation in ICU patients, particularly in those requiring inotropes and vasopressors who may be cardiovascularly unstable. There is a lack of studies on the safety of early mobilisation whilst patients are receiving continuous inotrope and/or vasopressor infusions (henceforth referred to as 'inotropes').

OBJECTIVES. This study investigates whether the mobilisation of patients on an adult ICU who require inotropes is safe. The risk associated with secondary outcomes of inotrope type, dosage, mobility type, reason for admission and rationale for inotrope prescription was quantified.

METHODS. This retrospective observational study used electronic ICU patient records from between January and May 2010. Records demonstrating any physiotherapy mobilisation treatments whilst the patients received inotropes, were selected and assessed for adverse events. An adverse event was defined as anything that caused the mobilisation treatment to be stopped prematurely or the need for additional medical intervention (for instance a decreased blood pressure). The proportion of treatments where an adverse event

occurred was the primary outcome. Relative risks and Fisher's exact test were used to analyse the association between secondary outcomes and adverse events.

RESULTS. 51 mobilisation treatments on inotropes from 23 patients were reviewed. 9 (18 %) of these resulted in an adverse event (95 % confidence interval: 7.2 to 28.1 %). Fisher's exact tests showed no statistically significant differences in adverse events between patients mobilised on different inotrope types or dosages, or between those mobilised to different extents. There were no statistically significant differences in adverse events for those patients admitted for different reasons or for those who were prescribed inotropes for different reasons. All relative risks calculated had wide confidence intervals indicating imprecise findings for the secondary outcomes.

CONCLUSIONS. This study shows regular mobilisation on inotropes does occur and the majority of treatments do not result in adverse events, suggesting that inotropes should not be an absolute contraindication to mobilisation. The small sample size and the effects of a retrospective design on reliability mean further research is required before conclusions can be made about the relative safety of mobilisation on inotropes. Therefore, caution during mobilisation should always prevail. Future prospective observational studies are needed to provide more robust data.

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0489
IS THE FIM + FAM A USEFUL OUTCOME MEASURE IN LONG-TERM CRITICAL CARE FOLLOW UP?

G. Pound¹, C. Purkiss¹, S. Cooke¹

¹Royal Brompton and Harefield Hospital NHS Foundation Trust, Physiotherapy, London, United Kingdom

INTRODUCTION. With increased survival of patients suffering critical illness there is rising interest in long term functional, psychological and health related quality of life outcomes. Functional and psychological morbidity after critical illness has been reported (1).

The Functional Independence Measure and Functional Assessment Measure (FIM + FAM) is a 30-item global measure of disability including 16 motor and 14 cognitive items. It is used to assess function in long term follow-up of neurological patients but use in critical care follow-up (CCFU) has not been explored.

OBJECTIVES. To assess whether the FIM + FAM is a useful and sensitive outcome measure when used at CCFU clinic.

METHODS. Patients attended CCFU clinic from 3 months after hospital discharge. Patients ventilated for > 10 days who received active rehabilitation and underwent FIM + FAM testing as inpatients were re-assessed at clinic by a physiotherapist.

Two distinct patient groups were identified. Group A: cardiac surgery patients who commenced and continued rehabilitation as inpatients at The Royal Brompton Hospital and Group B: patients retrieved from other hospitals for extracorporeal membrane oxygenation who were repatriated once stable. Data for the groups were analysed separately.

RESULTS. Demographic data of groups A and B is shown in table 1.

	Age	Gender	No. ICU days	Total length of hospital stay	Time to follow-up clinic
Group A	60yrs (42-73)	M = 4, F = 1	28 days (20-38)	40 days (27-57)	123 days (4.0 months) (100-187 days; 3.2-6.0 months)
Group B	42yrs (18-64)	M = 3, F = 2	43 days (34-108)	63 days (43-225)	154 days (5.0 months) (72-283 days; 2.3-9.1 months)

[Table 1: Demographic data; median (range)]

On initial therapy assessment group B had significantly lower motor, cognitive and total FIM + FAM scores compared to group A (p = 0.03).

Between initial assessment and discharge group A's motor, cognitive and total FIM + FAM scores improved significantly (p = 0.43). Group B's cognitive and total score improved significantly (p = 0.43) but motor score did not, reflecting that these patients were repatriated quickly once rehabilitation commenced.

Between discharge and CCFU clinic group A and B's motor, cognitive and total FIM + FAM scores improved significantly (p = 0.43, 0.43). There was no significant difference between the groups at CCFU clinic. The median scores for group A and B were high demonstrating excellent functional and cognitive recovery as determined by the FIM + FAM (Table 2) but a number of patients reported ongoing physical and psychological impairments.

	Motor (/112)	Cognitive (/98)	Total (/210)
Group A	111 (106-111)	96 (93-98)	206 (199-209)
Group B	112 (102-112)	98 (88-98)	210 (195-210)

[Table 2: Median FIM + FAM scores at follow]

One patient in group A and four in group B were receiving ongoing physiotherapy or psychology input. The FIM + FAM was not sensitive enough to identify these subtle impairments that did not impact on gross motor or cognitive function.

CONCLUSIONS. The FIM + FAM is useful as one of a battery of outcome measures to assess disability and function at CCFU clinics. It may not be sensitive enough to identify subtle impairments impacting on function and quality of life but is a useful tool that can be used across the continuum of critical illness rehabilitation and recovery.

REFERENCE(S). 1) Herridge et al. (2011). Functional disability 5 years after acute respiratory distress syndrome. N Engl J Med 364:14, 1293-1304. 2) NICE Clinical Guideline 83, Rehabilitation after critical illness, 2009.

Poster Corner Sessions

Ethics in the ICU II: 0490–0503

0490

BRAIN DEATH DETERMINATION IN 91 COUNTRIES: ARE WE THINKING ALIKE?

S. Wahlster¹, E.F. Wijdiicks², P.V. Patel³, J.C. Hemphill III⁴, D.M. Greer⁵, F.J. Mateen¹

¹Harvard Medical School, Neurology, Massachusetts General Hospital, Boston, United States, ²Mayo Clinic, Neurocritical Care, Minnesota, United States, ³Massachusetts General Hospital, Anesthesiology, Boston, United States, ⁴University of California San Francisco, Neurology, San Francisco, United States, ⁵Yale University, New Haven, United States

INTRODUCTION. The concept of brain death has evolved since first delineated in the 1960s [1]. In 1995 the American Academy of Neurology published evidence-based practice parameters [2], most recently updated in 2010 [3], to provide an algorithmic, universal step-by-step approach to brain death determination.

OBJECTIVES. To assess concepts and specific practices regarding brain death declaration worldwide.

METHODS. An electronic survey was distributed to physicians with reputed knowledge of brain death via the Neurocritical Care Society, published correspondence addresses, and personal contacts.

RESULTS. The response rate was 74 % (91 of 123 countries contacted); 30 % (n = 27) of respondents were from low or low-middle income countries (LMICs). Respondents characterized themselves as neurointensivists (n = 17, 20 %), intensivists (n = 19, 21 %), neurologists (n = 45, 49 %), and physicians from other subspecialties (n = 9, 10 %). Most countries reported a legal provision for brain death (n = 63, 70 %); 6 additional countries reported an institutional protocol without a recognized law. Of the 21 countries that reported no institutional protocol, 16 (76 %) were from LMICs.

Countries with an organized transplant network were more likely to have a brain death provision compared with countries without (53/64 (83 %) vs. 6/25 (24 %), p < 0.001).

Of the respondents that reported the presence of an institutional protocol, 54 % (n = 33) described an examination that was discordant with 2010 AAN criteria in at least some components. There were many discrepancies about the conduct of apnea testing, including specific blood gas requirements and number of tests required (54 % would perform apnea testing at least twice). There was wide variability in the use of ancillary testing; the most commonly required tests were electroencephalography (n = 20, 29 %), transcranial Doppler and catheter-based cerebral angiography (n = 4, 6 % for each test). Only 10 % (n = 7) reported that one physician alone was sufficient to declare brain death. Distinct criteria for declaration in children (n = 38, 56 %) were common; parameters reported to be different include minimum observation times before declaration (n = 33, 87 %), number of examinations (n = 17, 45 %), and additional ancillary tests required (n = 14, 37 %).

CONCLUSIONS. This recent worldwide survey demonstrates that the concept of brain death is widely established, but marked differences remain in the practice of declaration, even amongst neurological specialists. We expand on the previous report [4] by adding 29 countries and exploring additional parameters. These differences may be due to cultural and/or religious reasons, personal concepts of brain death as well as the availability of health technology, resources and medical training.

REFERENCE(S). [1] JAMA 1968;205:337-340. [2] Wijdiicks;Neurology 1995;45:1003-11. [3] Wijdiicks et al.;Neurology 2010;74:1911-8. [4] Wijdiicks;Neurology 2002; 58:20-25.

GRANT ACKNOWLEDGMENT. No financial disclosures.

0491

POSITIVE, PERCEIVED OBSTACLES TO SATISFACTORY INTERACTION IN TREATING ICU VENTILATED PATIENTS

A.-S. Debué¹, N. Kentish-Barnes²

¹Hôpital Cochin, Medical Intensive Care Unit, Paris, France, ²Hôpital Saint Louis, Paris, France

INTRODUCTION. Intensive care is a challenging setting for patient-caregiver relationships. Factors that complicate interaction include severity of the disease, coma or sedation, tracheal intubation, experience of pain, anxiety or panic. From the caregiver perspective, caring for severe, unconscious or intubated patients impedes communication and may create a feeling of depersonalized care, fear of delivering futile care or unsuccessful patient advocacy. Whether non-patient related factors contribute to altered recognition of the patient's status as a person is poorly studied.

OBJECTIVES. To evaluate caregivers' perception of ICU patients status as a person.

METHODS. We conducted 15 semi-open interviews among ICU caregivers from the MICU of Cochin University hospital. Each interview was conducted for 45-90 min using a semi-structured discussion guide to explore 4 main fields:

- i) professional history and relationship to intensive care,
- ii) definition of "good patient-caregiver relationship", including their views on autonomy, communication, and obstacles met;
- iii) personal appreciation of vulnerability and lack of autonomy,
- iv) definition and relevance of the concept of hospitality in the ICU.

Analysis was carried out with specific emphasis on identification of obstacles to what could be a satisfactory patient-caregiver relationship in the ICU.

RESULTS. We interviewed 15 ICU caregivers (5 nurses, 1 aid-nurse, 2 physiotherapists, 3 residents, 4 attending physicians) with diverse ICU experience. Analysis of interviews led to identification of 2 primary obstacles to satisfactory patient-caregiver relationship. First, the high-tech and rigid environment created by technology, protocols and impact of organ support techniques on the patients' appearance was noted in most of the interviews. Second, the "intensive care culture" that emerge from a closed team structure, the perception of emergency, the impetus for immediate organ support, as well as the burden of responsibility and sense of irreversibility. For each of these obstacles, we identified strategies implemented by caregivers to overcome barriers to communication and favor patient-centered care.

CONCLUSIONS. Caregivers are ambiguous in their approach to care for comatous patients. Perceived dehumanization of their patients is associated with caregivers' discomfort. In addition to organ support, caregivers implement strategies to overcome barriers to satisfactory patient-caregivers relationship. Such strategies involve inspection of minor reactions in their patients, and intense communication with families to re-create the person hiding behind the mask of critical illness.

0492

DO NOT ATTEMPT CARDIO-PULMONARY RESUSCITATION FORM DOCUMENTATION

C. Eyeington¹, K. Rowe¹

¹Broomfield Hospital, Mid Essex Hospitals Trust, Chelmsford, United Kingdom

INTRODUCTION. The quality of documentation is important in any aspect of medicine as documentation is a vital part of communication. Documentation of Do Not Attempt Cardio-Pulmonary Resuscitation (DNACPR) forms is particularly important as there are considerable emotional implications for the patient and their relatives as well as medico-legal responsibilities.

OBJECTIVES. The aims of this audit were to obtain a baseline and to assess the areas in which we were excelling and the areas that we could improve upon.

METHODS. This was a prospective audit that was performed by visiting all wards in a medium sized district general hospital on a single day in order to find all active DNACPR forms and assess the quality of documentation. The standard was set against local and national guidelines related to the documentation of DNACPR forms and the General Medical Council's Good Medical Practice guidance.

RESULTS. Sixty-eight DNACPR forms were identified on the twenty-first of September 2013. The areas in which we performed well include DNACPR form dated, 91 %; Appropriate patient details, 85 % and Easy to locate, 85 %. The sections that could have been done better include Documented reason why CPR is inappropriate, 78 %; DNACPR signed by appropriate person, 74 %; DNACPR countersigned, if required, 71 %; Review date completed, 72 % and Patients relatives involved, 65 %. The areas that were not performed well include Documentation of patients' capacity, 41 %; Nursing staff involved in the decision, 37 %; Nursing staff informed of the decision, 34 % and Patient involved in the decision, 29 %.

CONCLUSIONS. The overall quality of documentation of DNACPR forms is good, with the majority of forms stating appropriate patient demographics, details of why CPR would be inappropriate and signed by a suitably qualified doctor. However, the details regarding the patients' capacity to make and communicate decisions about CPR were documented poorly (41 %). There was also poor documentation of communication with the patient (29 %) and nursing staff (37 %). This suggests poor communication between doctors and nurses, and doctors and their patients. This may be due to a perceived difficulty in discussing end of life planning or fear of causing patient distress. However it may represent a documentation problem rather than a communication issue between the relevant parties. This project was presented at a joint meeting between anaesthetic, medical and surgical departments within our trust, which helped gain awareness of the issues of poor quality DNACPR documentation. This has been recognised at board level and the End of Life steering group is working towards improving the trusts practice in this important area.

REFERENCES. 1. Kiff, K and Seager, L; Adult Do Not Attempt Resuscitation Policy (DNAR) - Mid Essex Hospitals Trust Policy 05102, February 2011. 2. Good Medical Practice, General Medical Council, London, April 2013

GRANT ACKNOWLEDGEMENT. We did not receive any financial aid.

0493

DOCUMENTATION OF DEATH: A TRUST WIDE AUDIT OF COMPLIANCE

R. Chauhan¹, K. Smith¹, K. Archer¹, N. Arora¹

¹Good Hope Hospital, Intensive Care, Sutton Coldfield, United Kingdom

INTRODUCTION. Death consists of the loss of capacity for consciousness and the loss of the ability to breathe. The diagnosis, confirmation, and certification of death are core skills for medical practitioners in the UK¹. However, Recent reports suggest that we are failing in our standards in diagnosis and documenting death.

Between 2009 and 2011 five incidents where the family was prematurely informed that the patient had died at the point the resuscitation attempt was stopped were reported to the NPSA. Since then, 5 more have emerged. The actual number is underestimated. These reports do not suggest the decision to stop the resuscitation was incorrect, or that the outcome for the patient would have been any different had the resuscitation continued - the harm was in the distress caused to the patients' families.

OBJECTIVES. In light of these national safety alerts it was decided to review the documentation/certification process of those recently deceased across 2 hospital sites.

METHODS. A retrospective audit of patients certified death was conducted. Case notes across two hospital sites reviewed for documentation and compliance with the national standards set out by the Academy of medical Royal colleges². A pro-forma was designed to include the essential requirements for verification of death.

RESULTS. 103 case notes were reviewed and 14 parameters were appraised in compliance with the guidance (Patient identifiers, entry date & time, patient observations, respiratory & cardiac auscultations, pupils, duration of assessment, time & date of death, name, signature and GMC number for completion). 42 % complied with patient identifiers and there were four case notes, which had no identifiers at all. Timing and dating of entries were 99 % and 96 % respectively and only 23 % actually documented that they observed the patient for signs of respiratory effort or movement. 21 % did not document any palpation of pulses and 7 % did not mention cardiac auscultation. 94 % did however manage to check pupils. Final documentation was sub-standard with only 75 % dating and timing the verification and only 32 % actually printing their name. Only 33 doctors (32 %) actually documented their GMC numbers!

CONCLUSIONS. This audit has highlighted some gross errors in documentation and the process of diagnosing death. Documentation is key to all areas of medicine but more importantly, following the correct process to diagnose death will reduce distress to families. It has been recommended that this is highlighted at trust induction and certainly at the least the findings are disseminated and an intra-net guide/checklist developed to assist doctors and other practitioners.

REFERENCE(S). 1. Treatment and care towards the end of life: good practice in decision making. GMC 2010. 2. A Code of practice for the diagnosis and confirmation of death. AMRC

0494

A DYNAMIC MODEL OF ICU DECISION MAKING: FROM THEORY TO PRACTICE

G. Karp¹, M. Ben-Nun¹, E.K. Kishinevsky¹, G.G. Bergman¹, N. Adi¹

¹Kaplan Medical Center, Intensive Care Unit, Rehovot, Israel

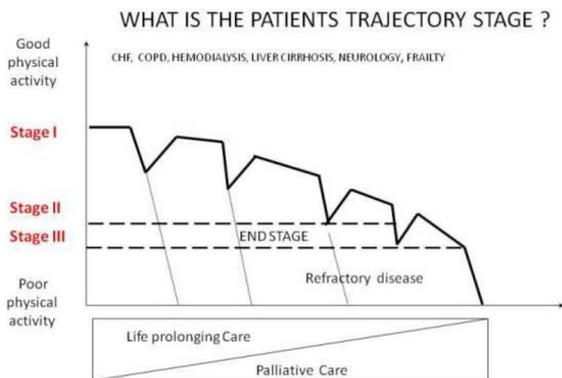
INTRODUCTION. For the bedside ICU clinician, making life and death decisions, it may be hard to evaluate the prognosis of critically ill patients suffering from comorbidities and chronic diseases. These decisions must be made to prevent unnecessary patient suffering,

family false hopes and misuse of precious resources. Ethical underpinnings and knowledge of the Law are essential to the decision making process.

OBJECTIVES. Disease Trajectories that plot the progress of terminal conditions are used in Oncology and Palliation to understand the stage that individual patients have reached. We have developed a dynamic model of an ICU Trajectory to help the ICU doctor understand where the patient is on his life arc and how near to death. It takes into account the patient's disease stage, the existing condition and acute disease severity (MODS).

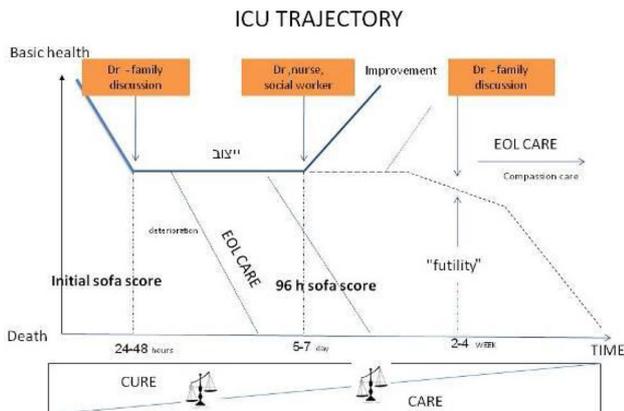
METHODS. 5 steps have to be considered

- 1) **The patient's own disease trajectory:** (Cancer trajectory; Organ System Failure Trajectory; Frailty)
- 2) **Where they are on that trajectory:** 3 triggers suggesting patient nearing end of life:
 - (a) The Surprise Question "would you be surprised if this patient were to die in next months/weeks/days?"
 - (b) General indicators of decline under optimal treatment - deterioration, increasing medical needs.
 - (c) Specific clinical indicators related to certain conditions.



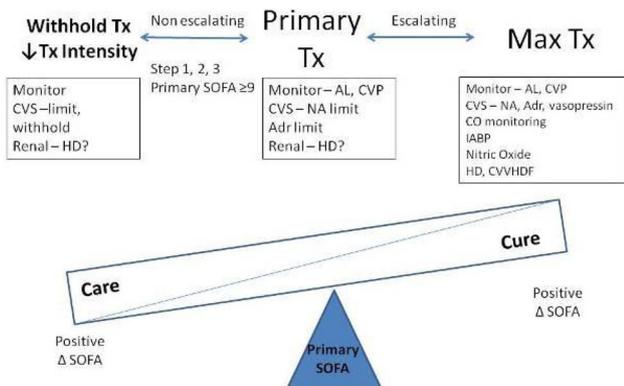
Patient trajectory stage

- 3) **Avoiding Prognostication Paralysis:** by re-considering stages 1 and 2; and then factor in patient age; Frailty Score; and SOFA score.
- 4) **ICU Trajectory: calculate Daily SOFA Score.** The trend of the delta SOFA score shows patients response to therapy.
- 5) **ICU goals strategy:** Continue Full Treatment; Limit treatment (non escalating/descending/withhold of treatment); Allow Natural Death (AND).



ICU trajectory

RESULTS.



Decision making model

CONCLUSIONS. Our model enables the ICU team to evaluate the patient's medical status with objective scores, evaluate the functional status and frailty index and thus "place" the patient on the trajectory graph. This helps decide if the patient is on the "Cure track" or "End of life track". The patient's condition is re-assessed on a daily basis. Decision making is dynamic and changes based on the patient's status. When a patient is defined as "end of life", treatment goals are adjusted accordingly. The patient (if conscious) and family receive explanations and professional support and are protected from future stress and depression. In addition, the ICU staff, who were all part of the decision making process, can cope with and contain more easily the patients dying and death.

REFERENCE(S). 1. The GSF Prognostic Indicator Guidance. 4th edition. Oct 2011. 2. Biston P. 2014. Int Care Med. Jan 2014, 40; 50-56. 3. Ferreira et al. 2001. JAMA.10;286(14):1754-8.

0495

ATTITUDES TO CO-ENROLMENT ON CRITICAL CARE: A SURVEY OF RESEARCH NURSING OPINION

K.M. Wilkinson¹, M. Bland¹, A. Krige¹

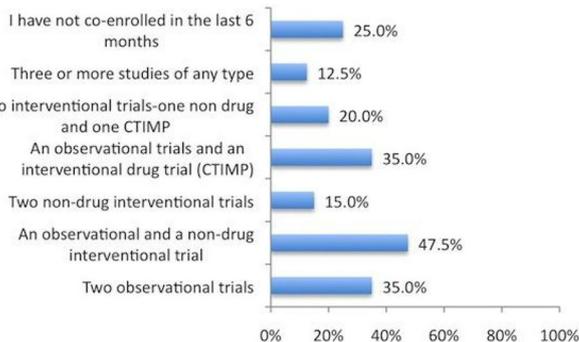
¹East Lancashire Hospitals NHS Trust, Department of Anaesthesia and Critical Care, Blackburn, United Kingdom

INTRODUCTION. Critical care research in the UK is undergoing rapid expansion-as of December 2013 there were 67 active trials registered with the National Institute for Health Research. A welcome development, this does however have the potential to saturate our research population. Co-enrolment-recruiting patients to multiple concomitant studies-has been mooted as a possible solution. The UK Intensive Care Society published guidance on this last year [2], and we are aware of several active critical care trials with co-enrolment agreements in place. Although Canadian and Antipodean critical care researchers have previously been canvassed on this subject [1], no such survey has been undertaken in the UK. Likewise, the extent of co-enrolment within the speciality is unknown.

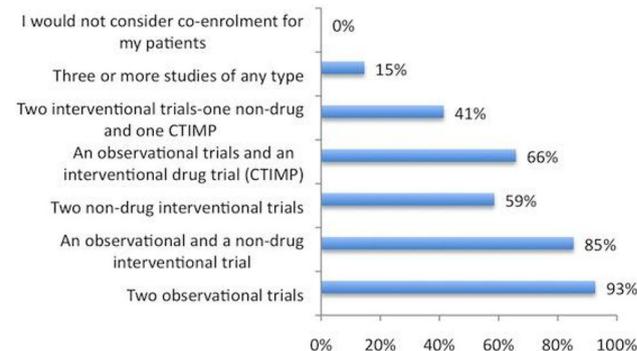
OBJECTIVES. To gain insight into the current practice of co-enrolment in the UK.

METHODS. An online survey was conducted via a UK database of critical care research nurses. Built around themes from Cook et al., this explored attitudes as well as current and potential patterns of co-enrolment. Responses were analysed using summary statistics.

RESULTS. 41 responses were received (40 % response rate). Median experience of research nursing was 4 years. All respondents were involved in the screening and consent of patients into research. 75 % had co-enrolled within the previous 6 months. None ruled out co-enrolment in the future. See charts below for a breakdown of co-enrolment patterns by study type. Co-enrolment was rated 3.95/5 (mean) effective to boost recruitment, and 3.59/5 for ethical acceptability. Most respondents expressed favourable opinions of co-enrolment in the free text. Many expressed concern that patients and families might feel overwhelmed by participation in multiple studies.



Current co-enrolment practice by trial combination



Potential co-enrolment by trial combination

CONCLUSIONS. Co-enrolment appears more widespread now than in 2008-75 % of those surveyed had co-enrolled recently compared with 53 % in the tri-national survey [1]. Forming a key link between doctors and their patients, critical care nurses would seem well placed to offer insight on this topic. In principle this staff group are supportive of co-enrolment, but concerns remain around excess burden at several stages of the research journey. Work is urgently needed to assess the impact of co-enrolment on patients and their families, with a special emphasis on assessing and reducing any psychological impact.

REFERENCE(S). 1. Enrolment of intensive care unit patients into clinical studies: a tri-national survey of researchers' experiences, beliefs and practices. Cook DJ et al. Crit Care Med 36(7):2100-5(2008). 2. Co-enrolment to intensive care studies-a UK perspective. Krige A, et al. JICS 14(2):103-6(2008).

0496 CARDIOPULMONARY RESUSCITATION IN PATIENTS OVER 80 YEARS: THE VISION OF MEDICAL STAFF

C. Martín Dal Gesso¹, J.A. Silva Obregón¹, C. Marián Crespo¹, S. Saboya Sánchez², M.A. Romera Ortega², J.E. Romo Gonzales¹

¹Hospital Universitario de Guadalajara, Guadalajara, Spain, ²Hospital Universitario Puerta de Hierro - Majadahonda, Madrid, Spain

OBJECTIVES. Analyze the opinion of ward physicians about cardiopulmonary resuscitation (CPR) performance on patients over 80 years old.

METHODS. Cross-sectional study, using questionnaires. We included all patients over 80 years old who were admitted in the hospital by the day 13/12/2013. We evaluated: age, sex, Charlson scale, Barthel scale, global deterioration scale (GDS scale), number of admissions in the last year (ALY) and the completion rate of do not resuscitate (DNR) order. Results, mean \pm standard deviation (interquartile range).

RESULTS. 378 patients admitted in the hospital, 90 (23.8 %) \geq 80 years. 11 were excluded due to the absence of the attending physician. Analyzed 79 (20.9 %). 44 males (55.7 %). Age 86.7 ± 4.7 years (83-90), 47 (59.5 %) patients were subsidiary of CPR maneuvers. Of these, 12 only of basic CPR. When we compared patients subsidiary of basic CPR (12/79) vs advanced CPR (35/79), we observed significant differences in age (88.8 ± 6.2 vs 84.3 ± 3.1 , $p < 0, 05$), Barthel (52.1 ± 29.1 vs 91.5 ± 17.8 , $P < 0.01$) and GDS (3.2 ± 1.6 vs 1.6 ± 0.7 , $p < 0, 01$). There were no differences by sex, Charlson scale and ALY. In 32 (40.5 %) patients no CPR was recommended. Seven (21.9 %) did not have the DRN order signed.

Analyzing both groups (Table 1).

	Age	Charlson	Barthel	GDS	ALY
CPR	85,4 \pm 4,5	3 \pm 1,7	81,5 \pm 27,2	2 \pm 1,2	0,8 \pm 1,1
No CPR	88,6 \pm 4,4	4,2 \pm 2,1	37,3 \pm 30,2	3,4 \pm 1,8	1,4 \pm 1,5
	$p < 0.01$	$p < 0.01$	$p < 0.01$	$p < 0.01$	N.S.

[Table 1.- Analysis CPR vs No CPR]

Comparing advanced CPR with the rest, the results are similar; finding significant differences in age, Charlson, Barthel and GDS. There are no differences in sex or ALY.

CONCLUSIONS. Age, comorbidities, degree of dependence and cognitive impairment are crucial when deciding CPR. Almost a quarter of patients in which no CPR was recommended lacked DNR order.

0497 EVALUATION OF THE AWARENESS OF ANAESTHESIOLOGISTS REGARDING REFERRAL OF POTENTIAL ORGAN DONORS: SPECIALISTS VS RESIDENTS

A. Miranda¹, N. Alegre¹, N. Losa¹, I. Carrapatoso¹, F. Santos², C. Almeida², M. Achando¹, P. Fernandes³, A. Paixão³, P. Castelões³

¹Centro Hospitalar Vila Nova Gaia/Espinho EPE, Anesthesiology, Vila Nova de Gaia, Portugal, ²Centro Hospitalar Vila Nova Gaia/Espinho EPE, Internal Medicine, Vila Nova de Gaia, Portugal, ³Centro Hospitalar Vila Nova Gaia/Espinho EPE, Anesthesiology/Intensive Care Unit, Vila Nova de Gaia, Portugal

INTRODUCTION. The number of referred potential donors (PD) is clearly insufficient for the increasing demands, becoming more important that anaesthetists who assure the emergency services, are capable of recognizing and validating the nationally accepted referral criteria.

OBJECTIVE. To compare the awareness of Anaesthesiology (A) specialists (S) and residents (R), regarding the referral of potential donors (RPD).

MATERIALS AND METHODS. anonymous and confidential questionnaire, handed to all participants of an Anesthesiology congress, evaluating theoretical knowledge of RPD criteria.

RESULTS. Amongst 500 questionnaires distributed, 101 participants answered (72 % S, 28 % R). Of these, 63 % of specialists assure the emergency room, as well as 35.7 % of R. From all surveyed, 47.9 % of the specialists and 7.1 % of residents had made at least one RPD. Both groups demonstrated the urge to be further elucidated on RPD (89 % of the R/60.3 % of S). Concerning the qualitative evaluation performed, 71.2 % of S vs. 85.7 % of R revealed a sufficient knowledge (50-74 % correct answers). The most consensual matter referred to the relation between the period of unversed hypotension and the feasibility of harvesting (94.5 % of S answered correctly, vs. 96.4 % of R). The largest discrepancy was verified on the question about whether family refusal was important and served as an exclusion criterion: 93.2 % of S and 64.3 % of R so considered. Both groups showed a low rate of correct answers on whether patients with active neoplasia, whatever its location, could be a donor (32.4 % R vs 50.6 % S). Table

Questions	Certain	Percentage
Age itself isn't an absolute criteria for exclusion	True	1 91 90,00%
Patients with active cancer, whatever is the location, cannot be donors	False	0 46 45,50%
Patients with primary CNS neoplasms may be potential donors	True	0 54 53,50%
HIV seropositivity is an absolute criteria for exclusion	True	0 86 85,10%
Carriers of hepatitis B and C may be potential donors	True	0 32 31,70%
Tubercular pulmonary lesions even if only residual contraindicate lung transplant harvest	True	2 49 48,50%
Long periods of hypotension not reversed may compromise the viability of the crop	True	0 96 95,00%
Cardiorespiratory arrest with prolonged manoeuvres may be contraindicated for harvest	True	1 68 67,30%
The criteria for brain death should always be checked in the intensive care environment	True	1 62 61,40%
The criteria for death may be performed by any specialist	False	0 84 83,20%
Faced with a potential donor we should immediately contact RENDDA before contacting the intensivists	False	1 71 70,30%
The refusal of the family is an exclusion criteria	False	0 86 85,10%

DISCUSSION AND CONCLUSION. Although specialists are in charge of emergency services and therefore the ones that refer more potential donors, they demonstrated only sufficient knowledge about the issue in question. The fact that R consider that family refusal is an exclusion criterion, reveals a more "defensive attitude". There is thus an urgent and obvious need for more and more effective education on this subject.

REFERENCES. - Transplant Law: Law No. 12/93 of 22 April, DR No 94 The 1st Series of 22/04/93. - Criteria for Brain Death: Statement of the Medical Council, under Article 12 of Law No 12/93 of 22 April, DR No. 235, 1st Series A of 08/28/99. - National Register of Non-Donor-RENDDA: Decree-Law No. 244/94 of 26 September, DR 223, 1st Series of 26/09/1994

0498 AWARENESS ABOUT ORGAN DONATION OF THE STAFF OF A SPANISH HOSPITAL

P. Carcelén¹, Z.E. Aray¹, F. Gómez¹, A. Marcos¹, F.C. Tarancón¹, T.L. Álvarez¹, S.M. Cortés², A.C. Caballero¹

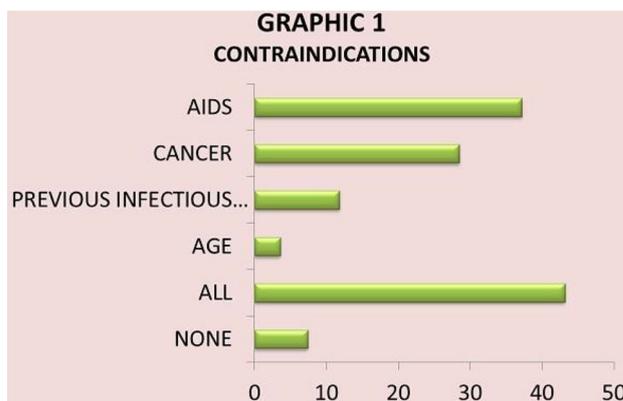
¹Complejo Asistencial de Zamora, ICU, Zamora, Spain, ²Complejo Asistencial de Zamora, Zamora, Spain

INTRODUCTION. Organ donation for transplants requires the teamwork of all the professional people in a hospital. Therefore, it is necessary right information and knowledge about this.

OBJECTIVES. The goal of this study is to find out the grade of knowledge and attitude of the staff of our hospital towards organ donation and transplant.

METHODS. A predesigned anonymous survey was done by health and non-health professionals of a secondary hospital, authorized for organ extraction. The survey contained 20 multiple-choice questions related to subjects such as: refusal to donate, brain death, need of information, etc. A total of 542 surveys were done.

RESULTS. Female: 71.2 %; Male: 28.8 %. Most frequent age range: 40-49 years old (31 %). Staff: health professionals: 437 (80.6 %); non-health professionals: 105 (19.4 %). Occupation: nurse (37.1 %), doctor (15.5 %), nurse-assistant (14.2 %), administrative staff (10.3 %), internal medical resident (6.1 %), orderly (4.8 %), others (12 %). 95.2 % think that donation is something good, 81.7 % would agree to be an organ donor, the 80.3 % of them would agree to donate all organs. The most frequent reasons to refuse to be an organ donor were: never thought about it (58.5 %), fear that doctors do not do what is necessary to save our lives (11.1 %) and lack of information (11.1 %). 92.4 % would agree to receive an organ transplant and 72.5 % would donate the organs of a deceased family member. The most frequent reasons to refuse the donation were: not knowing what the family had wanted (55 %); not a decision that can be taken for others (41.6 %), 85.6 % had ever listened about brain death, 81.9 % think that brain death is not reversible, 37.2 % think that AIDS is a contraindication to donation; 28.5 % that cancer is; 11.8 % any previous infectious disease; 3.6 % age, 43.2 % think that all of these are contraindications and 7.4 % that there are not. (GRAPHIC 1).



Graphic 1

46,7 % know the organization responsible of donation in Spain. 40,7 % think that organ distribution is according to emergency of receiver, 20,3 % that according to waiting list, and 26 % think that both are. 52,2 % had received information about organ donation. 85,4 % think that need more information about this. The most frequent way that they want to received information about organ donation were: training courses (42,4 %), media (16,7 %) and in schools (12,9 %). No significant differences in terms of sex or age (< 50 vs. ≥ 50). Significant differences were observed in terms of personal, with less knowledge about donation in non-health workers. (GRAPHIC 2).

GRAPHIC 2	ORGAN DONOR			LISTEN ABOUT BRAIN DEATH		ORGANIZATION		HAD RECEIVED INFORMATION	
	YES	NO	DON'T KNOW	YES	NO	YES	NO	YES	NO
HEALTH WORKERS	85%	1,6%	13,3%	90,6%	9,4%	52,1%	47,9%	58,7%	41,3%
NO HEALTH WORKERS	67,6%	1,9%	30,5%	64,8%	35,2%	24,8%	75,2%	25,7%	74,3%

CONCLUSIONS. The great majority of those polled indicated that they would agree to be an organ donor. The majority of the hospital staff had information about organ donation; however, a high percentage needs more information and considered the information disseminated on the subject, insufficient.

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0499 INCIDENCE OF NEUROLOGIC DEATH AMONG PATIENTS WITH BRAIN INJURY: A RETROSPECTIVE STUDY IN TURKISH HEALTH SYSTEM

C. Kaymak¹, I. Sencan², M.A. Aydin³, A. Kapuagasi⁴, B. Kemaloglu⁵, E. Kahveci⁶, H. Basar⁷, D. Oztuna⁷

¹Ministry of Health, Ankara Training and Research Hospital, Anaesthesiology and Reanimation, Intensive Care Unit, Ankara, Turkey, ²Ministry of Health, General Directorate of Health Services, Ankara, Turkey, ³Ministry of Health, Organ, Tissue and Transplantation Services, Ankara, Turkey, ⁴Ministry of Health, Deputy General Director of Organ, Tissue and Transplantation Services, Ankara, Turkey, ⁵Ministry of Health, Head of Organ Transplantation Services Unit, Ankara, Turkey, ⁶Medicana Hospital, Organ, Tissue and Transplantation Services, Ankara, Turkey, ⁷Ankara University Faculty of Medicine, Medical Biostatistics, Ankara, Turkey

INTRODUCTION. Determination of brain death can be made in patients who continue to have cardiac function during mechanical ventilation according to clinical criteria. It is defined by the irreversible cessation of cerebral and brainstem functions. Due to there is a shortage of suitable organs, diagnosis of brain death and to evaluate the donor potential is crucial.

OBJECTIVES. The aim of this study was to evaluate the brain deaths diagnosed in Turkish Health System from 2005 to 2013. In this retrospective study, Turkish Health System experiences in brain death are discussed and reviewed.

METHODS. Between 2005 and 2013, to evaluate and identify the number of brain deaths and donation performance, medical charts of all the patients who are diagnosed as brain death were retrospectively reviewed in Turkish Health System. After the diagnosis of brain death in a regional intensive care unit, all the data of the patient is registered in a web-based system (Turkish Organ and Tissue Data System) by the transplant coordinator. These data are verified by a quality-assurance process, in which all brain deaths are reviewed by National Coordination Centre.

RESULTS. The total number of potential organ donors who had diagnosed as brain death in intensive care units from 2005 to 2013 was 8146. Considering the total number of the potential donors, 26.7 % registered consent and 73.3 % registered refuse in the National Coordination Centre. The annual number of potential heart-beating donors, where brain death was diagnosed from 2005 to 2013, was ranged from a minimum of 229 up to 1705. The ratio of the actual donors to the ratio of the potential donors which is named as the overall conversion rate was 38.6 % with a range between 22.2 % and 75.9 during the years 2005-2013.

CONCLUSIONS. This study showed that the number of potential donors 3.32 times higher than the number of actual donors in these years in Turkish Health System. As the main reason of the potential donor losses is the high family refusal rates, health professionals should be focused on this main problem in order to increase the donation rates.

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0500

IMMINENT DEATH (ID) IN THE EMERGENCY DEPARTMENT. HOW AND WHERE TO TRY IT?

E. del Campo Molina¹, M.N. Parias Ángel², M.C. Alhama Lucena¹, M. Caro Díaz¹, F. Moreno Osuna¹, C. Doblas Miranda¹, M.A. Ramirez Pérez¹

¹Hospital Alto Guadalquivir, Montilla, Córdoba, Spain, ²Hospital Santa Barbara, Puertollano, Ciudad Real, Spain

INTRODUCTION. A current trend which is increasing, is that terminally ill patients suffering from degenerative diseases in advanced stage, and those patients with poor quality of life, will go to the hospital emergency room when they suffer an end exacerbation of the disease, generally to die there. The emergency room is not a cozy place for this outcome. Therefore, our emergency services must acquire the right Tools in order to achieve a dignified death in more humane conditions.

OBJECTIVES. The main objective of this study is to provide a dignified death to the terminally ill patients, accompanied by his relatives under more comfortable conditions, with appropriate health care, in the right place (not while doing an X-ray, tomography or so on), all this by performing a priority hospital admission as if the patient were a critical one.

METHODS. In 2010: A multidisciplinary income protocol was developed (doctors, nurses and auxiliary nurses) for early diagnosis of patients with signs or symptoms of impending death, who obviously did not have potential medical solution. We defined "imminent death" to that expected within the next 24 h. In 2011: We conducted training for all staff in the emergency department and, we developed a data Collection sheet. In 2012: We did a prospective study and collected the data of all the patients that had the entry criteria to the diagnosis of "imminent death".

RESULTS. Patients with the inclusion criteria during 2012 were 40 patients, of whom, up to 92.68 % were diagnosed as ID at admission. Mean age was 81.61 years (maximum/minimum were 51/96 years); 52.5 % of total were men. The exitus occurred in less than 24 h after hospital admission in 62.5 % of patients; between 24 and 48 h in 22.5 % of them, and further than 72 h in 7.5 % of patients. Of those who died before 24 h, 56 % died in less than 8 h, and of them, 28 % in the morning shift.

Hospital services to which patients were assigned at admission were: 85 % emergency department; internal medicine 5 %, and surgery 2.5 %.

CONCLUSIONS. We have improved the treatment of ID patients in our emergency department at admission.

- 97.7 % of them die in comfortable conditions, with their closest relatives with them.
- The circuito f ID is set and is known by 100 % of staff.

0501

DIFFERENCE IN THE DETECTION, EXTRACTION AND ORGANS AND TISSUE TRANSPLANTATION AT 12 YEARS

M. Recuerda¹, V. Perez², F. Carrizosa², A. Estella¹, M. Jaén², P. Guijo², M. Gracia², C. Castillo¹

¹Hospital Jerez de la Frontera, Medicina Intensiva, Cádiz, Spain, ²Hospital Jerez de la Frontera, Cádiz, Spain

OBJECTIVES. Spain is the world leader in organ transplants for 22 years, with his record in 2013. The objectives of the study is to identify the clinical and epidemiological characteristics of organ donors, the causes of refused, and compare them with cases of registration 2002.

MATERIALS AND METHODS. Cross-sectional observational study in a medical-surgical ICU of a 2nd level hospital with 17 beds. Activity data 2002 were analyzed and compared with 2013. Consecutive patients who were candidates for organ donor were included. The variables analyzed were age, sex, death cause, type of donor organs and reasons for non-donation. Data were analyzed using SPSS version 18.

RESULTS. In 2002 there were 22 donor candidates, 5 women and 15 men. Donor were 50 % (3 women and 7 men). The mean age was 51.6 years. The causes of brain death was ischemic stroke in 40 %, hemorrhagic stroke in 40 %, head trauma and anoxia was 10 %, respectively. The number of organs transplanted was 29 (20 kidneys, 7 livers 1 pancreas, 1 heart (also 10 corneas, and 10 valves). The reason for non-donation was elevated tumor markers in 60 % of cases, multiorgan failure in 20 %, renal insufficiency in 20 % remaining cases. In 2013 there were 11 candidates, 4 women and 7 men. 72.7 % were organ donors (3 women and 4 men) and one patient tissue donor. Mean age was 65.7 years. Brain death occurred in 42.8 % for ischemic stroke and hemorrhagic 57 %. 21 organs were transplanted

(14 kidneys, 5 livers, one lung and one heart). In non-patient donors the elevated tumor markers was observed, and in one case severe atherosclerosis and hemodynamic instability.

CONCLUSIONS. The profile of the organ donor patients in our sample is male, 50-60 years with acute stroke. The main problem in non-donors is the elevation of tumor markers. There is a clear increase in the average age of donors in 13 years.

0502

THE APPLICATION OF AN OPEN LUNG STRATEGY AFTER CARDIO-CIRCULATORY DEATH IN RATS PRESERVES LUNG VIABILITY AND PROMOTES THE UP-REGULATION OF PROTECTIVE GENES

F. Valenza¹, C. Lonati¹, P. Leonardi¹, A. Carlin¹, S. Coppola¹, S. Froio¹, F. Rapido¹, G. Bassani², A. Favarsani³, V. Vaira³, S. Ferrero³, P. Braidotti³, S. Gatti³, S. Bosari³, L. Gattinoni¹

¹Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Department of Pathophysiology and Transplantation, Università degli Studi di Milano, Milan, Italy,

²Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Centro di Ricerche Precliniche, Milan, Italy, ³Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, UOC Anatomia Patologica, Milan, Italy

INTRODUCTION. Donation after cardiocirculatory death (DCD) has been investigated as a method to increase the number of organs available for donation.

OBJECTIVES. Aim of our study was to test the hypothesis that an open lung strategy (OLS) preserves lung viability after cardio-circulatory death, and promote a cell protective gene pattern.

METHODS. Sprague-Dawley rats were sacrificed with intra-peritoneal injection of pentobarbital. After a no touch period of 60 min, animals were randomized to OLS or left untouched at room temperature for the next two hours (RT, n = 5). The OLS consisted of positive pressure ventilation followed by continuous positive airway pressure when body temperature reached 32 °C. Body temperature was allowed to drop naturally at room temperature (OLS-RT, n = 5) or was actively decreased (Maxi-Therm® Lite) to a target of 10 °C (n = 5) or 20 °C (n = 5). Outcome measures were wet-to-dry weight ratio (W/D), histological analysis, cell viability (Trypan-blue dye lung flush) and apoptosis (Tunel). The expression of cell protective genes was also investigated by RT-PCR. Lungs retrieved immediately after asystolia (Flush, n = 5) were also considered.

RESULTS. There was no difference between groups with respect to histological edema, hemorrhage or emphysema (P = 0.570), and lymphocyte infiltration (P = 0.146). As compared to both Flush and OLS, lungs of un-touched cadavers (RT) had more cells positive to Trypan (P < 0.05) and Tunel (P < 0.05). External cooling did not add benefit to lung preservation. Immediate early response (Fos), anti-oxidant (Hmox1), anti-inflammatory cytokine (IL-10), and suppressor of cytokine signaling (Socs3) genes were up-regulated in the OLS-RT strategy (P < 0.05).

CONCLUSIONS. The open lung strategy allowed to preserve lungs of DCD donors for up to three hours, and promoted the up-regulation of cell protective genes.

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0503

PATIENTS OLDER THAN 80 YEARS: ALL FOR EVERYONE?

J.A. Silva Obregón¹, C. Martín Dal Gesso¹, I. Bartolomé Martín¹, C. Marián Crespo¹, M.A. Romera Ortega², J.E. Romo Gonzales¹

¹Hospital Universitario de Guadalajara, Guadalajara, Spain, ²Hospital Universitario Puerta de Hierro - Majadahonda, Madrid, Spain

OBJECTIVES. The aim of our study was to analyze the opinion of physicians in charge of patients older than 80 years admitted to general hospital wards of the University Hospital of Guadalajara, regarding the employment of some "aggressive" therapeutic procedures (PRO) and "extraordinary" measures (EM) on these very old patients.

METHODS. Cross-sectional study carry out on 13/12/2013. Data collection process was fulfilled with an individual survey to physicians in charge of very old patients, employing a questionnaire specifically designed for this purpose.

All hospitalized patients ≥ 80 years old on the study day were included for the analysis. Age, gender, Charlson, Barthel and Geriatric Depression Scale (GDS) were evaluated. We considered as: 1) PRO: central venous catheter (CVC), permanent pacemaker (PP), emergency surgery (ES) 2) EM: Non-invasive mechanical ventilation (NIV), orotracheal intubation (IT), renal replacement therapy (RRT) and administration of catecholamines (CAT). The statistical analysis was performed with Student's t-test or Mann-Whitney U, as appropriate. Results are expressed as media ± standard deviation (interquartile range); (* p < 0.05; ** p < 0.01).

RESULTS. We found 378 hospitalized patients. Ninety (23.8 %) were ≥ 80 years. Eleven were excluded (no physician in charge was found), so finally we analyzed 79 (20.9 %) patients. Mean age 86.7 ± 4.7 years. Male 44 (55.7 %). Scales: Charlson 3.5 ± 2.0 (2-5); Barthel 63.6 ± 35.7 (25-100); GDS 2.6 ± 1.6 (1-3).

Analysis of PRO, revealed that physicians would employ (Yes vs NO):
CVC: 55 (69.6 %): Age 85.9 ± 4.7 vs 88.5 ± 4.3*. Charlson 3.1 ± 1.9 vs 4.2 ± 1.9*. Barthel 77.5 ± 29.9 vs 31.7 ± 26.3**. GDS 2.1 ± 1.4 vs 3.5 ± 1.6**

PP: 50 (63.3 %): Age 85.8 ± 4.7 vs 88.3 ± 4.5*. Charlson 3.1 ± 1.8 vs 4.1 ± 2.0*. Barthel 80.2 ± 27.5 vs 35 ± 29.8**. GDS 2.0 ± 1.3 vs 3.4 ± 1.7**

ES: 53 (67.1 %): Age 85.9 ± 4.5 vs 88.3 ± 4.7*. Charlson 3.3 ± 2.1 vs 3.8 ± 1.7; p = NS. Barthel 80.4 ± 27.6 vs 29.4 ± 24.1**. GDS 2.0 ± 1.3 vs 3.6 ± 1.7**

Analysis of EM, revealed that physicians would employ (Yes vs NO):
NIV: 40 (50.6 %): Age 84.7 ± 3.4 vs 88.7 ± 5*. Charlson 3 ± 1.8 vs 4 ± 2*. Barthel 88.9 ± 19.4 vs 37.7 ± 29.5**. GDS 1.6 ± 0.8 vs 3.5 ± 1.7**

IT: 31 (39.2 %): Age 84.2 ± 3.2 vs 88.3 ± 4.9*. Charlson 2.9 ± 1.8 vs 3.8 ± 2; p = NS. Barthel 94.8 ± 10.8 vs 43.4 ± 31.3**. GDS 1.5 ± 0.6 vs 3.2 ± 1.7**

RRT: 33 (41.8 %): Age 84.4 ± 3.2 vs 88.4 ± 4.9*. Charlson 3.1 ± 1.8 vs 3.8 ± 2; p = NS. Barthel 94.2 ± 11.4 vs 41.6 ± 30.6**. GDS 1.5 ± 0.6 vs 3.3 ± 1.7**

CAT: 48 (60.8 %): Age 85.8 ± 4.4 vs 88 ± 4.9*. Charlson 3.1 ± 1.8 vs 4 ± 2.1; p = NS. Barthel 80.1 ± 29.5 vs 38.1 ± 29.1**. GDS 2.1 ± 1.3 vs 3.3 ± 1.8**

CONCLUSIONS. In our study, age, level of dependency and the degree of dementia are determining factors when deciding to employ any of the evaluated procedures or extraordinary measures.

Comorbidities are only considered to decide on the employment of NIV or the implantation of CVC or a permanent pacemaker.

Catheter-related infections: 0504–0517

0504

ENTEROBACTERIACEAE BACTEREMIA (EB) IN THE EMERGENCY ROOM: EXTENDED SPECTRUM BETA LACTAMASE-PRODUCING ENTEROBACTERIACEAE (ESBL-PE) PREVALENCE, AND HOSPITAL OUTCOME. THE BACTERCOM PROSPECTIVE STUDY GROUP

J.-R. Zahar¹, J.-F. Timsit², C. Brun-Buisson³, BacterCom Study Group

¹CHU de Angers, Infection Control Unit, Angers, France, ²CHU Bichat-Claude Bernard-Paris Diderot, Intensive Care Unit, Paris, France, ³CHU Henri Mondor, Intensive Care Unit, Créteil, France

INTRODUCTION. The worldwide spread of ESBL-PE in outpatients could lead to changes in the epidemiology of EB at hospital admission, and thus may have a significant impact on the choice of first line antibiotic therapy.

OBJECTIVES. To firstly, define the prevalence of resistance to third generation cephalosporins (3GC) and ESBL-PE in patients admitted with EB BSI at hospital admission and secondly to describe hospital outcome according to the first line chosen antibiotic therapy **METHODS.** Prospective multicentric observational cohort study conducted in 68 volunteer French hospitals and 1 in Geneva. All patients admitted to the emergency room with community-onset EB were included and followed up until hospital discharge. Demographic data and underlying diseases were prospectively collected; the primary source of EB was determined according to CDC criteria; co-morbidities were determined using Charlson's weighted index and severity of sepsis according to Bone's criteria. In vitro antimicrobial susceptibility testing was performed by the disk diffusion method or the Vitek 2 system according to the guidelines of the Antibiogram Committee of the French Microbiological Society.

RESULTS. 684 patients were included. The mean age of our population was 72 ± 17 years-old; 60 (9 %) were considered immunocompromised. The mean Charlson's score at admission was 2.1 ± 2.6. The most frequent primary sites of infection were urinary (n = 388, 57 %) and intra-abdominal infection (n = 176, 26 %), whereas primary bacteremia was observed in 5 % (n = 34) of cases; 81 (12 %) patients were admitted to the ICU within the first 2 days, including 62 (76 %) presenting with severe sepsis or septic shock. *Escherichia coli* and *Klebsiella pneumoniae* were the two most frequent isolated microorganisms, respectively in 78 % and 7 % of cases. Overall, 66 (9.6 %) of the 710 isolates recovered were resistant to 3GC. Among these, 59 (8.3 %) were ESBL-PE and the remaining were cephalosporinase hyperproducers. Among *Escherichia coli* and *Klebsiella pneumoniae*, respectively (n = 49, 9 %) and (n = 6, 13 %) were ESBL-PE. Among the 59 patients with an ESBL-PE bacteremia, 42 (71 %) had been hospitalized within the last year and 34 (49 %) for a duration of more than 5 days. Among the 675 patients followed-up to hospital discharge, 68 (9.9 %) died (Table), including 29.6 % of those admitted to the ICU. Hospital mortality did not differ among those infected with 3GC-R (7/70; 10.0 %) or ESBL producers (5/54; 9.3 %) or non-ESBL-PE (58/587; 9.9 %) bacteria.

CONCLUSIONS. In patients admitted to the hospital with community-onset EB BSI, 66 (9.6 %) are infected with strains resistant to the first-line agents, of which 59 (89 %) are ESBL producers. Most of these patients have a history of prior hospital stay within the past year; however, a sizeable fraction cannot be identified only on this basis.

0505

IMPACT OF THE ARTERIAL STABILIZATION DEVICE ON THE INCIDENCE OF ARTERIAL CATHETER-RELATED BLOODSTREAM INFECTIONS AND CATHETER-RELATED COMPLICATIONS IN ICU

E. Nakataki¹, N. Okuda¹, Y. Tsunano¹, M. Onodera¹, M. Nishimura¹

¹Tokushima University Hospital, Emergency and Critical Care Medicine, Tokushima, Japan

INTRODUCTION. Arterial catheters (AC) are commonly used in clinical practice in intensive care unit (ICU), and it sometimes leads to AC-related bloodstream infection (AC-BSI). The incidence of AC-BSIs is comparable with that of central venous catheters. The insertion site is a main route of the microorganisms access to the blood stream. Radial artery is the most common site to insert an arterial catheter, and it is difficult to keep it sterile because patients move their wrist frequently.

OBJECTIVES. To investigate if the arterial stabilization device (StatLock[®], Bard Inc., NJ) decreases the incidence of catheter-related complications and AC-BSIs.

METHODS. We conducted a prospective, open label randomized trial. Patients who required an arterial line catheter for more than 48 h were enrolled in the study. Each patient was randomly allocated to two groups. The catheter was fixed with a conventional method or with StatLock[®], we called these two groups as the C group or S group, respectively. Catheters were removed when it was no longer needed, catheter-related complications (bleeding from insertion site, catheter kink etc.) occurred, or AC-BSI was suspected. Bacterial cultures were performed with removed arterial catheter tips.

RESULTS. One hundred and one patients were recruited, and 55 and 56 patients were allocated to the S and C group, respectively. The incidence of catheter-related complications was significantly less in the S group (6/55, 10.9 %) than in the C group (15/56, 26.8 %) (p = 0.039). The incidence of catheter tip contaminations did not differ between the groups (6/55 (10.9 %) in the S group vs 5/56 (8.9 %) in the C group). AC-BSI was suspected in one case with a burn patient in the S group.

CONCLUSIONS. The arterial stabilization device did not decrease the incidence of AC-BSIs, while the incidence of catheter-related complications decreased significantly.

0506

ÉPICO 2.0 PROJECT. DEVELOPMENT OF AN EDUCATIONAL THERAPEUTIC RECOMMENDATIONS USING THE DELPHI TECHNIQUE ON INVASIVE CANDIDIASIS IN CRITICALLY ILL ADULT PATIENTS

R. Zaragoza¹, R. Ferrer², P. Linares³, E. Masada⁴, A. Rodriguez⁵, Épico Project Group

¹Hospital Universitario Dr. Peset, Sepsis Unit/Intensive Care Unit, Valencia, Spain, ²Hospital Mutua de Terrasa, ICU, Terrasa, Spain, ³Hospital a Coruña, Infectious Diseases Department, Coruña, Spain, ⁴Hospital Univ. La Paz, Madrid, Spain, ⁵Hospital Universitario Joan XXIII, Tarragona, Spain

INTRODUCTION. Although there has been an improvement in the management of Invasive Candidiasis (IC) in the last decade, several issues are still controversial, especially in selected subgroups of critically-ill patients.

OBJECTIVES. We sought to achieve high agreement recommendations required to treat critically ill adults patients with IC f in different scenarios and situations.

METHODS. Second prospective Spanish survey reaching consensus by the Delphi technique, in a first term to 25 national multidisciplinary experts in IC from five national scientific societies including Intensivists, Anesthesiologists, Microbiologists, Pharmacologists and Infectious diseases specialists, answering 33 questions prepared by a coordination group. The educational objectives spanned four categories, including immunocompromised patients (ICP), special situations, organ failure and peritoneal candidiasis. The agreement among panellist in each item should be higher than 75 % to be selected. In a second term, more than 80 specialists were invited to validate the preselected recommendations.

RESULTS. In the first term 15 recommendations were preselected (ICP(6), special situations (3), organ failure (3) and peritoneal candidiasis (3)). After the second round the following 13 were validated: **ICP (5):** Consider hepatotoxicity and interactions before starting antifungal treatment with azoles in transplanted patients; Treat candidemia in neutropenic patients (NP) with antifungals at least 14 days after the first blood culture negative and until normalization of neutrophils. Caspofungin, if needed, is the echinocandin with more scientific evidence to treat IC in NP; Caspofungin also is the first choice drug to treat febrile neutropenia; In NP with IC remove catheter. **Special situations (2):** In moderate hepatocellular failure patients with IC use echinocandins (anidulafungin and caspofungin low dosage preferably) and try to avoid azoles; In case of possible interactions review all the drugs involved and use preferably Anidulafungin. **Organ failures (3):** Echinocandins are the safest antifungal drugs; reconsider the use of azoles in patients under renal replacement therapy; All the echinocandins are accepted to treat patients under continuous renal replacement therapy and do not need any dosage adjust. **Peritoneal candidiasis (3):** Source control and early adequate antifungal treatment is mandatory; Empirical antifungal treatment is recommended in secondary nosocomial peritonitis with risk Candida spp. colonization risk factors and in tertiary peritonitis

CONCLUSIONS. Treatment of IC in ICU patients requires skills that our recommendations resume. These recommendations may help to optimize the therapeutic management of these patients in special situations and different scenarios based on DELPHI methodology.

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0507

HEALTHCARE ASSOCIATED BLOOD STREAM INFECTIONS IN CRITICALLY ILL PATIENTS: DESCRIPTIVE CROSS-SECTIONAL DATABASE STUDY EVALUATING CONCORDANCE WITH CLINICAL SITE INFECTIONS

N. Culshaw¹, G. Glover¹, C. Whiteley¹, D. Wyncoll¹, A. Jones¹, M. Shankar-Hari^{1,2}

¹Guy's and St. Thomas' NHS Foundation Trust, Intensive Care Medicine, London, United Kingdom, ²King's College London, Division of Asthma, Allergy and Lung Biology, London, United Kingdom

INTRODUCTION. The detection of pathogenic micro-organisms in blood culture 48 h or more following admission to critical care (ICU-BSI) is associated with an increased risk of adverse outcomes. ICU-BSI are either primary [unknown source] or secondary [pathogens disseminate from a known primary focus of infection into the bloodstream]. This study addresses a key knowledge gap in the literature: evaluating pathogen concordance between secondary ICU-BSIs and clinical site isolates.

OBJECTIVES. We performed a descriptive cross-sectional database study to characterise the epidemiology of pathogens identified in ICU-BSI; to determine the source of ICU-BSI: identifying primary and secondary ICU-BSI; and to assess the concordance of secondary ICU-BSI with pathogens detected at other clinical sites.

METHODS. All positive blood cultures identified 48 h or more following admission to our single centre tertiary adult ICU were captured in a database over a 48 month period. ICU-BSI were classified as either catheter linked blood stream infections [CLBSI] or non-CLBSI infections. Non-CLBSI blood cultures were categorised as either contaminants or secondary concordant or discordant ICU-BSI depending on their concordance with contemporaneous clinical site microbiology. Pathogenic isolates for which no clinical site source was identified were defined as primary ICU-BSI.

RESULTS. We identified 724 individual culture results and 765 organisms; 5.5 % (n = 40), of the blood cultures contained more than one isolate. Contaminant species were the sole organisms cultured in 48.1 % [n = 348] of blood cultures. Amongst non-contaminant pathogens gram-positive bacteria were the predominant isolates (n = 455 [59.5 %]) followed by gram-negative bacteria and fungi (n = 270 [35.3 %] and n = 40 [5.2 %] respectively). 5.8 % [n = 44] of isolates were CLBSI. A total of 363 isolates met the primary or secondary non-CLBSI ICU-BSI definition. 250 (68.9 %) of the ICU-BSIs were secondary; of these 152 (60.8 %) were concordant with pathogens at a clinical site and 98 were discordant. 113 isolates were primary ICU-BSIs. The respiratory and urinary tracts were the most common clinical site sources of both concordant and discordant secondary ICU-BSI.

CONCLUSIONS. Contaminant species are frequently isolated in blood cultures taken from ICU patients. Secondary ICU-BSI are more common than primary ICU-BSI, however only two-thirds of these had a concordant clinical site isolate. Discordant secondary ICU-BSI may explain the heterogeneity in outcomes reported in other studies evaluating ICU-BSI.

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0508

PREDICTING BACTERAEMIA - A VALIDATION STUDY OF CURRENT BACTERAEMIA PREDICTION TOOLS

L. Hodgson¹, N. Dragolea², R. Venn¹, B. Dimitrov³, L. Forni¹

¹Western Sussex Hospital, Worthing, United Kingdom, ²Brighton and Sussex Medical School, Brighton, United Kingdom, ³University of Southampton, Primary Care and Population Sciences, Southampton, United Kingdom

INTRODUCTION. Bacteraemia is a major cause of morbidity and mortality worldwide. Improving early recognition of evolving sepsis could have a major impact on management and subsequent patient outcomes. A number of bacteraemia prediction rules have been reported though only the SIRS criteria is in widespread clinical use and validation studies remain scarce.

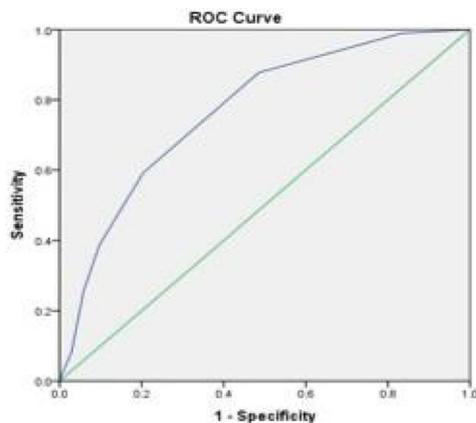
OBJECTIVES. We aimed to validate a bacteraemia prediction rule (the Shapiro criteria)¹ and compare its performance with that of the SIRS criteria,² the neutrophil-lymphocyte ratio (NLR)³ and a combination of the NLR with CRP in medical patients admitted to a District General Hospital in the UK.

METHODS. Data was collected prospectively over a year from 4807 medical patients aged 18 and over. 634 (13 %) had blood cultures (BCs) taken, with 105 (17 %) of these judged to have significant 'true bacteraemia.' The patients with positive BCs were then compared with a similar sample of patients with negative BCs for analysis. The Shapiro criteria¹ prompts a BC if 1 major or at least 2 minor criteria are met. SIRS criteria are well known.

RESULTS. 98 patients with positive BCs (mean age 68) and 103 patients with negative BCs (mean age 63) were available for full analysis. In-patient mortality was 12 % in the BC positive group and 6 % in the BC negative group. (See table for a comparison of the prediction models)

	Sensitivity (95 % Confidence Intervals)	Specificity (95 % CIs)	Positive Predictive Value (95 % CIs)	Negative Predictive Value (95 % CIs)
Shapiro Criteria (at least one major or two minor criteria)	88 % (80-94)	52 % (41-61)	63 % (55-71)	82 % (70-90)
SIRS (2 or more)	50 % (40-60)	63 % (53-72)	56 % (45-67)	57 % (47-66)
Neutrophil Lymphocyte Ratio (NLR) > 10	83 % (74-90)	55 % (45-65)	64 % (55-73)	77 % (65-86)
NLR > 10 or CRP > 50	95 % (88-98)	37 % (27-47)	58 % (50-66)	88 % (74-96)

[Bacteraemia Prediction Rules]



ROC Shapiro Criteria

The Figure above demonstrates the receiver operating curve (ROC) for the Shapiro criteria, with an area under the curve of 0.77 (0.70-0.83) for the suggested cut-off.

The SIRS criteria performed poorly. Using the NLR value >10 or a CRP value >50 was the most sensitive model for predicting patients who developed bacteraemia, but lacked specificity.

CONCLUSIONS. The Shapiro criteria predicted patients who developed bacteraemia with high sensitivity (88 %) however with a negative predictive value of 82 %, employing the rule in clinical practice to guide clinicians as to which patients do not require a BC would potentially lead to missed cases of bacteraemia. The SIRS criteria was neither sensitive nor specific in evaluating risk of bacteraemia. Future avenues of study could utilise the NLR alongside observations and past medical history to accurately predict those patients with suspected infection who are at high or low risk of bacteraemia.

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0509

PERIPHERALLY-INSERTED CENTRAL CATHETERS PLACED IN THE ICU

A. Loza¹, P. Jimenez¹, D. Macias¹, S. Gonzalez¹, F. Lucena¹, C. Leon¹, A. Lesmes¹

¹University Hospital of Valme, Intensive Care Unit, Seville, Spain

BACKGROUND. The use of peripherally-inserted central catheters (PICCs) has notably increased in hospitalized, critically ill and ambulatory patients. However, it is important to understand the rationale and risks associated with this new technology.

OBJECTIVES. To describe patterns of use and complications of PICCs, which were placed in the ICU setting.

METHODS. Prospective and observational study conducted in a teaching hospital of more than 500 beds, with a 14-bed ICU, in which a specialized unit for catheter insertion (Hickman, Ports) is available. PICCs were implanted following a protocol that included a strict sterile insertion procedure, echographic and radiological control, carried out by a staff intensivist and a nurse of the ICU. Data of all PICCs inserted during the year 2013 were recorded as well as insertion-related variables, follow-up (1 and 6 months) and withdrawal. Descriptive data included frequencies and percentages for categorical variables and mean and standard deviation (SD) or median and interquartile range (IQR) (25th-75th percentile) for quantitative variables.

RESULTS. A total of 206 PICCs were placed. The mean age of the patients was 60 (15) years, with a predominance of males (n = 108, 52.4 %). Patients came from a hospital ward (n = 124, 60 %) and the remaining from home (n = 81, 40 %). More than half of the

patients (n = 110, 53.4 %) belonged to the Haemato-Oncology Service, 28 (13.6 %), to Internal Medicine, 20 (9.7 %) to Nutrition, 16 (7.8 %) to Surgery and only 11 (5.3 %) to the ICU. Seventy-four (36.8 %) patients had solid tumours, 54 (26.9 %) haematological neoplasms and 21 (10.4 %) inflammatory bowel disease. PICCs were mainly used for chemotherapy and parenteral nutrition in 108 (53.2 %) and 54 (26.6 %) patients, respectively. In 199 (97 %) patients, no complications related to PICCs insertion were recorded. Eighty-two patients were followed in which the mean length of use was 66.5 (94.9) days and reasons for withdrawal included end of treatment in 29 (35.4 %), death in 28 (34.1 %) and obstruction in 1 (1.2 %). Ten episodes of catheter-related bloodstream infection (1.6/1000 catheter-days) were recorded. These episodes appeared at a median length of use of 61 days (IQR 33.5-110.2). Causative pathogens were S. epidermidis in 4 cases and S. capitis, S. haemolyticus, S. aureus, S. liquefaciens, K. pneumoniae and B. fragilis in 1 case each. Venous thrombosis occurred in two patients. None of the complications (infectious and vascular) had a direct effect on mortality.

CONCLUSIONS. In our experience, many patients in non-intensive care unit settings receive PICCs, most were haemato-oncological patients, mainly for the administration of chemotherapy. There were no relevant complications related to catheter insertion, the mean time of use was 2 months, and the reason for withdrawal was the end of treatment/death. A rate of catheter-related bloodstream infection of 1.6/1000 catheter-days was recorded.

0510

PREVALENCE OF CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS IN GREEK INTENSIVE CARE UNITS-THE BACT.GR STUDY

M. Kompoti¹, K. Arvaniti¹, F. Frantzeskaki¹, M. Michalia¹, N. Kapravelos¹, A. Panagiotakopoulou¹, K. Mandragos¹, P. Tasioudis¹, A. Ioakeimidou¹, V. Theodorou¹, I. Chouris¹, G. Vlachogianni¹, A. Vakalos¹, E. Nagki¹, V. Makrakis¹, A. Karathanou¹, E. Paramythiotou¹, S. Papanikolaou¹, G. Sideri¹, E. Tavladaki¹, E. Papadomichelakisi¹

¹Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine, Athens, Greece

INTRODUCTION. Central line-associated bloodstream infection (CLABSI) is considered a frequent complication in intensive care unit (ICU) patients in Greece. However, published studies are often undersized and not depictive of the total burden of the problem.

OBJECTIVES. The Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine designed the BACT.GR study in order to delineate the epidemiology of CLABSIs in Greek ICUs, on a national scale.

METHODS. Prospective, observational study performed between January and March 2012. All ICU-acquired bloodstream infections (BSIs) in patients with a central line in place were included. Definitions were according to CDC-NHSN. Demographic and clinical patients' characteristics as well as ICU characteristics were collected. Results are reported as mean ± SD.

RESULTS. Thirty-three ICUs of 30 hospitals participated, 21 (64 %) ICUs were from the two largest cities in Greece. Most ICUs were non-teaching (27/33, 82 %) and medical-surgical (32/33, 97 %). In total, 14,553 patient-days and 13,857 catheter-days were recorded (mean central line utilization ratio 0.96 ± 0.07). In 191 patients, 226 BSIs were recorded; 156 out of 226 (69 %), 10.3 per 1,000 catheter-days, 95 % CI 7.9 - 12.6) were primary bacteremias and characterized as CLABSIs and 70 out of 226 (31 %) were considered secondary bacteremias. In 67 out of 156 primary cases (43 %, 4.7 per 1,000 catheter-days, 95 % CI 3.3 - 6.2) BSIs were attributed to central line (Catheter-Related BSIs, CR-BSIs). Patients with CLABSIs had an age of 62.7 ± 16.8 years, APACHE 20.6 ± 7.3, ICU length of stay 44 ± 37.9 days (vs. 12.2 ± 7.1 days in the overall studied ICU population, p < 0.05) and a mortality of 54.2 % (vs. 21.3 % in the overall studied ICU population, p < 0.05).

CONCLUSIONS. This was the first nationwide surveillance in Greek ICUs revealing an alarming prevalence and a significant impact of CLABSIs on ICU length of stay and mortality. Important considerations to guide further action include the noticeably high central line utilization ratio and the need for infection control implementation.

0511

SUSTAINED LOW RATE OF CATHETER-RELATED INFECTIONS BY REPEATED MULTIDISCIPLINARY INTERVENTIONS

C. Agvald-Ohman¹, E. Erlandsson¹, E. Sjöström¹

¹Karolinska University Hospital Huddinge, Anaesthesiology and Intensive Care, Stockholm, Sweden

INTRODUCTION. Central venous catheters (CVC)-related infections in the ICU is a complication with impact on morbidity and health care costs. Several studies has (1) shown the impact of infection control programs to decrease the infection rates. However, the infection rate expressed as CVC-infections/1000 days can be difficult to monitor exactly in daily clinical practice.

OBJECTIVES. To decrease our CVC-related infections by implementing a bundle of measures. To monitor the effect with help of our patient data system (Clinisoft) that can monitor every minute with a CVC/CDC line in the ICU.

METHODS. Our CVC-related infection rate had increased between 2009-2011, (see Fig 1). To start working with a quality improvement project we planned for different interventions during 2011. We made several one day prevalence studies of compliance to the CVC bundle of caring for the CVC. We started an education program for all staff in March 2011. We implemented a checklist for CVC insertion with the beginning in May 2011. We gave continuous feedback to all staff including the physicians on a monthly basis after implementing the checklist.

RESULTS. We reached a good compliance (> 90 %) to our checklist among physicians and assisting nurses. (See Fig 2).

We also achieved a better compliance to the CVC bundles for caring of the CVC, (data not shown). Altogether this decreased our infection rate from 4,35 to 1,95/1000 CVC days. (See Fig 2).

CONCLUSION. To reach sustainable changes it is important to work multidisciplinary and be prepared to make a new drive to restart focus on the subject every now and then. It is also favourable to have a patient data system that allows you to monitor the exact time with central lines in your ICU. "Never let go" to keep up the performance!

REFERENCE. 1. Prevention of central line-associated bloodstream infections through quality improvement interventions: a systematic review and meta-analysis; *Clinical Infectious Diseases* (On line published April 9, 2014)

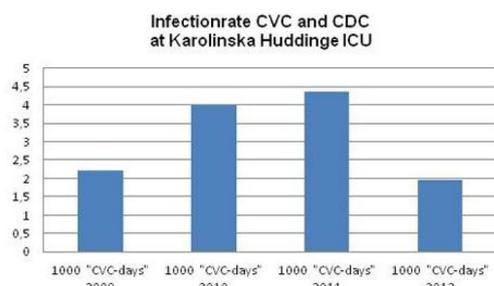


Fig 1. Shows the infection rate per 1000 catheter days at the ICU during 2009-2012.

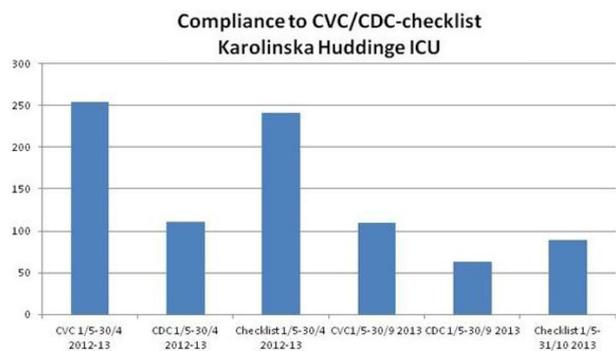


Fig 2. This shows compliance to checklist after implementation. Assuming that 1/3 of the patients gets a CVC and a CDC at the same occasion, the compliance to checklist is > 90 % CVC=Central venous catheters CDC=Central dialysis catheters

0512 REDUCING CATHETER RELATED BLOODSTREAM INFECTION WITH CENTRAL VENOUS CATHETER COATING: A SYSTEMATIC REVIEW

S.R. Kennedy¹

¹University of Bristol, Bristol, United Kingdom

INTRODUCTION. Catheter related bloodstream infection (CRBSI) is a common, severe and costly complication of central venous catheters. Coating such devices with antibiotic and antiseptic materials is a potentially efficacious method of reducing rates of infection but the optimal coating is yet to be fully elucidated.

OBJECTIVES. To evaluate the effectiveness of central line catheters coated with minocycline-rifampicin (MR) or chlorhexidine and silver-sulphadiazine (CSS) when compared to uncoated catheters, in reducing CRBSI.

METHODS. Systematic searches of MEDLINE, EMBASE and COCHRANE databases for relevant randomised-controlled trials were conducted. Studies were analysed for number of catheter-related bloodstream infections relating to MR, CSS and uncoated central lines. Meta-analysis was used to generate overall risk ratios of CRBSI for each comparison of catheters. Trials were also assessed for quality using the Jadad score.

RESULTS. A total of 15 studies were selected, reporting data on 5,455 central venous catheters. Trials were of varying quality. Both CSS and MR coated catheters were found to reduce rates of CRBSI compared to uncoated devices (respectively: RR 0.59 [0.40-0.89]; RR 0.36 [0.17-0.77]). In trials directly comparing MR and CSS coated catheters, MR catheters were found to be significantly more effective in reducing catheter related infection (RR 0.07 [0.01-0.57]).

CONCLUSIONS. Coating central lines with minocycline-rifampicin or chlorhexidine and silver-sulphadiazine reduces rates of CRBSI compared to uncoated lines. Minocycline-rifampicin coated catheters appear to be the most efficacious devices at reducing CRBSI rates. Given the cost and severity of these infections, such a finding may have significant implications for practice on intensive care units.

0513 RISK FACTORS ASSOCIATED WITH CENTRAL CATHETER INFECTIONS INSERTED IN INTENSIVE CARE UNIT (ICU) IN A DISTRICT HOSPITAL

B. Sosa¹, L.A. Domínguez¹, P. Fernández¹, E. Blasco¹, M.J. Prieto¹

¹Hospital Marina Baixa, Intensive Care Unit, Villajoyosa, Spain

INTRODUCTION. Catheter bacteraemia is the second infection complication in frequency in ICU. Usually, factors related to catheter infection are: location, lumen number, staff experience, duration, patient characteristics and number of interventions over the catheter.

OBJECTIVES. To assess whether the location of central venous catheter is related to catheter infections in patients admitted to the ICU.

METHODS. Observational, retrospective, cohort study. Central catheters inserted in patients admitted to the ICU were collected. ICU works with a protocol of insertion and catheter care. We considered catheter infection if clinical signs and, blood and catheter cultures positive for the same bacteria. Variables describing the patients and potentially related to catheter-bacteremia were collected. Quantitative variables were described as mean and standard deviation (SD) if they followed the normal distribution, and as percentiles 25, 50 and 75 if they don't. Categorical variables were described as absolute numbers and percentages. Quantitative variables were compared using the Student's t test for independent samples for following the normal distribution and the Mann-Whitney U test for not following. Categorical variables were compared using the Pearson's Chi square test (χ^2). To identify independent risk factors for catheter related bacteraemia a binary logistic regression was performed.

RESULTS. A total of 133 CVCs were inserted in 97 patients. Five catheter-bacteremia were obtained. The median of age was 69 years. The mean APACHE II was 21.16, SD 11.04. 54.6 % were men. 68 % were medical. The most frequent diagnosis was abdominal septic

shock (17.52 %). A 22.7 % of patients were under total parenteral nutrition (TPN). The insertion access was femoral vein in 45.9 % of catheters. Median catheter days was 22. In the bivariate analysis only TPN and urgent insertion were significantly related to catheter-bacteremia ($\chi^2 = 6.51$, $p = 0.01$, OR = 11.68, 95 % CI 1.15 to 118.73) and ($\chi^2 = 4.97$, $p = 0.026$, OR = 1.08, 95 % CI 1.01 to 1.15). In the multivariate analysis only TPN appeared as an independent risk factor for bacteraemia ($p = 0.027$, OR = 27.03, 95 % CI 1.45 to 50). The femoral access did not appear as a factor related to catheter-bacteremia ($\chi^2 = 0.42$, $p = 0.518$, OR = 1.81, 95 % CI 0.29 to 11.20).

CONCLUSIONS. In our study, venous access was not found to be a risk factor for catheter related bacteraemia. The only independent risk factor for catheter-bacteremia was TPN.

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0514 FUNGAEMIA CAUSES, OUTCOME AND PREDICTORS OF SURVIVAL IN NON-NEUTROPENIC PATIENTS IN A GENERAL 12-BED ICU IN GREECE

V. Tsolaki¹, M. Karapetsa¹, S. Xitsas², E. Peteinaki², E. Zakyntinos¹

¹Intensive Care Department, University Hospital of Thessaly, Larisa, Greece, ²Microbiology Department, University Hospital of Thessaly, Larisa, Greece

INTRODUCTION. Fungaemia, especially from *Candida* species, largely increases the risk of patient mortality, length of stay and related costs.

OBJECTIVES. The purpose of this study was to evaluate the characteristics, the survival rate of patients with fungaemia and also to identify predictors of survival.

METHODS. A retrospective study of intubated patients with a fungal BSI who were admitted to a general ICU in central Greece, due to any cause.

RESULTS. During a 4-year period (2011-2014), 19 patients with fungaemia were identified (10 *C. albicans*, 6 *C. non-albicans* [1 *C. famata*, 1 *C. tropicalis*, 2 *C. parapsilosis*], 2 *Fusarium solanii*, 1 *Fusarium ventriculoides*). 21 % were admitted due to surgical reasons (trauma, rupture of the oesophagus) and the rest due to medical problems (ARDS, sepsis, Guillain-Barre syndrome). 26 % of the patients were immunocompromised. In 63.5 % fungal infection occurred beyond 10 days of ICU stay, 47.36 % had a preceding BSI and 73.68 % of the patients were on antibiotics for more than 10 days with 89.47 % being treated with two or more. Overall survival was 57.9 %. Survival of patients with *C. non-albicans* strains and *Fusarium* was 100 %. Survival between patients with early (< 10 days) vs late onset fungaemia was not different ($p = 0.994$). Univariate analysis revealed that the need for RRT (OR 6.86 $p = 0.041$), need for vasopressors (OR 3.2 $p = 0.020$), blood urea (> 94.5 mg/ml) (OR 4.80 $p = 0.005$), concomitant presence of the fungus in the urinary tract (OR 6.86 $p = 0.041$) and SOFA score > 8 on the day of fungus isolation in blood (OR 9.61 $p = 0.001$) were predictors of mortality. In logistic regression analysis, SOFA score on the day of fungaemia detection, was the only predictor of mortality (adjusted OR 2.68 $p = 0.034$). Survival of patients with low SOFA score on the day of fungus isolation was 90.9 % (cut off point for SOFA was 8, with 100 % sensitivity and 91 % specificity in predicting death), whereas patients with increased SOFA score had a survival rate of 12.5 %.

CONCLUSIONS. Patients with fungal blood stream infections in general, have a survival rate of 57.9 %. SOFA score on the day of fungus isolation in blood can accurately predict mortality with a cut off value of 8.

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0515 ICU-ACQUIRED BACTEREMIAS SECONDARY TO OTHER FOCI (BSOF). DIFFERENCES ACCORDING TO THE SITE OF INFECTION

M. Palomar¹, N. Xavier², F. Alvarez Lerma³, P. Olaechea⁴, M. Martinez⁵, M. Catalan⁶, E. Yuste⁷, B. Jimenez⁸, ENVIN HELICS

¹H U Arnau de Vilanova, ICU, Lleida, Spain, ²H U Arnau de Vilanova, Lleida, Spain, ³H U Mar, Barcelona, Spain, ⁴H Galdakao, Galdakao, Spain, ⁵IRB Lleida, Lleida, Spain, ⁶H U Doce de Octubre, Madrid, Spain, ⁷H U San Cecilio, Granada, Spain, ⁸H U Lozano Blesa, Zaragoza, Spain

INTRODUCTION. The UCI acquired BSOF represent a significant risk to critically ill patients. **OBJECTIVES.** To study the source-dependent differences of the ICU-acquired bacteremias secondary to other foci (BSOF), excluding the origin catheter.

METHODS. Multicenter prospective, observational, study of ICU acquired BSOF from January 2012 to December 2013 according to the HELICS definitions. BSOF were classified as respiratory (RB), urinary (UB), abdominal (AB), central nervous system (CNSB) skin and soft tissue (SSTB) and others (OB). Participating units, length of stay, episodes of bacteraemia, characteristics of patients and episodes were documented. The results are compared with the Fisher and Chi square test.

RESULTS. A total of 203258 patients from 231 ICUs were included, with 1274.000 days of stay; 2.578 episodes of BSOF were diagnosed, giving an incidence of 2.02 episodes per 1000 d of stay. RB was the most common (38.8 %) followed by AB (27.3 %), UB (14.3 %), SSTB (6.8 %), CNSB (1.4 %) and OB (1.1 %). The characteristics of each foci are shown in Table 1. Significant differences in severe systemic inflammatory response (SIR) and mortality between different foci were observed.

	RB	UB	AB	CNSB	SSTB	OB
N (%)	1003(38,8)	370 (14,3)	706 (27,3)	38 (1,4)	38 (1,4)	285 (11,0)
Age	60,12	63,76	63,48	55,03	58,26	61,92
APACHE II	21,38	19,79	20,93	20,09	19,78	20,02
Day Bacteremia	17,71	17,08	17,03	19,18	16,75	16,53
ICU LOS (days)	34,49 (27,6)	30,54 (24,58)	32,26 (23,5)	34,80 (19,8)	32,82 (24,4)	32,61 (24,39)
Mortality (%)	43,80	38,82	49,17	38,23	37,26	35,96
Severe sepsis (%)	27,91	27,95	30,58	15,79	26,70	24,11
Septic shock (%)	25,40	16,71	39,54	15,79	39,54	23,40

[Table 1]

CONCLUSIONS. The main foci were the respiratory and abdominal BSOF. The characteristics of patients with BSOF varied according to the site of infection. The most serious SIR occurred in the BSOF of abdominal origin. Mortality was high, especially in the AB and RB.

0516 DAPTOMYCIN IN PREVENTION OF BACTERIEMIA ASSOCIATED TO CENTRAL VENOUS CATHETER (CVC) DURING REPLACEMENT

A.F. Villasboa¹, M. Basas Satorras¹, S. Valles Angulo¹, A. Rey Perez¹, A. Zapatero Ferrandiz¹, F. Vasco¹, V. Plasencia², C. Segura², F. Alvarez Lerma¹

¹Hospital del Mar, Parc de Salut Mar, Intensive Care Unit, Barcelona, Spain, ²Laboratori de Referencia de Catalunya, Microbiology, Barcelona, Spain

INTRODUCTION. When moving central venous catheters (CVC) in Intensive Care (SMI), which are suspected contaminated with gram-positive cocci (GPC) may spread bacteria occurs through blood and contamination new catheter.

OBJECTIVES. Reducing contamination and subsequent new CVC suspected bacteremia with daptomycin administration (two doses) and extend the life of the newly inserted catheter.

MATERIALS AND METHODS. A prospective, interventional, open-label, single-center study. ICU patients with one or more suspected bacteremia and CVC source not clarified (absence of local signs of infections at insertion point) were included. Pre-established extraction percutaneous CVC blood cultures and through the suspect, a new CVC placement, administration of intravenous daptomycin (6 mg/kg) by the new CVC, CVC removal of the suspect, the same study (connections and catheter tip) protocol was applied and administration of a second dose of daptomycin at 24 h. To assess response—CVC bacteremia (B-CVC) rate is determined 10 days, catheter-days and reasons for withdrawal of the new CVC.

RESULTS. 57 patients were included, with a mean of 53.7 years (SD 17.3), of which 35 were men (61.4%), with APACHE II at admission of 16.3 points (SD 6.1), mean ICU stay 35.5 days (SD 24.3). Most patients were medical: 38 (66.7%), and other invasive devices catheterization were 56 patients (98.2%), mechanical ventilation in 40 patients (70.2%) with antibiotics in the previous 7 days in 54 cases (94.7%) and intra-ICU mortality was 13 patients (22.8%). 8 cases (14%) of bacteremia prior to removal of the CVC were detected, with 0 (0%) positive BC (blood culture) within 10 days of daptomycin. The number of hours until normalization of temperature (<37.5 °C) in the absence of antipyretic drugs was 74.1 h (mean 37.8 h). The reason for removing the second catheter was infection, suspected in 21 cases (36, 8%) being negative all the cultures grown. Bacteremia rate with the new catheter was 0%. The number of days of the new CVC was 12.6 days (SD 7.8).

CONCLUSIONS. The management strategy with Daptomycin (two doses), during and after the replacement of CVC, on suspicion of B-CVC, has been followed by a B-CVC rate of 0% on new CVC.

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0517 CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS IN GREEK INTENSIVE CARE UNITS (THE BACT.GR STUDY): PATHOGENS AND ANTIBIOTIC RESISTANCE PATTERNS

K. Pontikis¹, M. Kazantzis¹, E. Papatheou¹, A. Sakagianni¹, H. Nikolaou¹, I. Strouvalis¹, V. Souliotis¹, K. Hadziniakou¹, A. Chovas¹, A. Paridou¹, E. Mouloudi¹, F. Fligkou¹, A. Kyparissi¹, E. Mageira¹, A. Prekates¹, K. Katsifa¹, V. Bekos¹, P. Opsimoulis¹, K. Tassopoulos¹, E. Volakli¹, P. Myrianthefs¹

¹Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine, Athens, Greece

INTRODUCTION. Central line-associated bloodstream infections (CLABSIs) often complicate hospitalization in the intensive care unit (ICU). Multiresistant pathogens have been considered as principal etiologic agents of ICU-acquired infections in Greece, with serious adverse effects on LOS and mortality. Previous studies on implicated pathogens presented mainly local epidemiological patterns and were probably non-informative on the actual burden of antimicrobial resistance among CLABSIs episodes, in a national level.

OBJECTIVES. The Section of Infection Prevention and Management of the Hellenic Society of Intensive Care Medicine designed the BACT.GR study in order to delineate the incidence and microbial etiology of CLABSIs episodes in Greek ICUs, on a national scale. A meaningful surveillance of prevalent pathogens could serve as an essential tool for appropriate empirical antimicrobial regimens and a decline in antibiotic prescription against more uncommon pathogens.

METHODS. Prospective, observational study performed between January and March 2012. All ICU-acquired bloodstream infections (BSIs) in patients with a central line in place were included. Definitions and methodology were according to CDC-NHSN. Demographic and clinical patients' characteristics as well as ICU characteristics were collected. Identification and antimicrobial sensitivity determination was performed according to local microbiology protocols (automated susceptibility systems, CLSI standards).

RESULTS. Thirty three adult ICUs participated in the study (14,553 patient-days of observation). In total, 175 isolates were recovered in 156 CLABSIs episodes (mean CLABSIs incidence: 10.3 per 1,000 catheter-days, 95% CI 7.9–12.6). The relative frequency of pathogens with their sensitivities to selected antibiotics is reported in the following table.

Pathogen	n = 175	%	Ceftazidime Suse (%)	Meropenem Suse (%)	Colistin Suse (%)	Gentamicin Suse (%)	Vancomycin Suse (%)
<i>Acinetobacter baumannii</i>	49	28.0		0	93		
<i>Klebsiella pneumoniae</i>	33	18.9	6	13	62	74	
<i>Pseudomonas aeruginosa</i>	20	11.4	27	26	97	40	
Other-gram negative	21	11.9					
<i>Enterococcus spp</i>	28	16.0				30	94
Coagulase negative staph	10	5.7					
<i>Staph aureus</i>	4	2.3					100
Other gram-positive	2	1.2					
<i>Candida spp</i>	8	4.6					

[CLABSI pathogen antibiotic susceptibility]

CONCLUSIONS. Gram-negative pathogens predominate in the etiology of CLABSIs in Greek ICUs, mainly multiresistant *A. baumannii*, *K. pneumoniae* and *P. aeruginosa*. Among Gram-positives, *Enterococcus spp* is predominant, while *Staphylococcus aureus* has a notably low incidence. Our results raise important implications regarding empirical antimicrobial prescription adequacy as well as prevention issues targeting antimicrobial resistance spread.

The body composition & metabolism of ICU patients: 0518–0530

0518 GLUCOSE HOMEOSTASIS IN CRITICALLY ILL PATIENTS IS NOT AFFECTED BY DIFFERENT ENTERAL NUTRITION FORMULAS

M. Wewalka¹, A. Drolz¹, M. Schmid¹, C. Zauner¹

¹Medical University of Vienna, Gastroenterology and Hepatology, Vienna, Austria

INTRODUCTION. Hyperglycemia is common in critically ill patients and associated with increased mortality. It has been suggested that different nutrition formulas may beneficially influence glucose levels in surgical ICU patients.

OBJECTIVES. We investigated glucose homeostasis in response to different enteral nutrition formulas in medical critically ill patients.

METHODS. A total of 60 patients were randomized to receive continuous fat-based (group A, n = 30) or glucose-based enteral nutrition (group B, n = 30) for 7 days. Indirect calorimetry was performed to determine energy demand at baseline and repeated on days 3 and 7 to evaluate substrate oxidation. Glucose levels, insulin demand, insulin/glucose ratio, caloric and substrate intake per 24 h, as well as nutrition related side effects were assessed for 7 days.

RESULTS. Patients presented with similar age (60 ± 12 vs. 58 ± 16 years, P = 0.657), Body Mass Index (26.2 ± 5.2 vs. 27.5 ± 4.4 kg/m², P = 0.294) and SAPS II score (58 ± 14 vs. 63 ± 13, P = 0.147). At baseline patients did not differ with regard to energy demand (1,542 ± 382 vs. 1,485 ± 384 kcal, P = 0.566) or fasting glucose levels (149 ± 65 vs. 139 ± 68 mg/dl, P = 0.571). Over the course of 7 days patients had similar glucose AUC (710 ± 172 vs. 763 ± 122, P = 0.193), similar average glucose concentrations per 24 h (repeated measures ANOVA P = 0.655), similar overall insulin demand (187 ± 165 vs. 186 ± 125 IE, P = 0.991), and a similar insulin/glucose ratio (repeated measures ANOVA P = 0.962). Furthermore they received similar amounts of enteral nutrition per 24 h and showed no difference in nutrition related side effects such as gastric reflux, vomiting, diarrhea, and hyperlipidemia.

CONCLUSIONS. Patients showed similar glucose homeostasis and insulin demand regardless of whether continuous enteral nutrition was fat-based or glucose-based. Special nutrition formulas do not seem to influence glucose homeostasis in the acute phase of illness in medical critically ill patients.

0519 THE EFFECT OF EXOGENOUS GLUCAGON LIKE PEPTIDE-1 (GLP-1) ON SMALL INTESTINAL GLUCOSE ABSORPTION IN THE CRITICALLY ILL

C.E. Cousins¹, A. Miller¹, M.P. Plummer^{1,2,3}, A.M. Deane^{1,2,3}, M. Horowitz^{3,4}, M.J. Chapman^{1,2,3}

¹Royal Adelaide Hospital, Intensive Care Research, Adelaide, Australia, ²University of Adelaide, Acute Care Medicine, Adelaide, Australia, ³Centre for Clinical Research Excellence in Nutritional Physiology, Interventions and Outcomes, Adelaide, Australia, ⁴University of Adelaide, Discipline of Medicine, Adelaide, Australia

INTRODUCTION. Glucagon-like-peptide-1 (GLP-1) is secreted from the small intestine in response to the presence of nutrients. GLP-1 stimulates insulin, suppresses glucagon secretion and slows gastric emptying, thereby, attenuating hyperglycemia. Treatment with GLP-1 is appealing because even at pharmacological doses it does not cause hypoglycaemia. Previous studies have demonstrated that GLP-1 reduced glucose absorption in critically ill patients by a greater increment than the observed slowing of gastric emptying following an intragastric meal¹.

OBJECTIVES. To evaluate the effect of exogenous GLP-1 on small intestinal glucose absorption in the critically ill.

METHODS. Twelve mechanically ventilated patients (Age: 51 ± 14 years; APACHE II: 20.6 ± 7.3; BMI: 27.0 ± 1.3 kg/m²) were studied on consecutive days receiving both the intervention (1.2 pmol/kg/min GLP-1 IV) and control (0.9% saline), in a randomised, double-blind, cross over fashion. A mixed nutrient liquid test meal containing 100 ml of 1 kcal/ml standard feed and 3-O-methyl-D-glucopyranose (3-OMG) was administered into the small intestine via a post-pyloric feeding tube. Blood samples were collected over a period of 4 h at timed intervals and analysed for plasma 3-OMG and blood glucose concentrations (BGL). Data are presented as mean (±SEM).

RESULTS. The area under the curve (AUC) for BGL was significantly lower during GLP-1 administration (2,061.9 ± 111.1 vs. 2,327.5 ± 139.4 mmol/l; P = 0.005). Glucose

absorption (3-OMG) was also reduced during GLP-1 administration when compared to placebo (AUC: 68.21 ± 4.56 vs. 77.69 ± 4.19 mmol/l; P = 0.02).

CONCLUSIONS. In the critically ill exogenous GLP-1 appears to reduce glucose absorption independent of the effects on gastric emptying.

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GRANT ACKNOWLEDGMENT. This project was kindly supported by an ANZCA project grant.

0522

EARLY ENDOCRINE DYSFUNCTION IN CRITICAL ILLNESS OF DIFFERENT AETIOLOGY

A.T. Mazzeo¹, V. Fanelli¹, L. Muratore¹, E. Peyrot¹, S. Beninati¹, M. Zanin¹, T. Tenaglia¹, P. Terragni¹, I. Battaglini¹, S. Tosoletto¹, F. Guaraldi², F. Settanni³, G. Mengozzi³, M. Lucchiarini³, M. Parasiliti Caprino², I. Mastromauro¹, F. Civiletti¹, M. Berardino⁴, S. Grottole², E. Ghigo², L. Mascia¹

¹University of Turin, Anesthesia and Intensive Care, Turin, Italy, ²University of Turin, Endocrinology, Turin, Italy, ³University of Turin, Clinical Biochemistry, Turin, Italy, ⁴Presidio CTO. AOU Citta' della Salute e della Scienza di Torino, Anesthesia and Intensive Care, Turin, Italy

INTRODUCTION. Critical illness induces an activation of neuroendocrine system as a general adaptation to stress. Inflammatory cytokines has been proposed with a causative role of this activation. It is not known if critical ill patients with different aetiology develop a different degree of endocrine dysfunction with a related different inflammatory profile.

OBJECTIVES. Aim of this study was to investigate if critical ill patients following acute respiratory distress syndrome (ARDS), traumatic brain injury (TBI), subarachnoid hemorrhage (SAH), and those evolving to brain death present a different level of neuroendocrine dysfunction induced by inflammatory cytokines.

METHODS. Post hoc analysis of prospectively collected data. Adult patients requiring ICU admission for ARDS, TBI, SAH, and neurocritical patients evolving to brain death (BD) were studied. Demographic data, severity indexes on admission and physiological variables were recorded. Blood samples were collected for the determination of TSH, FT3, FT4, ACTH, cortisol, prolactin, GH, IGF-I, copeptin and IL6 (at day 1, 2 and 4 after admission in TBI and SAH, at day 1 and 2 in ARDS, and at the time of brain death diagnosis in BD). Exclusion criteria: history of endocrine dysfunction or autoimmune disorders. Data are expressed as median and ranges. Comparison between groups was performed with ANOVA and post hoc analysis.

RESULTS. Ninety-four patients (17 ARDS, 26 TBI, 20 SAH, 31 BD) were studied. Table shows median and ranges of hormonal levels at day 1.

	ARDS	TBI	SAH	Brain death
FT3 (pg/ml)*	1.3 (0.6-2)	2.5 (1.3-3.4)	1.9 (1.3-4.1)	2.1 (0.7-3.2)
FT4 (pg/ml)*	8.6 (4.4-15.9)	11.1 (3.2-14.5)	12.6 (9.7-21.7)	11.2 (6.8-17.5)
TSH(microUI/ml)*	0.2 (0-1.9)	0.5 (0.04-3.5)	0.4 (0-1.9)	0.7 (0-4.6)
Cortisol (ng/ml)	163.8 (66.3-524.2)	256.8 (23.3-550.3)	159.7 (17-4211)	100.5 (21.7-1125)
ACTH (pg/ml)*	Ongoing	9.2 (0.9-64)	2.9 (1.2-10.1)	8.5 (2-27.4)
Copeptin (pmol/L)*	38.5 (15.4-203.9)	18.2 (3.2-93.2)	10.4 (5.3-60)	2.8 (0.5-10.1)
IL6 (pg/ml)*	1289 (111-45550)	170 (20-940)	89 (40-1500)	460 (31-5714)

[Median and ranges of hormones at day 1. *p < 0.005]

Patients with ARDS showed the highest level of IL6 and copeptin and the lowest level of cortisol, FT3 and FT4 with low TSH levels when compared to TBI and SAH. In BD patients low levels of cortisol without an associated increase in ACTH, very low copeptin and high levels of IL6 suggest a severe neuroendocrine dysfunction probably due to the devastating cerebral lesion associated with a significant inflammatory response. The hormonal response observed at day 1 was consistent over the studied period.

CONCLUSIONS. The neuroendocrine dysfunction related to the inflammatory reaction exhibited a specific profile in the different critical illnesses. Further studies need to elucidate if this is an adaptive response in the acute phase of the disease, or if it is a maladaptive reaction which needs therapeutic interventions.

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GRANT ACKNOWLEDGMENT. University of Turin Ex 60 % N. D15E12006240005.

0523

BIOELECTRICAL IMPEDANCE PHASE ANGLE AS INDICATOR OF ADVERSE CLINICAL OUTCOMES AND PROLONGED HOSPITALIZATION IN PATIENTS UNDERGOING CARDIAC SURGERY

D. Ringaitiene¹, V. Vicka², D. Gineityte², M. Balčiūnas², I. Norkiene¹, J. Sipylyte¹, J. Tvaskevicius¹

¹Vilnius University, Faculty of Medicine, Clinic of Anesthesiology and Intensive Care, Vilnius, Lithuania, ²Vilnius University, Faculty of Medicine, Vilnius, Lithuania

INTRODUCTION. Bioelectrical impedance analysis (BIA) is simple and non-invasive technique to evaluate changes in body composition and nutritional status. Phase angle (PhA), determined by BIA, detects changes in tissue electrical properties and has found to be a prognostic indicator in several chronic conditions¹.

OBJECTIVES. The aim of this study is to assess the impact of phase angle on postoperative adverse outcomes and length of hospitalization in patients undergoing cardiac surgery.

METHODS. A prospective randomised study was conducted between April and September 2013. The phase angle of 276 cardiothoracic patients was evaluated using bioelectrical impedance analysis (BIA) 1 day before surgery. After applying randomisation criteria 151 patients were selected for further evaluation. Patients were classified into two groups in accordance to phase angle value cutoff point of 5.44. Associations between low phase angle (PhA < 5.44) and adverse postoperative outcomes defined by STS postoperative risk evaluation model were analysed. Additionally, the impact of low PhA on length of stay in ICU and hospital were assessed.

RESULTS. Low PhA was detected in 59 (39 %) patients from the randomized group. Postoperative morbidity was higher in low PhA group (28 (47.5 %) vs. 29 (31.5 %) p = 0.049). Univariate regression analysis revealed low PhA as predictor of higher postoperative morbidity (OR = 1.962 CI95 % 1.000-3.851 p = 0.05) which persisted as an independent factor in multivariate regression analysis (OR = 2.078, CI95 % 1.023-4.220 p = 0.043). Evaluation of hospitalization length showed longer postoperative stay in ICU (3.15 ± 2.65 vs. 2.54 ± 0.97 p = 0.046) and prolonged hospitalization (>10 days) rate (41 (69.5 %) vs. 48 (52.2 %) p = 0.035) in the group with low PhA. In further statistical analysis univariate regression reported low PhA as indicator of hospitalization longer than 10 days (OR = 2.088, CI95 % 1.049-4.158 p = 0.036) and linear regression showed low PhA as indicator of longer stay in ICU (exp(B) = 1.65, CI95 % 1.011-3.340 p = 0.046).

CONCLUSIONS. More than one third of cardiac surgery patients have a low PhA which is associated with postoperative morbidity, prolonged stay in ICU and hospital. Preoperative nutritional support may improve phase angle and lower the risk of postoperative morbidity.

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0524

RISK ASSESSMENT OF CRITICALLY ILL INTENSIVE CARE PATIENTS: USE OF BIOELECTRICAL IMPEDANCE ANALYSIS

S.N. Stapel¹, P.J. Weijs², I.M. Dekker², H.M. Oudemans-van Straaten¹

¹VU University Medical Center, Adult Intensive Care, Amsterdam, Netherlands, ²VU University Medical Center, Nutrition and Dietetics, Amsterdam, Netherlands

INTRODUCTION. Bioelectrical impedance analysis (BIA) provides raw data from which body composition can be calculated and has the potential to aid in risk assessment of critically ill patients on intensive care (ICU) admission.

OBJECTIVES. Aim of this study was to determine whether raw data as measured with BIA on intensive care admission predict hospital mortality independent of mortality predicted by APACHE IV.

METHODS. In this prospective cohort study, BIA was performed in 109 critically ill ICU patients within 24-h of ICU admission. BIA results (independent of body weight) were compared between survivors and non-survivors. APACHE IV was used to predict mortality risk. To determine whether BIA markers predict hospital mortality, the AUC of the Receiver Operating Characteristics (ROC curves) and logistic regression corrected for APACHE IV were performed.

RESULTS.

	Survivors (n = 98)	Non-survivors (n = 11)	p-value ^d
Age (y)	65 ± 14	69 ± 15	0.380
Weight (kg)	79.7 ± 15.5	70.9 ± 20.1	0.086
Height (cm)	173 ± 9	169 ± 11	0.172
BMI (kg/m ²)	26.6 ± 4.3	24.6 ± 5.5	0.172
APACHE IV	0.56 ± 0.18	0.86 ± 0.37	0.024
Impedance (Z/m) ^{a, c}	266 ± 51	351 ± 95	0.022
Resistance (R/m) ^a	264.8 ± 51.1	349.5 ± 95.0	0.015
Reactance (Xc/m) ^a	22.8 ± 6.4	26.2 ± 9.5	0.263
Phase angle ^b	4.9 ± 1.2	4.4 ± 1.3	0.149

[Results]

^aR, Xc and Z are normalized for height in meters

^bphase angle = arc tangens of Xc/R*180

^cImpedance (Z) = Sqrt (R² + Xc²)

^dindependent T-test, equal variances not assumed

The AUC for hospital mortality was 0.86 (95 % CI 0.73-0.94) for APACHE IV and 0.79 (95 % CI 0.63-0.96) for both resistance and impedance. Logistic regression analysis found that, after correction for APACHE IV, the odds ratio for mortality for resistance was 1.035 (95 % CI 1.015-1.057; p = 0.001) and for impedance 1.072 (1.031-1.114, p < 0.001).

CONCLUSIONS. Bioelectrical impedance analysis appears to be useful for risk stratification of intensive care patients. High resistance and impedance on day of ICU admission predict hospital mortality independent of APACHE IV.

0525

THE IMPACT OF THE STRESS RESPONSE ON PERIOPERATIVE IRISIN CONCENTRATIONS AND INSULIN SENSITIVITY IN PATIENTS UNDERGOING CARDIAC SURGERY

A. Boltres¹, T. Schefer², U. Schurr³, E. Nitschmann⁴, E. Seeberger¹, H. Pargger¹, L. Wykes¹, A. Kopp Lughl¹

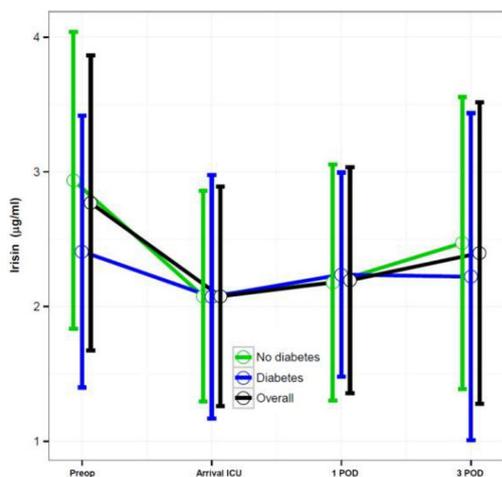
¹University Hospital Basel, Department of Anesthesia and Surgical Intensive Care, Basel, Switzerland, ²University Hospital Basel, Department of Internal Medicine, Basel, Switzerland, ³University Hospital Basel, Department of Cardiac Surgery, Basel, Switzerland, ⁴McGill University, School of Dietetics and Human Nutrition, Montreal, Canada

INTRODUCTION. The recently identified myokine irisin has been shown in animal studies to interfere with metabolic regulation and to counteract insulin resistance, whereas its effect in humans is still debated¹. Insulin resistance is increased in diabetes mellitus type 2 (DM2) and in surgical patients due to the stereotypical stress response². Impaired insulin sensitivity is related to negative outcomes following surgery.²

OBJECTIVES. The aim of this observational study was to investigate perioperative levels of irisin in patients undergoing elective cardiac surgery.
METHODS. Sixty-six patients scheduled for elective aortocoronary bypass surgery and/or valve repair were consecutively enrolled. Irisin levels were assessed before anesthesia induction as baseline value, upon arrival at the intensive care unit (ICU), on the first (1 POD) and third (3 POD) day postoperatively.
RESULTS. Patients' baseline characteristics are shown in Table 1. Irisin levels were higher at baseline in non-diabetic compared to DM2 patients. In all patients, irisin decreased upon arrival at the ICU and slightly increased to the same level on the 1 POD. On the 3 POD, irisin levels differed again showing an increase in non-diabetic and a decrease in diabetic patients (Figure 1).
CONCLUSIONS. In DM2 patients, the underlying insulin resistance of diabetes may explain the lower levels of irisin preoperatively and in the late postoperative phase. In contrast, in the early postoperative period, the decrease in irisin concentration to a similar level in DM2 and non-diabetic patients may be due to the standardized insulin regimen implemented during surgery and intensive care.
 These results encourage to further explore the influence of surgical stress on irisin concentrations and the interaction with insulin resistance in order to evaluate consecutive outcomes and the potential therapeutic relevance of irisin.
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GRANT ACKNOWLEDGMENT. Research Fond, Department of Anesthesia and Surgical Intensive Care, University Hospital Basel, Switzerland.

Variable	All Patients (66)	Non-Diabetics (46)	Diabetics (20)
Sex (M/F)	45/21	33/13	12/8
Age (years)	65.5 \pm 13	64 \pm 14	68.7 \pm 9.8
ASA (2/3/4)	13/46/7	9/35/2	4/11/5
BMI (kg/m ²)	27.5 \pm 4.4	26.4 \pm 4.2	30.1 \pm 3.9
LV-EF (%)	57.6 \pm 9	58.4 \pm 9.2	55.6 \pm 8.4
HbA1c (%)	6.3 \pm 0.9	5.9 \pm 0.4	7.3 \pm 1.1
EuroSCORE	4.8 \pm 4.6	4.0 \pm 2.6	6.5 \pm 7.1
SAPS II Score	28.3 \pm 8.3	27.7 \pm 8.7	29.9 \pm 7.1
Type of surgery: AKB/valve/multiple	23/22/21	16/17/14	7/5/7

[Table 1]

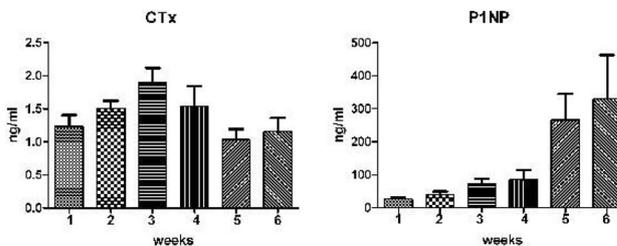


[Figure 1]

0526
EVALUATION OF BONE METABOLISM USING CTX AND P1NP MARKERS IN CRITICALLY ILL PATIENTS

A. Gavala¹, K. Makris², A. Korompeli¹, I. Pavlopoulou¹, E. Konstantinou¹, G. Baltopoulos¹, P. Myrianthefs¹
¹Athens University School of Nursing ICU, Athens, Greece, ²KAT Hospital, Athens, Greece
INTRODUCTION. Prolonged ICU immobilization along with nutritional deficits, vitamin D deficiency and specific drug administration in critically ill patients may lead to osteoporosis.
OBJECTIVES. The aim of the study was to evaluate the kinetic of two bone metabolism markers including N-terminal propeptides of type I procollagen (P1NP) and b-CrossLaps (CTX).
METHODS. We prospectively evaluated critically ill patients having at least 10 days of ICU stay and up to 5 weeks of ICU stay. We collected demographics, laboratory data, APACHE II score, SOFA score, length of stay (LOS), drug administration including heparin, phenytoin, steroids, and transfusions. Blood was collected at baseline and on a weekly basis for P1NP (normal values <75 ng/ml) and CTx (normal values <1 ng/ml) measurements.
RESULTS. We included 29 patients (19 men) of mean age 67.4 \pm 2.3, mean APACHE II 23.2 \pm 0.9, SOFA 10.1 \pm 0.8, LOS 26.1 \pm 4.1. Eleven patients were receiving low molecular weight heparin and low dose hydrocortisone and only one phenytoin. Vitamin D values were below normal values 5.5 \pm 0.9; 6.7 \pm 1.2; 7.6 \pm 1.8; 6.4 \pm 1.3; 8.4 \pm 1.0; 5.7 \pm 3.7 ng/ml respectively. Cortisol levels were 1,208 \pm 103; 1,003 \pm 97.5; 955 \pm 128;

1,003 \pm 143; 771 \pm 337; 661 \pm 149 nmol/L respectively. CTx was significantly increased compared to baseline on 3rd week indicating increased bone catabolism until the 3rd week of ICU stay. Contrary, P1NP was significantly increased after the 5th week indicating new bone formation after the 5th week.



[Figure 1. Evolution of bone markers over time]

CONCLUSIONS. Immobilized critically ill patients may develop bone catabolism during the first 3 weeks of ICU stay expressed by CTx increase and then bone formation expressed by P1NP increase.
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0527
CLINICAL APPLICATION OF BIOELECTRICAL IMPEDANCE ANALYSIS AND ITS PHASE ANGLE FOR NUTRITIONAL ASSESSMENT OF CRITICALLY ILL PATIENTS

H.S. Kim¹, E.S. Lee¹, Y.J. Lee², J.H. Lee², C.-T. Lee², Y.-J. Cho², S.-H. Choi³
¹Seoul National University Bundang Hospital, Pharmacy, Seongnam, Republic of Korea, ²Seoul National University Bundang Hospital, Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine, Seongnam, Republic of Korea, ³Suwon University, Department of Nursing Science, Gyeonggi-do, Republic of Korea
INTRODUCTION. Bioelectrical impedance analysis (BIA) is a quick, noninvasive method of evaluating body compartments. Phase angle (PA) as a reflection of body cell mass, is objectively determined from resistance and reactance measured by BIA.
OBJECTIVES. This study aimed to evaluate the clinical application of PA for the nutritional assessment of critically ill patients.
METHODS. We analyzed 89 adult patients admitted to a medical intensive care unit (ICU) of a tertiary academic hospital from August 2012 to September 2013. PA values were measured by direct segmental multi-frequency BIA. As traditional nutrition assessment tools, body mass index (BMI), serum albumin levels, total lymphocyte counts, and our hospital's nutrition screening index (NSI) were also recorded. The correlations between the results of BIA and other traditional parameters were analyzed.
RESULTS. PA was correlated with traditional nutritional parameters, including BMI (r = 0.479), serum albumin (r = 0.347), and NSI score (r = 0.483). Patients with PA lower than the median value (3.5°) had significantly lower nutritional status, and suffered from increased duration of mechanical ventilation (P = 0.039) and length of ICU stay (P = 0.041).
CONCLUSIONS. PA measured by BIA could be a potentially useful parameter for nutritional assessment in critically ill patients.
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0528
ACUTE KIDNEY INJURY ASSOCIATED TO DIABETIC KETOACIDOSIS IN ICU

J.-C. Orban¹, E.-M. Maizière¹, A. Ghaddab¹, E. Van Obberghen², C. Ichai¹
¹Nice University Hospital, Medical Surgical ICU, Nice, France, ²Nice University Hospital, IRCAN, Nice, France
INTRODUCTION. Incidence of diabetes mellitus and its acute and chronic complications increases worldwide (1). Severe ketoacidosis require admission and care in ICU because of the many metabolic derangements including acute kidney injury (2). However the characteristics of the acute kidney injury (AKI) associated with ketoacidosis remain poorly studied.
OBJECTIVES. To describe characteristics of acute kidney injury associated to severe diabetic ketoacidosis
METHODS. This is a retrospective study conducted in an ICU including all patients admitted for diabetic ketoacidosis between 2003 and 2013. Clinical and laboratory data of the first 24 h of hospitalization were collected for each patient. Treatments parameters during this period were also collected. Acute kidney injury was evaluated according to the RIFLE classification. Data are expressed as median and interquartile range. Comparisons between groups were made by a Mann-Whitney test. A p < 0.05 was considered significant.
RESULTS. Ninety-four patients were admitted for diabetic ketoacidosis during the study period. Most of them were type 1 diabetes (87 %). Their main clinical and biological characteristics are described in the Table 1. Three patients died of septic shock. According to the RIFLE classification, 47 patients (50 %) presented AKI on admission, classified as "Risk", "Injury" or "Failure" in respectively 51, 27 and 21 %. Twelve hours after admission, AKI was still present in 21 patients (26 %, n = 80) with similar proportions in terms of RIFLE classes. After 24 h, 13 patients had acute kidney injury. Comparison of

patients with and without acute kidney injury on admission found many differences (Table 1). However there was no difference according to RIFLE classification. In multivariate analysis, age (OR = 1.081, 95 % CI [1.040–1.125]) and the first blood glucose (OR = 1.104, 95 % CI = [1.049–1.162]) were associated to AKI on admission.

CONCLUSIONS. Acute kidney injury is common in ketoacidosis patients admitted in ICU. According to the very good renal recovery in the majority of cases, it appears to be a volume-responsive transient azotemia (3). The various parameters studied were not different between RIFLE classes but this is probably due to the small size of the groups. Kidney injury seems associated to age and importance of hyperglycemia.

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0529

INCIDENCE OF AND RISK FACTORS FOR READMISSION TO INTENSIVE CARE IN PRIMARY DIABETIC KETOACIDOSIS

M. Sykes¹, M. Pimentel², M. Santos², J. Shalhoub¹, J. Salciccioli¹, D. Marshall¹

¹Imperial College London, London, United Kingdom, ²University of Oxford, Oxford, United Kingdom

INTRODUCTION. Diabetic ketoacidosis (DKA) is a life-threatening complication of diabetes which often requires admission to a critical care unit. Previous investigations have identified factors that are associated with mortality in this population (1). Factors associated with readmission to the intensive care unit (ICU) in DKA have not previously been examined. **OBJECTIVE.** We aimed to assess the incidence of ICU readmission for primary DKA, and determine the factors that are associated ICU readmission in these patients.

METHODS. We performed a retrospective cohort study of adult patients requiring ICU admission from the Multiparameter Intelligent Monitoring in Intensive Care (MIMIC-II) database (2). Patients were identified by ICD-9 codes and complete discharge summaries were reviewed to confirm DKA as the primary indication for admission to ICU. The primary outcome was readmission to ICU within 1 year. Statistical analyses employed Chi square and Fisher's exact tests.

RESULTS. There were 360 patients admitted to the ICU with an ICD-9 code of DKA. Review of the discharge summaries from this group identified 179 patients with confirmed DKA at arrival to ICU. The median age of the cohort was 43 years (IQR: 29–56) and 54 % were female. The median simplified acute physiology score-I score was 11 (IQR: 8–14). A total of 31 (18 %) of patients were re-admitted to ICU at least once and 8 (4 %) of these patients required greater than 1 re-admission to ICU. Factors associated with re-admission to ICU included age >60 years (p = 0.002), female gender (p = 0.03), a concurrent diagnosis of sepsis upon admission (p = 0.003), a baseline hemoglobin <12 g/dL (p = 0.02), and an anion gap of >30 mEq/L (p < 0.001).

CONCLUSION. The readmission rate to ICU within 1 year was high in this cohort of patients with primary DKA. This rate is high compared to recent epidemiological assessments of readmission in all ICU patients (3). Factors including older age, female sex, and the presence of significant comorbidity—including the sepsis syndrome—were associated with ICU readmission.

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0530

MUSCLE MASS IN CRITICALLY ILL PATIENTS: STRONG RELATION WITH SHORT AND LONG-TERM MORTALITY

N. Koopmans¹, A. Oude Lansink¹, S.J. Bakker², M. Nijsten¹

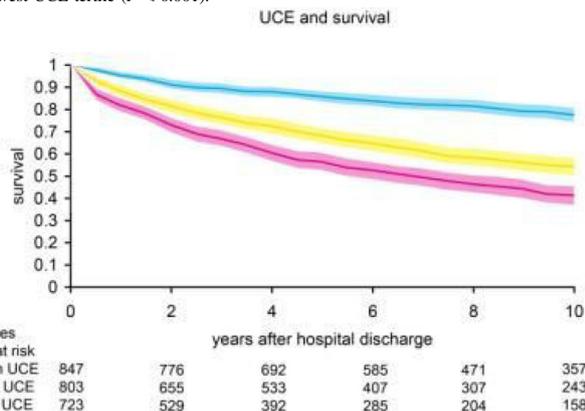
¹UMC Groningen, ICU, Groningen, Netherlands, ²UMC Groningen, Internal Medicine, Groningen, Netherlands

INTRODUCTION. Muscle wasting adversely affects patient outcome¹, but muscle mass is difficult to quantify in the intensive care (ICU). Urinary creatinine excretion (UCE) reflects muscle mass, but has not been studied in critically ill patients^{2–4}.

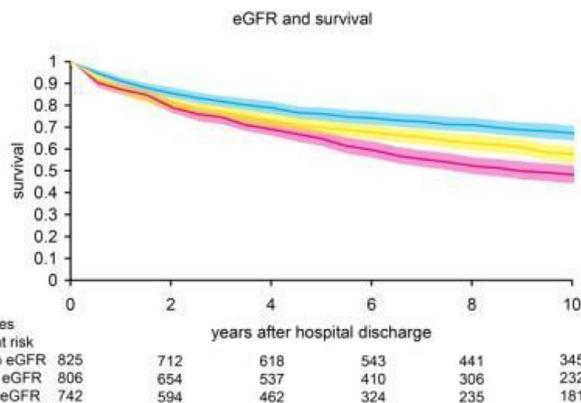
OBJECTIVES. We evaluated the relation of baseline UCE with short and long-term outcome in patients admitted to our surgical ICU.

METHODS. UCE was routinely measured in all adult patients admitted during a 15 year period. All UCE measurements performed within 3 days of ICU admission where evaluated except those considered not reliable due to renal replacement therapy, oliguria or serum creatinine levels >250 µmol/L. Estimated glomerular filtration (eGFR) and measured creatinine clearance (mCC) were also determined. Both in-hospital mortality and long-term mortality were determined.

RESULTS. In 9,564 patients admitted during the study period, 2,710 patients with 5,545 UCE samples were included. In-hospital mortality was 12 % in these patients. Mean (SD) UCE was 56 % higher in males compared to females. After multivariate analysis that included creatinine and eGFR, only age, UCE and mCC were independently associated with in-hospital mortality. The odds ratio for UCE was 1.50 (95 % CI 1.24–1.82; P < 0.001) per tertile and for mCC it was 1.31 (1.08–1.58; P = 0.01). For patients who were discharged alive from the hospital, survival at 10 years was 78 % in the highest UCE tertile vs. 41 % in the lowest UCE tertile (P < 0.001).



[Figure 1]



[Figure 2]

CONCLUSIONS. Urinary creatinine excretion as a measure of muscle mass on ICU-admission showed a strong association with short-term and long-term mortality, stronger than, and independent of renal function.

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Sepsis prognosis I: 0532–0545

0532

EARLY FERRITIN LEVELS, CD56+ PERCENTAGE AND HLA-DR EXPRESSION ACTING AS PROGNOSTIC FACTORS IN PATIENTS WITH INFLUENZA A VIRUS PNEUMONIA

F. Valenzuela Sanchez¹, B. Valenzuela Méndez², J.F. Rodríguez Gutiérrez³, R. Bohollo de Austria⁴, J. Rubio Quiñones⁴, L. Puget Martínez⁵, I. Valiente Alemán⁶, A. Estella¹, S. Garzón López², A. Jareño Chaumel¹

¹Associate University Hospital SAS of Jerez, Critical Care Medicine, Jerez de la Frontera, Spain, ²Seville University, Seville, Spain, ³Associate University Hospital SAS of Jerez, Hematology, Jerez de la Frontera, Spain, ⁴University Hospital 'Puerta del Mar' Cadiz, Critical Care Medicine, Cadiz, Spain, ⁵Hospital 'Santa Maria del Puerto', Critical Care Medicine, El Puerto de Santa Maria, Spain, ⁶University Hospital Puerto Real, Critical Care Medicine, Puerto Real, Spain

INTRODUCTION. The immunity is an important factor in the evolution of the systemic inflammatory response. The basal immune state can be decisive in the clinical presentation of influenza A virus pneumonia.

OBJECTIVES. We study aspects of innate and acquired immunity in patients with severe sepsis from pulmonary origin due to influenza A virus pneumonia.

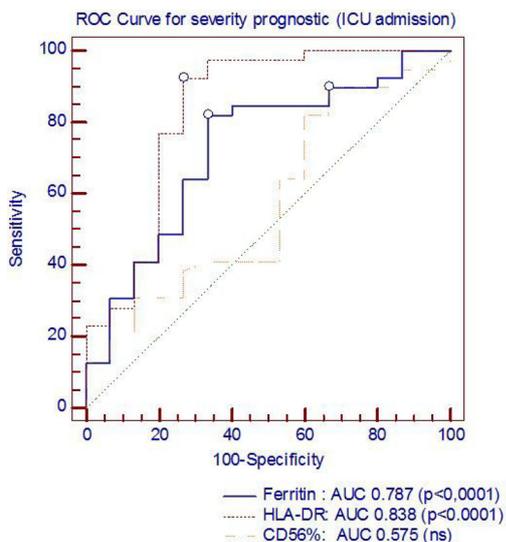
METHODS. Prospective observational multicentre study. We recruited patients admitted to the ICU from five different hospitals in Andalucía (Spain) with a diagnosis of severe sepsis during a period of 24 months due to influenza A virus pneumonia. Epidemiological data, number of leukocytes, neutrophils, lymphocytes and monocytes, as well as lymphocyte subpopulations, HLA-DR expression on CD14+ cells, immunoglobulin levels, biomarkers levels (RCP, PCT, Proadrenomedullin) and iron metabolism parameters were collected at admission, at 48 h, on the 5th day and at discharge. Data were compared with a control group (CG) of patients with influenza A virus pneumonia with less severity who were not admitted to the ICU.

RESULTS. After implementation of the protocol 66 patients were included: 41 patients suffered severe pneumonia caused by influenza A virus (IAvPN) and 25 patients were included in the control group (CG). The mortality of IAvPN group was 29.26 % (12/41). The main results are shown in the Table 1. The percentage of CD56+ was similar in both groups 9.4 vs 11.55 %; p = 0.3694, with significant difference between survivors and non-survivors respectively (12 vs 5.75 %; p = 0.0416). The expression of HLA-DR at admission was 1.394 MFI in IAvPN and 5.293 MFI in CG (p = 0.0001). There was significant difference between survivors and non-survivors respectively (2,144.5 MFI vs 993.5; p = 0.0247). Iron levels at admission were 43.42 mcg/dl similar values in both groups. Ferritin levels at admission was 805 vs 238 ng/ml in the GC (p = 0.0001), with significant difference between survivors and non-survivors respectively (2,747 ng/ml/371.6 ng/ml; p = 0.0022). The area under the curve (AUC) (ROC curve) for severity prognostic (ICU admission) was 0.787 (p < 0.0001) for Ferritin levels and 0.838 (p < 0.0001) for HLA-DR levels. The AUC-ROC for mortality prognostic at admission was 0.855 (p = 0.0001) for Ferritin levels and 0.76 (p = 0.004) for HLA-DR levels and 0.694 (p = 0.0249) for CD56 percentage. Patients with CD56+ percentage less than 11.5 % (p = 0.047), Ferritin levels of 2,000 ng/ml and above or HLA-DR less than 1,078 MFI showed an increase in mortality (p < 0.0001) in Kaplan-Meier survival curve. In the multivariate analysis (Cox proportional-hazards regression), Ferritin levels on admission were statistically significant predictive factor for mortality.

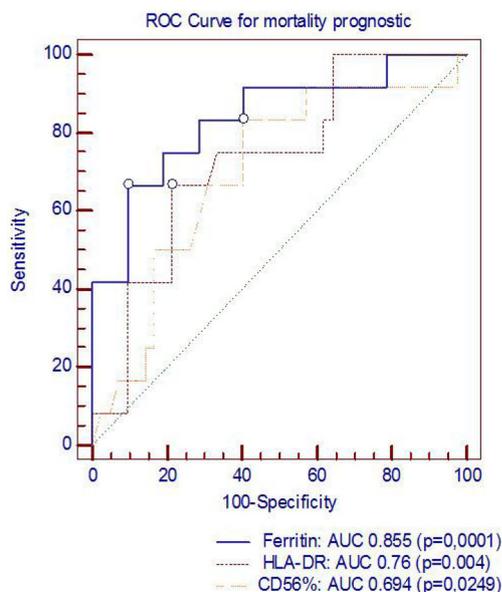
	Not admitted ICU (CG) Median	IAvPN group Median	p	Survivors Median	Non survivors Median	p
CD %	36.1	44.6	p = 0.3353	41.35	45.95	p = 0.3504
CD4/CD8	1.22	2.2	p = 0.0125	1.73	1.78	p = 2.727
CD19 %	11.1	15.7	p = 0.0139	13.3	16.7	p = 0.3038
CD56 %	9.4	11.55	p = 0.3694	12	5.75	p = 0.0416
HLA-DR	5293	1394	p = 0.0001	2144.5	993.5	p = 0.0247
Fe	38	32	p = 0.4421	34	30.5	p = 0.3701
Ferritin	238	805.55	p = 0.0001	371.6	2747	p = 0.0001
Transferrin	244	157.5	p = 0.0001	195	156.4	p = 0.0171

[1 Immunity and Iron metabolism parameter]

CONCLUSIONS. CD56+ percentage, HLA-DR levels and specially Ferritin levels at admission help us to determine unfavorable evolution and the risk of mortality in patients with influenza A virus pneumonia.



[Figure 1: Comparison ROC curves]



[Figure 2: Comparison ROC curves]

0533
“REANET”, INTERNET UTILIZATION AMONG SURROGATES OF CRITICALLY ILL PATIENTS WITH SEPSIS

Y.L. Nguyen^{1,2}, P. Asfar³, L. Argaud⁴, C. Guitton⁵, R. Porcher⁶, J.-P. Mira⁷, RéaNet Coordinators

¹Cochin Hospital, Paris-Descartes University, Surgical Thoracic ICU, Paris, France, ²INSERM U 707/UPMC, Paris, France, ³Angers Hospital, Angers University, MICU, Angers, France, ⁴Edouard Herriot Hospital, Lyon University, MICU, Lyon, France, ⁵Nantes Hospital, Nantes University, MICU, Nantes, France, ⁶Hôtel Dieu Hospital, Paris-Descartes University, Public Health Department, Paris, France, ⁷Cochin Hospital, Paris-Descartes University, MICU, Paris, France

INTRODUCTION. There is a poor public awareness of sepsis and the word “sepsis” is not associated with the perception of a life-threatening condition in the general population (1). Surveys suggest that majority of adults in developed countries checks internet to seek medical information but it is not known if relatives of critically ill septic patients use internet to seek health information.

OBJECTIVES. To describe the prevalence and internet use characteristics among surrogates of critically ill septic patients in French ICUs.

METHODS. This longitudinal prospective study was approved by the ethics committee of the SRLF. Patients with community-acquired severe sepsis or septic shock, unable to participate in decision making and with at least one proxy identified as a decision making surrogate, were selected. A questionnaire on internet use characteristics, satisfaction and anxiety-depression was filled by surrogates.

RESULTS. 146 patients, mostly males (N = 100; 68 %), mean age 64 ± 16 years-old, with a mean SAPS2 of 53 ± 17 were included in 19ICUs between May and July 2013. Majority required vasopressors (N = 117; 83 %) or invasive mechanical ventilation (N = 116; 82 %). ICU mortality rate was 23 %. One-third of ICUs had a 24/24 visiting hours policy (N = 6; 32 %). None ICU offered an internet access for patients or families but 16 % (N = 3) had their own website. 169 surrogates, mostly female (N = 119; 71 %), mean age 51 ± 16 yo answered to the questionnaire. Half of them had at least a college education (N = 82; 50 %). Less than half had received an information leaflet (N = 65; 41 %). Only 16 % (N = 27) had heard about “sepsis” previously. Majority were very satisfied with ICU care (N = 108; 65 %) 0.58 % (N = 92) and 24 % (N = 38) presented symptoms of mild or severe anxiety and depression. Most of surrogates found easy to get medical information (N = 141; 85 %) and to understand provided medical information (N = 136; 83 %) 0.46 % (N = 77) used internet for seeking health information on their proxy. Main motivations were to learn more about sepsis and treatments and being able to ask questions to physicians. Prior use of internet for seeking health information was associated with internet use during the hospitalization (OR = 20.7 [4.30–100.1]). Patient age (OR = 0.76 [0.58–0.99]) and the use of renal replacement therapy (OR = 2.58 [1.06–6.26]) were associated with internet use. Surrogate age, education level, satisfaction with medical information provided or presence of anxiety-depression symptoms were not associated with internet use. The presence of a room dedicated to information, an information leaflet, an ICU website, a 24/24 visiting hours policy were not associated with internet use.

CONCLUSIONS. Nearly half of surrogates of critically ill septic patients used internet during hospitalization for seeking health information. Their motivations were to learn more about sepsis and treatments and being able to ask questions to physicians. Patient related factors with internet use were young age and renal replacement therapy.

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0534
IMMUNOGLOBULIN G CONCENTRATIONS AND OUTCOMES IN CRITICALLY ILL ADULTS WITH SEPSIS: A SYSTEMATIC REVIEW

N. Culshaw¹, B. Post¹, R. Beale¹, J. Spencer², M. Singer^{3,4}, M. Shankar-Hari^{1,2}

¹Guy’s and St Thomas’ NHS Foundation Trust, Intensive Care Medicine, London, United Kingdom, ²King’s College London, Peter Gorer Department of Immunobiology, London, United Kingdom, ³University College London Hospital NHS Foundation Trust, Intensive Care Medicine, London, United Kingdom, ⁴Bloomsbury Institute of Intensive Care Medicine, Research Department of Clinical Physiology, London, United Kingdom

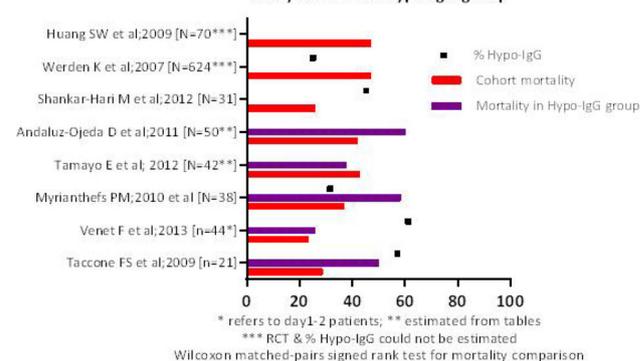
INTRODUCTION. Immunoglobulins are endogenous molecules with key roles in both early innate and delayed adaptive immune responses. Observational studies in human sepsis evaluating the association between subnormal IgG concentrations [Hypo-IgG] and mortality have reported conflicting results.

OBJECTIVES. To evaluate the prevalence of Hypo-IgG and the relationship of Hypo-IgG to ICU mortality in adult critically ill patients with sepsis.

METHODS. A systematic review was undertaken using methodology outlined in the PRISMA statement [1]. Search terms included the following ‘mp’ terms, MESH headings and ‘exploded’ combinations thereof-sepsis, septic shock, septicemia, infection, immunoglobulin*, and free light chain, ‘humans’ and publications since 1992 limits were applied. The OVID version of MEDLINE, EMBASE CLASSIC, EMBASE and Web of Science were searched [to April week 13, 2013]. We also manually searched the reference lists and related citations of included studies. Investigators [BP, NC] independently evaluated the eligibility of studies; differences were resolved by consensus of three investigators [BP, NC, MS-H]. To be included in the review, the study had to be a controlled trial or observational study; enrol adult patients [≥16 years] satisfying sepsis definitions in a critical care setting; measure Ig; and report severity of illness or mortality. A modified STROBE checklist was used to collect data [1]. The Newcastle-Ottawa scale [NOS] assessed observational study quality [2].

RESULTS. Literature search identified 342 articles of which 7 met the inclusion criteria. The definition of Hypo-IgG in sepsis was variable [4 observational studies, 2 randomised controlled trials, 1 abstract]. The NOS identified significant variability in case representativeness in observational studies. The sample size, prevalence of Hypo-IgG on ICU admission day, cohort mortality and mortality in patients with Hypo-IgG were variable and are summarized in Figure 1. Hypo-IgG was reported in only four studies and varied between 31–61 %. There was no statistically significant difference in ICU mortality between patients with normal IgG and in patients with Hypo-IgG [p = 0.85].

Figure 1 Comparison of Included studies Study Cohort vs. Hypo-IgG group



[Figure 1]

CONCLUSIONS. Hypo-IgG on the day of ICU admission is not associated with an increased risk of death from sepsis. Analysis strategy and quality of included studies were variable, thus necessitating individual patient meta-analysis to assess the true impact of hypo-IgG.

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0535

PREDICTORS OF MORTALITY IN PATIENTS WITH SEVERE SECONDARY PERITONITIS

R. Jiménez¹, A. Ojados¹, A. Ortín¹, S. Rebollo¹, L. Herrera¹, L. Tarraga¹, S. Moreno¹, M. Galindo¹, A. Fernández¹, M.M. Ortiz², J.M. Castillo¹, M. Viqueira², M.D. Rodríguez¹, J.M. Allegue¹

¹Hospital General Universitario Santa Lucía, Intensive Care Unit, Cartagena, Spain, ²Hospital General Universitario Santa Lucía, Laboratorio de Microbiología, Cartagena, Spain

INTRODUCTION. Secondary peritonitis remains a frequent cause of multiorgan failure and death. Factors associated with poor outcome in patients with severe secondary peritonitis are still not well established.

OBJECTIVES. To investigate baseline characteristics, comorbidities, clinical and surgical issues, and microbiological and therapeutical aspects associated with mortality in patients with severe secondary peritonitis.

METHODS. Retrospective and observational analysis of patients admitted with severe secondary peritonitis. Data related with clinical, surgical, microbiological and therapeutic considerations were collected and studied their possible association with hospital mortality. Univariate analysis was made using t-test, Mann-Whitney test and Chi square. A multivariate analysis was made using significant variables obtained in univariate analysis in a forward stepwise logistic regression model.

RESULTS. 111 patients were admitted to our Unit due to secondary peritonitis associated severe sepsis/septic shock. Hospital mortality occurred in 36 patients (32.7 %). Non survivors were older (74.9 years (CI 95 % 72.2–77.6) vs 62.2 (59.3–65.1); $p < 0.001$), had higher APACHE II (24.7 (22.5–26.8) vs 16.9 (15.4–18.3); $p < 0.001$), higher Mannheim Peritonitis Index (29.7 (27.3–32.1) vs 26.4 (24.6–28.3); $p < 0.001$) and higher Charlson Index (2 (IQR 1–4.7) vs 2 (0–3); $p < 0.019$) than survivors. Cardiac comorbidity were more frequent in non-survivors (44.4 vs 12.2 %; $p < 0.001$), with no differences in other kind of comorbidities. Previous exposure to antibiotic was higher in non-survivors (75 vs 52.7 %, $p < 0.02$). No differences in the rate of postoperative peritonitis or anatomical origin of peritonitis was observed, but reintervention was higher in non-survivors (38.9 vs 17.8 %, $p < 0.017$). Non-survivors presented higher proportion of septic shock (75 vs 52.7 %, $p < 0.02$) and renal failure (63.9 vs 28.4 %, $p < 0.001$). ICU length of stay was longer in non-survivors (11.5 (IQR 5–22.5) vs 8 (4–14) days) but without statistical significance. By contrast, hospital stay was shorter in non-survivors (13 (5.3–29.5) vs 27 (18.5–40.3) days, $p < 0.001$). Non-survivors showed more frequency or higher prolongation in: days of mechanical ventilation (6 (IQR 3–15.5) vs 1.5 (0–6) days, $p < 0.001$), use of parenteral nutrition (86.1 vs 64.9 %, $p < 0.015$), length of parenteral nutrition (13.5 (6–24.9) vs 8.5 (2–19.6) days, $p < 0.005$). Non-survivors had less use of enteral nutrition (50 vs 74.3 %, $p < 0.011$). Type of microbiological isolation, empirical antimicrobial coverage, appropriateness of empiric treatment or de-escalation did not differ between survivors and non-survivors. In multivariate analysis, five variables were found to be independently associated with mortality (Table 1).

	OR	CI 95 %	p
Age	1.17	1.06–1.30	0.002
APACHE II	1.19	1.02–1.40	0.028
Mannheim	1.12	1.01–1.26	0.044
Relaparotomy	15.20	2.04–113.12	0.008
Length of parenteral nutrition	1.10	1.03–1.17	0.004

[Table 1 Multivariate analysis]

CONCLUSIONS. In our patients with severe secondary peritonitis, higher age, higher severity scores, need for relaparotomy and higher duration of parenteral nutrition, appears to be associated with hospital mortality.

0536

DIFFERENCES IN SEPTIC SHOCK MANAGEMENT AND OUTCOMES BETWEEN DIFFERENT EUROPEAN ICUS

S. Calcinaro^{1,2}, R. Domizi^{1,2}, C. Beilstein³, C. Boerma⁴, J.-D. Chiche⁵, A. D'Egidio⁶, E. Damiani⁷, A. Donati², M.P. Madden⁸, D. McAuley⁷, A. Morelli⁹, P. Royer⁵, M. Shankar-Hari⁸, N. Wickboldt³, P. Zolfaghari³, M. Singer¹

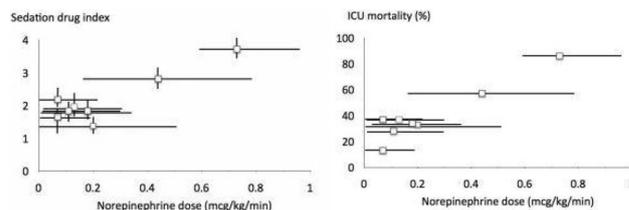
¹University College London Hospital NHS Foundation Trust, London, United Kingdom, ²Ospedali Riuniti Umberto I-Salesi-Lancisi di Ancona, Ancona, Italy, ³Royal London Hospital, Barts Health, London, United Kingdom, ⁴Medisch Centrum Leeuwarden, Leeuwarden, Netherlands, ⁵Hopital Cochin, Paris, France, ⁶Policlinico Umberto I-Sapienza¹, Rome, Italy, ⁷Royal Victoria Hospital, Belfast, Ireland, ⁸St Thomas' Hospital, London, United Kingdom

INTRODUCTION. Norepinephrine (NE) is the first-line vasopressor recommended by Surviving Sepsis for treating resistant hypotension in septic shock (1). While an increase in BP may be crucial for organ perfusion, excessive catecholamines may have detrimental effects (2) and could potentially impact upon survival. The amount of sedation may also have an important effect on norepinephrine use.

OBJECTIVES. Assess the use of NE and sedation, and outcomes, in septic shock patients managed in eight European ICUs.

METHODS. Data were retrospectively collected from the records of 711 consecutive septic shock patients in eight European ICUs (in the Netherlands, UK, France and Italy). At 24 h following initiation of NE, data collected included SOFA score, NE dose and a sedation dose index (scoring 0–4 points for predefined dose ranges of each sedative and analgesic drug being administered). 28-day, ICU and hospital mortality were also recorded.

RESULTS. Data from 706 patients (range 40–110 per ICU) were collected. Median 24 h SOFA score ranged from 9–11 (except 1 outlier at 7). Hospital mortality ranged from 17–88 %. A significant correlation ($p < 0.001$) was seen between norepinephrine dose at 24 h and (Fig 1) amount of sedation used at 24 h, and (Fig 2) mortality, but not with SOFA score.



[NE dosing and sedation index; NE dosing and SOFA]

Norepinephrine dose shown as median (interquartile range).

CONCLUSIONS. Marked variation existed between the ICUs in norepinephrine and sedative use, despite generally similar SOFA scores. An association was seen between increasing norepinephrine dose and hospital mortality. These findings warrant further investigation.

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0537

TRENDS IN INCIDENCE AND HOSPITAL OUTCOMES AMONG PATIENTS WITH SEVERE SEPSIS IN CATALUNYA DURING THE 2008–2012 PERIOD

J.C. Yébenes¹, J.C. Ruiz², R. Ferrer³, A. Artigas⁴, C. Lorenzo⁵, A. Rodriguez⁶, X. Nuvalis⁷, T. Martín-Löchés⁴, L. Bordeje⁸, A. Bosch⁹, M. Cleries⁹, Grup de Treball en Sepsis SOCMIC-SOCMUE

¹Hospital de Mataro, Intensive Care Department, Mataro, Spain, ²Hospital Vall d'Hebron, Barcelona, Spain, ³Hospital Mutua de Terrasa, Terrasa, Spain, ⁴Consorci Sanitari Parc Taulí, Sabadell, Spain, ⁵Hospital Universitari Dr Josep Trueta, Girona, Spain, ⁶Hospital Universitari Joan XXIII, Tarragona, Spain, ⁷Hospital Arnau de Vilanova, Lleida, Spain, ⁸Hospital Universitari Germans Trias i Pujol, Badalona, Spain, ⁹Departament d'Anàlisi de la Demanda, Servei Català de la Salut, Barcelona, Spain

INTRODUCTION. Recent epidemiological studies using administrative hospital data have reported trends of rising prevalence and declining hospital mortality rates associated with severe sepsis.

OBJECTIVES. To determine the trends in incidence and outcome of severe sepsis in Catalonia, Spain during the 2008–2012 period.

METHODS. Population-based observational study. A retrospective analysis was conducted using discharge records during the 2008–2012 period from the Administrative Registry of Minimum Basic dataset of Acute-care Hospitals (CMBD-HA), handled by the Catalan Health Service (CatSalut) that includes 100 % of public and 90 % of private hospitals in Catalonia (7,565,603 population). We defined severe sepsis as documented infection and acute organ dysfunction using criteria based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). We compared continuous data by ANOVA and categorical data by Chi Square.

RESULTS. We identified 82,300 patients with severe sepsis among 4,761,726 acute-care hospital discharges during the study period with an incidence of 182 cases/100,000 residents/year in Catalonia. The hospital incidence of severe sepsis has increased from 12,809 cases in 2008 (1.3 % of hospital admissions) to 20,228 cases in 2012 (2.1 %) ($p < 0.0001$). Mean age of cases increased from 69 to 73 years ($p < 0.0001$) as the comorbidity of patients estimated by the Charlson score (4.9–5.3, $p < 0.001$).

Length of hospital stay decreased during the study period from 18.4 days to 15.3 days ($p < 0.00001$). We observed a reduction in the hospital mortality in multivariate analysis adjusted by all significant variables (gender, age group, comorbidities, ICU admission, emergency admission, organ dysfunction, number of organ dysfunction, septic focus, bacteraemia) from 23.7 to 19.7 % ($p < 0.0001$, OR: 0.772, 95 % CI 0.727–0.820).

CONCLUSIONS. We observed a 6 % increase in the incidence of severe sepsis every year in Catalonia, for a mean incidence in the last 5 years of 182 cases/100,000 residents/year. Despite the increase of age and comorbidities in septic patients, we observed a reduction of mortality and length of stay of a 3.4 % every year.

0538

RELATIONS BETWEEN STATIN USE AND DEATH IN GRAM-NEGATIVE AND GRAM-POSITIVE BLOODSTREAM INFECTION: A PROSPECTIVE OBSERVATIONAL STUDY

A. Mehl^{1,2}, S. Harthug^{3,4}, S. Lydersen⁵, J. Paulsen^{1,6}, B.O. Åsvold^{7,8}, E. Solligård^{9,10}, J.K. Damås^{6,11}, T.H. Edna^{2,12}

¹Levanger Hospital, Nord-Trøndelag Health Trust, Department of Medicine, Levanger, Norway, ²Norwegian University of Science and Technology, Institute of Cancer Research and Molecular Medicine, Trondheim, Norway, ³Haukeland University Hospital, Department of Medicine, Bergen, Norway, ⁴University of Bergen, Institute of Medicine, Bergen, Norway, ⁵Norwegian University of Science and Technology, The Regional Centre for Child and Adolescent Mental Health, Department of Neuroscience, Trondheim, Norway, ⁶Norwegian University of Science and Technology, Centre of Molecular Inflammation Research, Trondheim, Norway, ⁷Norwegian University of Science and Technology, Department of Public Health and General Practice, Trondheim, Norway, ⁸St Olav's University Hospital, Department of Endocrinology, Trondheim, Norway, ⁹Norwegian University of Science and Technology, Department of Circulation and Medical Imaging, Trondheim, Norway, ¹⁰St Olav's University Hospital, Clinic of Anaesthesia and Intensive Care, Trondheim, Norway, ¹¹St Olav's University Hospital, Department of Infectious Disease, Trondheim, Norway, ¹²Levanger Hospital, Nord-Trøndelag Health Trust, Department of Surgery, Levanger, Norway

INTRODUCTION. In several studies on patients with bloodstream infection (BSI), use of statins has been associated with improved survival. Gram-positive and Gram-negative bacteria alert the innate immune system in different ways. We therefore studied whether the association between statin use and 90-day total mortality differed between Gram-positive and Gram-negative BSI.

METHODS. We conducted a prospective observational cohort study of 1,409 adults with BSI admitted to Levanger Hospital between January 1st, 2002, and December 31st, 2011. Data on use of statin and other medication at admission, comorbidities, functional status, treatment, and outcome were obtained from the patients' hospital records. The association between statin use and death was studied by multivariable logistic regression.

RESULTS. The association of statin use with 90-day mortality differed between Gram-negative and Gram-positive BSI (p value for interaction = 0.01). Among patients with Gram-negative BSI, statin users had significantly lower 90-day total mortality (odds ratio 0.42, 95 % CI 0.23–0.74, p = 0.003). The association remained essentially unchanged after statistical adjustment for sex, age, functional status before the infection, and underlying diseases (adjusted odds ratio 0.35, 95 % CI 0.18–0.69, p = 0.003). A similar analysis of patients with Gram-positive BSI showed no association of statin use with mortality (adjusted odds ratio 1.09, 95 % CI 0.61–1.95, p = 0.77).

CONCLUSION. The present study suggests that statin use is associated with a lower 90-day total mortality in Gram-negative BSI, but not in Gram-positive BSI.

0539

ASSOCIATION OF TIME TO RESOLUTION OF SEVERE SEPSIS AND IN-HOSPITAL MORTALITY AMONG ADULT ICU PATIENTS

A. Vengerovsky¹, R. Kashyap², J. Park²

¹Mayo Clinic Rochester, Internal Medicine, Rochester, United States, ²Mayo Clinic Rochester, Pulmonary and Critical Care Medicine, Rochester, United States

INTRODUCTION. Sepsis is an exaggerated immunologic response to infection that results in end-organ dysfunction due to hypoperfusion. The ability to reverse the damaging effect of hypoperfusion with fluid bolus distinguishes between mild and severe grades of sepsis. Long-term outcomes following sepsis survival are known to be poor, though prognostic factors relating to the incident sepsis episode have not been identified.

OBJECTIVES. Develop and test a definition for sepsis resolution to assess outcomes of patients that recover from the initial hemodynamic instability of severe sepsis.

METHODS. This is a retrospective cohort study of adult patients with severe sepsis (defined by the Surviving Sepsis Campaign guideline) admitted to the ICU. Patients with cardiogenic or hemorrhagic shock and those whose care was withdrawn during sepsis resuscitation were excluded from analysis.

Using an existing database of ICU patients, we extracted variables used to diagnose severe sepsis (BP, lactate, vasopressor use), parameters related to Early Goal Directed Therapy (fluid resuscitation, CVP, hematocrit, RBC transfusion, inotrope use), and outcomes of the hospitalization (ICU length of stay (LOS), hospital LOS, disposition, and 90-day and 2-year survival).

At present, we have only evaluated a subset of our data consisting of patients initially diagnosed with severe sepsis based solely on lactate ≥ 4 mg/dL. We defined "lactate resolution" (LR) as reduction of lactate to ≤ 2.5 mg/dL in this group.

RESULTS. 684 patients from 2011–2013 were diagnosed with severe sepsis; complete data was available for 670. Of these, 174 patients were identified to have initial lactate ≥ 4 mg/dL. Among this subset, LR occurred in 129. The median duration of sepsis based on the LR was 11.9 h (IQR 4.8–24.7). Of patients who experienced LR (vs no LR), 91.5 % (vs 60 %; p < 0.0001) survived to ICU discharge and 81.4 % (vs 53.3 %; p = 0.0006) survived to hospital discharge.

In multivariate analysis, adjusting for age, gender, first day SOFA and 24-h APACHE III scores, mortality of patients who met the definition of LR was lower than those who did not with OR of 0.34 (CI = 0.14–0.80).

CONCLUSIONS. Our preliminary results suggest that our definition of LR may prove to be an accurate marker of good prognosis in patients with severe sepsis. Further work will include analysis of additional outcome measures and outcome stratification based on the time to LR. We also plan to evaluate two other proposed markers of sepsis resolution—discontinuation of vasopressor agents and resolution of hypotension. We hope to construct a prognostic model based on these analyses.

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0540

CONSTRUCTION AND ANALYSIS OF EARLY PREDICTION MODEL OF SEPSIS: A RETROSPECTIVE CLINICAL STUDY

L. Tong¹, H.E. Liu¹, X.C. Tang¹

¹The 1st Affiliated Hospital, Sun Yat-Sen University, Guangzhou, China

INTRODUCTION. Over 100 biomarkers related to sepsis have been reported in the literature^[1], some of which have predictive value. Because sepsis is a complex syndrome with a variety of manifestations, these biomarkers are often insufficient^[2, 3, 4].

OBJECTIVES. This study was designed to analyze and compare the ability of eight biomarkers with their accuracy in an early prediction of sepsis.

METHODS. This was a retrospective clinical study. We collected data from the patients in the Surgery Intensive Care Unit who had systemic inflammatory response syndrome but not sepsis from March 2012 to March 2013. 131 cases were utilized. The levels of Procalcitonin, C-reactive protein, Interleukin-6, Fibrinogen, Lactate, D-Dimer, Neutrophilic granulocyte percentage, Platelet were recorded as well as the age, gender, primary diagnosis, vital signs, microbiological culture results and the site of infection. We performed one-way analyses of variance, receiver operating characteristic curve analysis, and logistic regression analysis to determine the prediction accuracy of sepsis and to establish a predictive model.

RESULTS. According to the diagnostic criteria of sepsis, all patients were divided into sepsis and non-sepsis groups. It is found that PCT had a higher sepsis prediction accuracy compared with other biomarkers. The logistic regression model was used to build predictive models. The final predictive model was: $\log(P) = 0.341 - 0.015 \times \text{PLT} (10^9/L) + 0.099 \times \text{PCT} (\text{ng/mL}) + 0.012 \times \text{CRP} (\text{mg/L})$. The area under the curve (AUC) of the predictive model was 0.893, which was higher than the AUC of a single serum biomarker.

CONCLUSIONS. PCT has higher sepsis prediction accuracy. The three serum biomarkers PLT, PCT, and CRP can be used to establish a predictive model of sepsis: $\log(P) = 0.341 - 0.015 \times \text{PLT} (10^9/L) + 0.099 \times \text{PCT} (\text{ng/mL}) + 0.012 \times \text{CRP} (\text{mg/L})$. The predictive model can more reliably predict the occurrence of sepsis compared with a single serum biomarker.

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GRANT ACKNOWLEDGMENT. Thanks for Mr Xiaoguang Hu collecting data, blood taking, Miss Lu Cao giving the statistical advice and performing the statistical analysis.

0541

OCCULT ADRENAL INSUFFICIENCY IN PATIENTS WITH SEPTIC SHOCK AND THE PROGNOSTIC VALUE OF A SHORT CORTICOTROPHIN STIMULATION TEST

M. Arafa¹, R. Soliman², K. Hussein², A. Elsherif², I. Abdelatif¹

¹Cairo University, Cairo, Egypt, ²Cairo University, Critical Care, Cairo, Egypt

INTRODUCTION. Corticosteroid insufficiency in acute illness can be difficult to discern clinically. Occult adrenal insufficiency (i.e., $\Delta\text{max} \leq 9$ $\mu\text{g/dL}$) after corticotrophin may be associated with a high mortality rate.^(1, 2)

OBJECTIVES. TO undertake a prospective study to assess the factors associated with mortality, with special interest in cortisol levels and its response to corticotrophin in patients with septic shock.

METHODS. A total of 50 consecutive patients admitted in the adult intensive care unit of the critical care department, Cairo University who met the clinical criteria for septic shock were prospectively enrolled in the study. A low dose (1 μg) short corticotrophin stimulation test was performed; blood samples were taken before the injection (T0) and 30 (T30) and 60 (T60) min afterward.

RESULTS. The prevalence of occult adrenal insufficiency was 74 %. The 28-day mortality rate was 74 % and the median survival time was 5 days. The following variables remained independently associated with death: APACHE III greater than 63.5 (P = 0.04), mean arterial pressure of 66 mm Hg or less (P = 0.03), lactate level 4.7 or more (p value 0.01), base deficit -9.0 or more (p = 0.03), GCS 13 or less (p value = 0.001), random baseline cortisol (T0) greater than 28.5 $\mu\text{g/dL}$, and maximum variation after test (Δmax) of ≤ 7.5 $\mu\text{g/dL}$ (P < 0.001).

CONCLUSION. A short corticotrophin test using low-dose corticotrophin has a good prognostic value and can be helpful in identifying patients with septic shock at high-risk for death. High basal cortisol levels and a low increase in cortisol on a corticotrophin stimulation test are predictors of a poor outcome in patients with septic shock.

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GRANT ACKNOWLEDGMENT. Critical care department, Cairo University.

0542

TIMING AND CAUSES OF DEATHS IN SEPTIC SHOCK

F. Daviaud^{1, 2}, D. Grimaldi³, A. Dechartres⁴, S. Bourcier¹, G. Géri^{1, 2}, N. Marin¹, J. Charpentier¹, J.-D. Chiche^{1, 2}, A. Cariou^{1, 2}, J.-P. Mira^{1, 2}, F. Pène^{1, 2}

¹Cochin Hospital, Medical ICU, Paris, France, ²Paris Descartes University, Paris, France, ³Hopital Mignot, ICU, Versailles, France, ⁴Hopital Hotel Dieu, Centre d'Épidémiologie Clinique, Paris, France

INTRODUCTION. Most observational and interventional studies about septic shock commonly report a crude mortality rate that is not only related to the primary infection but also to secondary complications or to underlying comorbidities. Furthermore, a number of patients are likely to die after withholding or withdrawing life supports.

OBJECTIVE. The aim of this study was to determine the timing and the causes of death of septic shock patients in the ICU.

METHODS. We conducted a retrospective monocenter study over a 5-year period (2008–2013). All patients diagnosed for septic shock within the first 48 h of ICU admission were included. Data were extracted from the computed medical file and checked manually for every patient. Early and late deaths were defined as occurring within or after the early 72 h, respectively. The cause of death was determined from medical files by two independent physicians. Variables are presented as mean \pm SD or median (IQR). We performed univariate and multivariate logistic regression analysis to determine factors associated with early death.

RESULTS. Over the study period, 544 patients out of a total of 9,002 admissions presented with septic shock during the first 48 h. Mean age was 66 \pm 15 years. A high proportion of patients had underlying comorbidities: immunodepression (39.8 %), chronic respiratory insufficiency (19 %), diabetes (18 %), and cirrhosis (12 %). Infection was healthcare-associated or nosocomial in 53 % of patients. The primary source of infection was the lung, and it was documented in 67 % of patients. Admission SAPS 2 and SOFA scores were 66 (51; 85) and 13 (7; 22), respectively. ICU and hospital mortality rates were 37 and 45 %. Deaths occurred during the first 72 h for 78 (38 %) patients, and later for 125 (62 %) patients. Early deaths were mostly related to multiple organ failure related to the primary infection (64 %) and to non-occlusive mesenteric ischemia (10 %). Causes of late deaths were therapeutic limitations (36 %), non-occlusive mesenteric ischemia (21 %) and ICU-acquired infections (15 %). In multivariate analysis adjusted with the extent of organ failures, factors associated with early death were age, diabetes, neutropenia, hypoprotidemia and absence of microbiological documentation.

CONCLUSION. Septic shock is associated with a high rate of early mortality directly related to the primary infection. However, the majority of deaths occurs later and is mainly related to ICU-acquired complications. Our study provides a comprehensive assessment of septic shock-related deaths in unselected patients and is likely to impact on the design of future interventional trials or institution of preventive and therapeutic measures towards ICU-acquired complications.

0543

SEPTIC SHOCK COMPLICATING INTENSIVE CARE UNIT-ACQUIRED PNEUMONIA DRASTICALLY WORSENS PATIENT OUTCOMES AND SURVIVAL

M. Carbonara^{1,2}, G. Li Bassi¹, A. Gabarrus¹, F. De Rosa², M. Rinaudo¹, L. Fernández-Barat¹, M. Ferrer¹, A. Torres¹

¹Hospital Clínic, Pulmonary and Critical Care Medicine, Barcelona, Spain, ²University of Milan, Anesthesia, Milan, Italy

INTRODUCTION. Intensive care unit-acquired pneumonia (ICU-AP) is one of the most common iatrogenic nosocomial infections. Septic shock (SS) may complicate its course. Further studies are needed to characterize ICU-AP patients who develop SS.

OBJECTIVES. To describe characteristics of ICU-AP patients with SS upon admission or during the course of infection, and the impact on outcomes and survival.

METHODS. We prospectively analyzed ICU-AP patients from 6 ICUs in a tertiary university hospital. ICU-AP was diagnosed based on either clinical criteria or clinical pulmonary infection score ≥ 6 . Clinical, laboratory, radiologic and microbiologic data were collected upon admission, and every other day, until hospital discharge or death. SS was defined by a score ≥ 3 of the cardiovascular component of the Sequential Organ Assessment Failure (SOFA) score. Clinical deterioration after 72 h of antibiotic therapy was considered as treatment failure.

RESULTS. From January 2007 to August 2013, we recruited 394 patients with ICU-AP, of whom 59.4 % had ventilator-associated pneumonia. 141 patients (35.8 %) developed SS, and in 65.9 % of these cases SS arose upon ICU-AP diagnosis. Overall, baseline characteristics did not differ between patients with or without SS, except for chronic hepatic disease (28.4 versus 15.4 %, respectively, $p = 0.002$). In multivariate analysis, endotracheal intubation, severe leukocytosis upon diagnosis, and SOFA score at day 3 after diagnosis were predictors of SS (OR 1.98, 1.45, 1.70, respectively, $p < 0.05$). ICU-AP was microbiologically confirmed in 62.4 % of the cases. In SS patients, causative pathogens were commonly multi-drug resistant (32.4 versus 22.5 %, $p < 0.05$). Appropriate empiric therapy was administered in 76.5 and 84.3 % of the patients with or without SS, respectively ($p = NS$). Yet, treatment failure occurred in 80.9 % of the SS patients versus 42.3 % without SS, $p < 0.05$. Procalcitonin, interleukin (IL)-6, IL-8 and tumor necrosis factor- α were higher in SS patients. SS patients stayed longer in the ICU (27.2 versus 20.9 days, $p < 0.05$), but ultimately hospital stay did not vary between groups. Ventilator-free days, in patients with or without SS were 5 versus 15.3, respectively ($p < 0.05$). SS was associated with 3- or 2-fold higher ICU, 28-day and 90-day mortality rates (59.6, 33.3 and 63.1 %, versus 16.2, 13.8 and 29.1 %, respectively, $p < 0.05$). In multivariate analysis of features associated with 90-day mortality during the course of the infection, SS was the strongest predictor of worse survival (OR 2.2, $p < 0.05$).

CONCLUSIONS. In a third of the patients with ICU-AP, SS complicates the course of infection. This is associated with higher risk for treatment failure. SS results in a dramatic worsening of outcomes and survival. Our findings indicate the need of novel therapeutic strategies to optimize management of these patients.

0544

EFFECT OF EARLY INTERVENTION AND EARLY ICU ADMISSION ON ACUTE INTRA-ABDOMINAL SEPSIS

K.B. Tang¹

¹North District Hospital, ICU, Hong Kong, Hong Kong, China

INTRODUCTION. Intra-abdominal sepsis is one of the major causes of emergency admission in intensive care unit, which associated with high mortality. Study on the effect of early intervention and early ICU admission on prognosis was surprisingly lacking.

OBJECTIVES. Conduct study to determine if early intervention and early ICU admission would improve survival and length of stay in patient with acute intra-abdominal sepsis admitted to ICU.

METHODS. This is a retrospective case control study. All ICU patients (2007–2013) presented with acute intra-abdominal sepsis and with intervention done were included. Relationships of early intervention and early ICU admission vs late intervention and late ICU admission on ICU and hospital mortality and length of stay were assessed. Demographic data such as age and sex, and prognostic indicator such as APACHE II score were recorded to test their effect on hospital mortality and be controlled as confounders, using multiple logistic regression models.

RESULTS. 439 patients presented with acute intra-abdominal sepsis were recruited, with hospital mortality of 23.46 %. Survivors were younger (mean age 65.9 vs 74.6, $p < 0.0001$), have a lower APACHE II score (mean score 19.29 vs 30.47, $p < 0.0001$), and with a non-significant trend towards shorter time from AED to ICU admission (mean time 47.5 vs 85.5 h, $p = 0.104$). Patient with early ICU admission (< 24 h after AED attendance) was associated with a non-significance trend towards lower hospital length of stay (22.79 vs 28.25 days, $p = 0.109$), but not for hospital mortality. Early intervention time was not shown to have any different in terms of hospital outcome and length of stay. Multiple logistic regression shown patient age (OR 1.034, 95 % CI 1.01–1.059, $p < 0.0001$) and APACHE II score (OR 1.099, 95 % CI 1.008–1.199, $p < 0.0001$) was significantly associated with hospital mortality, while patient with ICU admission > 12 h after AED attendance was significantly associated with higher ICU mortality (OR 3.499, 95 % CI 1.277–9.589, $p = 0.015$).

CONCLUSIONS. For patient with acute intra-abdominal sepsis that required intervention, Earlier ICU admission after AED presentation was associated with a trend towards lower hospital length of stay and hospital mortality, and was associated with a lower ICU mortality. Better early resuscitation and early antibiotic could be the reason for such finding. Further study with larger sample size will be required to examine this relationship.

0545

QRS DURATION AS A PROGNOSTICATOR OF ICU SEPSIS MORTALITY

F. Rezaei¹, N. Junaid¹, P. Prayag¹, M. Hasnain¹, M. Handler¹, S. Sivan¹, P.C. Yodice¹, N. Mistry¹, K.G. Fless¹

¹Saint Barnabas Medical Center, Livingston, United States

INTRODUCTION. Sepsis is defined as Systemic Inflammatory Response Syndrome (SIRS) in the presence of infection, and carries high morbidity and mortality rates, particularly in the intensive care unit (ICU) setting. To date, a variety of biomarkers and sepsis scoring systems have been employed in predicting sepsis prognosis, though studies on these prognostic factors have largely yielded equivocal results. Prior studies have shown that electrocardiogram (EKG) QRS complex prolongation is indicative of left ventricular (LV) dysfunction. Given the high rate of LV dysfunction in septic adults admitted to the ICU, our study sought to determine the prognostic value of QRS duration in this patient population.

OBJECTIVES. We hypothesized that a prolonged QRS duration (≥ 120 ms) was predictive of poor outcomes in ICU patients with severe sepsis and septic shock.

METHODS. A retrospective chart review of all patients previously admitted to a community hospital ICU with a primary diagnosis of severe sepsis or septic shock over a period of 18 months was performed. A total of 307 patients were identified. Of these, 43 patients were excluded due to arrhythmias, history of pacemaker placement or missing EKG data. Demographic and clinical variables (age, gender, EKG results and mortality) were abstracted, and patients were divided into two groups based on QRS duration (≥ 120 or < 120 ms). Categorical variables were analyzed using the Chi squared test. Statistical analysis was performed using IBM SPSS v21.0.0.

RESULTS. Among our study sample of 264 patients, sepsis occurred most commonly in the 6th decade (mean age 67.4 ± 17.4 years), and was more common in females (51.9 % females). Fifteen patients (5.7 %) had a prolonged QRS duration (≥ 120 ms) of which 11 died, (mortality rate 73.3 %) versus 31.7 % mortality in the normal QRS group (< 120 ms). The overall ICU mortality rate for sepsis was 34.1 %. The association between prolonged QRS and mortality in patients with a diagnosis of severe sepsis and septic shock was statistically significant ($p = 0.001$).

CONCLUSIONS. This study suggests there is an association between prolonged QRS interval and mortality in septic adults in the ICU setting. This is an inexpensive tool that could be used by healthcare professionals in the ICU to predict the outcome of patients with severe sepsis and septic shock. We recommend further studies be done to validate the use of QRS duration as a sepsis prognosticator.

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Monitoring & assessment of respiratory function: 0546–0559

0546

THE ASSESSMENT OF END EXPIRATORY TRANSPULMONARY PRESSURE IN ARDS PATIENTS

I. Algieri¹, D. Chiumello^{1,2}, A. Colombo¹, G. Babini¹, M. Brioni¹, F. Crimella¹, S. Luoni¹

¹Università degli Studi di Milano, Dipartimento di Fisiopatologia Medico-Chirurgica e dei Trapianti, Milano, Italy, ²Fondazione IRCCS Ca' Granda-Ospedale Maggiore Policlinico, Dipartimento di Anestesia, Rianimazione (Intensiva e Subintensiva) e Terapia del Dolore, Milano, Italy

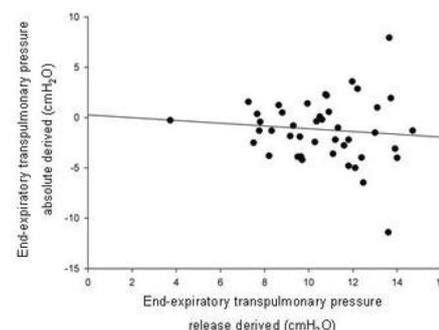
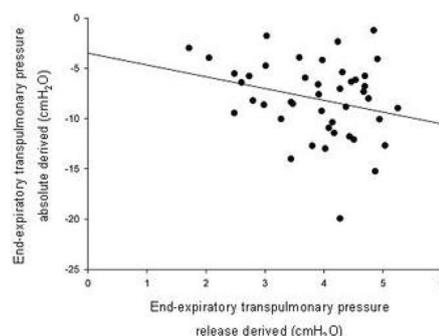
INTRODUCTION. The optimal method for estimating transpulmonary pressure (i.e. the fraction of the airway pressure transmitted to the lung) has not been established.

OBJECTIVES. To compare two methods for estimating transpulmonary pressure.

METHODS. In forty four patients with ARDS the end-expiratory transpulmonary pressure was computed as the change in airway and esophageal pressure from PEEP to atmospheric pressure (i.e. release derived) and as the difference of PEEP minus absolute esophageal pressure (i.e. absolute derived). In addition a lung CT at 5 cmH₂O of PEEP was performed and analyzed with a dedicated software package. The elastance of respiratory system (Ers), lung (El) and chest wall (Ecw) were computed.

RESULTS. The absolute esophageal pressure averaged 11.9 ± 4.1 cmH₂O at atmospheric pressure without any difference among the severity of ARDS. The mean absolute and release derived transpulmonary pressure were -8.0 ± 3.8 and 3.9 ± 0.9 cmH₂O at 5 cmH₂O and -1.2 ± 3.2 and 10.6 ± 2.2 at 15 cmH₂O of PEEP respectively. The absolute and release derived transpulmonary pressure were not related ($r^2 = 0.07$, $P = 0.08$, at 5 cmH₂O of PEEP) and ($r^2 = 0.10$, $P = 0.53$, at 15 cmH₂O of PEEP) (figure 1). Absolute esophageal pressure at 5 cmH₂O was not significantly correlated with lung weight, lung recruitability, amount of not aerated lung tissue, hypoxemia, chest wall elastance and gastric pressure

CONCLUSIONS. The release and absolute derived end expiratory transpulmonary pressure are not related.



[Fig. 1]

0547
QUANTIFICATION OF INTRAPULMONARY SHUNT AFTER LUNG TRANSPLANTATION. COMPARISON OF THE NON-INVASIVE ALPE® SYSTEM VS. THE CONVENTIONAL SWAN-GANZ-CATHETER

T. Hamp¹, B.A. Tudor², M. Wiegeler¹, C.G. Krenn¹

¹Medical University of Vienna, Anaesthesiology, General Critical Care and Pain Management, Vienna, Austria, ²Medical University of Vienna, Vienna, Austria

INTRODUCTION. Lung transplantation frequently causes disturbances in gas exchange due to various pathological changes. Ischemia and reperfusion injury as well as surgical manipulation can all result in an increase of intrapulmonary shunt and ventilation/perfusion (V/Q) mismatch. These disturbances are usually treated by optimisation of PEEP and airway pressures whilst avoiding further ventilator induced lung injury. Fluid therapy and hemodynamic support also play an important role. For adequate treatment decisions it is of utmost importance to monitor and correctly distinguish and quantify intrapulmonary shunt and V/Q mismatch. This can be done with the Swan-Ganz-Catheter but non-invasive methods would be preferable due to the potential complications of invasive monitoring. The ALPE® system (ALPE Integrated, Mermaid Care A/S, Sundby, Denmark) offers non-invasive quantification of intrapulmonary shunt.^{1,2} This is achieved by adapting settings of FiO₂/SpO₂ and measuring the resulting variations in pulseoximetry. The ALPE® system constructs a FiO₂/SpO₂ curve derived from these data and intra pulmonary shunt is calculated by a mathematical algorithm. Opposed to the Swan-Ganz-Catheter this can be done non-invasively.

OBJECTIVES. This study should evaluate whether values of intrapulmonary shunt obtained by the ALPE® system are reliable and comparable to those obtained by the Swan-Ganz-Catheter.

METHODS. In this pilot study we include adult patients after lung transplantation admitted to our ICU without postoperative ECMO support. Measurement of intrapulmonary shunt with the ALPE® system and simultaneously with the routinely placed Swan-Ganz-Catheter are performed daily after lung transplantation until the Swan-Ganz-Catheter is removed.

RESULTS. Preliminary data of 24 measurements in 10 patients were performed yet. Mean intrapulmonary shunt values obtained with the ALPE system are 9.4 % ± 10.7, and with the Swan-Ganz-Catheter 9.5 % ± 5.9. Although mean values are similar, regression analysis revealed no strong correlation between the measurements obtained with the Swan-Ganz-Catheter and the ALPE® system (R² 0.104, p = 0.13; intercept coefficient 3.907, p = 0.35; x-variable coefficient 0.576, p = 0.13). Data are also presented in a Bland and Altman Plot (Figure 1).

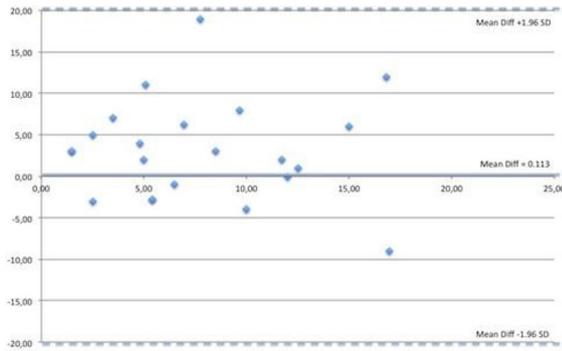


Figure 1 Bland and Altman plot of data obtained from 24 paired measurements of intrapulmonary shunt with the ALPE system and the Swan-Ganz-Catheter.

[Figure 1]

CONCLUSIONS. Preliminary data shows no strong correlation of the intrapulmonary shunt values obtained by the ALPE system as compared to the Swan-Ganz-Catheter.

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0549
ANALYSIS OF TRANSPULMONARY PRESSURE WITHIN TWO DIFFERENT GROUPS OF ARDS PATIENTS

I. Algieri¹, D. Chiumello^{1,2}, G. Babini¹, A. Colombo¹, F. Crimella¹, M. Monti¹, B. Comini¹, M. Brioni¹

¹Università degli Studi di Milano, Dipartimento di Fisiopatologia Medico-Chirurgica e dei Trapianti, Milano, Italy, ²Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Dipartimento di Anestesia, Rianimazione ed Emergenza Urgenza, Milano, Italy

INTRODUCTION. Transpulmonary pressure (P_L) is the driving force acting on the lung during mechanical ventilation and it can be used as a marker of lung stretching (1). However, at similar airway pressures ARDS patients can have different P_L, and the same ventilatory setting can be either safe or harmful, depending on the characteristics of the patient.(2).

OBJECTIVES. To compare end-inspiratory transpulmonary pressure between high (HR) and low recruiters (LR) ARDS patients.

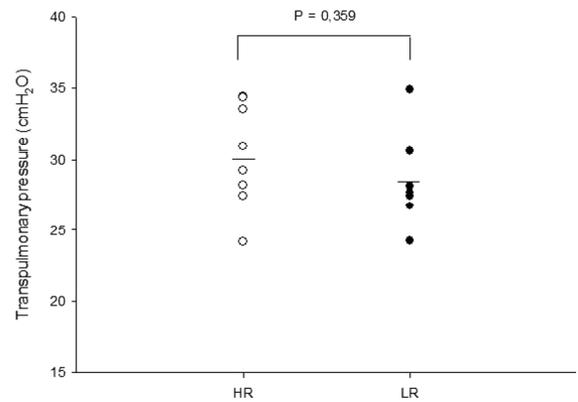
METHODS. In 15 ARDS patients, respiratory mechanics parameters (i.e. esophageal pressure, airway pressure, tidal volume) were recorded during pressure controlled ventilation with PEEP 5 cmH₂O and end-inspiratory pressure 45 cmH₂O (recruitment maneuver). The elastance of respiratory system (E_{rs}) and lung (E_l) were computed. End-inspiratory P_L was computed as (Airway pressure end-inspiration) * (E_l/E_{rs}) (2). Then, patients underwent a whole-lung CT scan at PEEP 5 cmH₂O end-expiration and at airway plateau pressure 45 cmH₂O end-inspiration. Quantitative analysis of CT data was performed and recruitability was defined as the fraction of lung parenchyma that regains inflation going from 5 cmH₂O end-expiration to 45 cmH₂O end-inspiration. Patients were classified as high recruiters (HR group) and low recruiters (LR group) according to median lung recruitability (15.4 % of lung parenchyma [IQ range 11.3-28.5 %]).

RESULTS. In HR group and in LR group median recruitability was 27.6 % [17.9 to 36.8 %] and 10.9 % [9.3 to 14.2 %] respectively (p < 0.001). Mean end-inspiratory P_L at

airway plateau pressure of 45 cmH₂O was 30.2 ± 3.7 cmH₂O in HR group and 28.5 ± 3.4 cmH₂O in LR group (p = 0.359) (fig 1). Mean E_l/E_{rs} was 0.775 ± 0.082 in HR group and 0.732 ± 0.025 in LR group (p = 0.289).

CONCLUSIONS. These preliminary data show that there is not a significant statistical difference in P_L between high and low recruiters, suggesting that lung recruitability is not related to end-inspiratory lung stretching for a given airway pressure.

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[Transpulmonary pressure in HR and LR groups]

0550
MONITORING OF VENTILATION BY EIT AT DIFFERENT END-EXPIRATORY VOLUMES: A VALIDATION STUDY

T. Mauri^{1,2}, G. Bellani^{1,2}, G. Suriano^{1,2}, N. Eronia^{1,3}, M. Battistini^{1,2}, M. Pozzi^{1,2}, R. Marcolin², A. Pesenti^{1,2}

¹University of Milan Bicocca, Department of Health Sciences, Monza, Italy, ²San Gerardo Hospital, Monza, Italy, ³University of Foggia, Foggia, Italy

INTRODUCTION. Electrical Impedance Tomography (EIT) is a non-invasive bedside technique able to track global and regional changes in lung aeration. Previous studies described that, within the same patient, changes in lung volumes caused by tidal ventilation (V_{tidal}) are tightly correlated with tidal impedance variation (V_{EIT}). Moreover, changes in end-expiratory lung impedance multiplied by the V_{tidal}/V_{EIT} ratio (ΔEELV_{EIT}) presented a strong linear correlation with changes in end-expiratory lung volume (ΔEELV) measured by nitrogen washin/washout technique.

OBJECTIVES. Aim of this study was to verify if, in intubated patients undergoing controlled mechanical ventilation, the V_{tidal}/V_{EIT} ratio remains constant at two different EELV.

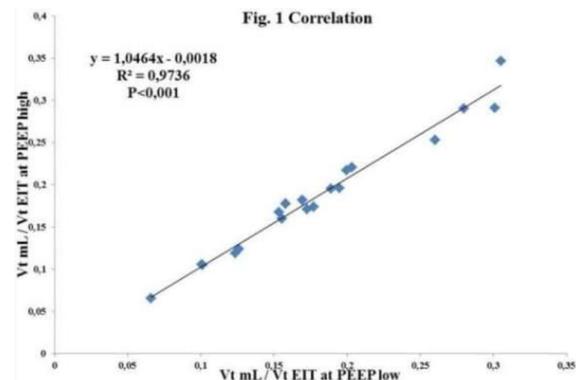
METHODS. We enrolled 19 critically ill patients undergoing volume-controlled mechanical ventilation, sedated, paralyzed and with PaO₂/FiO₂ ≤ 300 at PEEP ≥ 5 cmH₂O. Tidal volume was set at ≈ 6 mL/kg and the respiratory rate to obtain eucapnia, while the attending physician set PEEP based on oxygenation. We connected the EIT monitor (Pulmovista500[®], Dräger Medical GmbH, Germany) by a dedicated belt placed on the 5th-6th intercostal space and randomly applied two PEEP levels (clinical and clinical + 5 cmH₂O) for 20 min each. At each PEEP level, we measured: different respiratory parameters and V_{tidal} from the flow sensor of the ventilator, V_{EIT} from EIT, ΔEELV by Helium dilution technique (ΔEELV_{He}) and ΔEELV_{EIT}.

RESULTS. Clinical PEEP was 7 ± 2 cmH₂O. At higher PEEP (12 ± 2 cmH₂O, p < 0.001), ΔEELV_{He} and ΔEELV_{EIT} increased and they didn't differ (491 ± 198 mL vs. 475 ± 188 mL, p = 0.47). We disclosed tight correlation between ΔEELV_{He} and ΔEELV_{EIT} (R² = 0.789, p < 0.001). PEEP change didn't affect V_{tidal} (432 ± 84 mL vs. 432 ± 85 mL, p = 0.85), while V_{EIT} slightly decreased 2648 ± 918 a.u. vs. 2561 ± 898, p < 0.05). Thus, the ratio between V_{tidal} and V_{EIT} slightly varied between the two PEEP levels (0.18 ± 0.07 mL/a.u. vs. 0.19 ± 0.07 mL/a.u., p < 0.05). Nonetheless, the correlation between patient's V_{tidal}/V_{EIT} ratios at the two PEEP levels was close to identity (Figure 1). The ratio [(V_{tidal}/V_{EIT}) at lower PEEP]/[(V_{tidal}/V_{EIT}) at higher PEEP] was 0.97 ± 0.05 (Figure 2 shows the Bland and Altman plot of the V_{tidal}/V_{EIT} ratios at two PEEP levels).

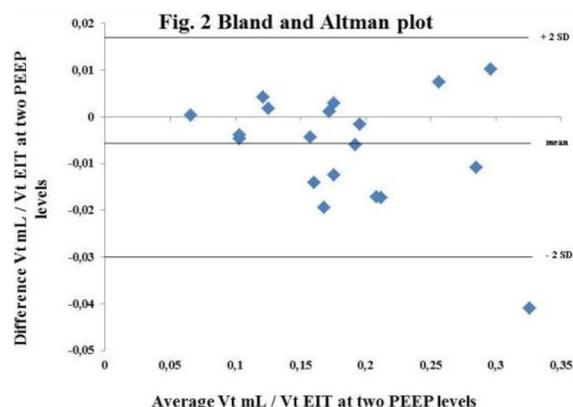
CONCLUSIONS. When EELV changes, EIT still represents a valid non-invasive bedside imaging tool to monitor changes over time of ventilation, with approximation around 3 %. These findings might be particularly relevant to monitor relative changes of minute ventilation over time in non-intubated patients by EIT at different lung volumes.

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[Figure 1]



[Figure 2]

0551 ASSISTED VENTILATION IN ARDS PATIENTS: LUNG-DISTENDING PRESSURE AND PATIENT-VENTILATOR INTERACTION

J. Doorduyn¹, C. Sinderby^{2,3}, J. Beck^{3,4}, J.G. van der Hoeven¹, L.M.A. Heunks¹

¹Radboud University Medical Center, Critical Care, Nijmegen, Netherlands, ²St-Michael's Hospital, Critical Care Medicine, Toronto, Canada, ³St-Michael's Hospital, Keenan Research Centre for Biomedical Science, Toronto, Canada, ⁴University of Toronto, Pediatrics, Toronto, Canada

INTRODUCTION. In patients with acute respiratory distress syndrome (ARDS), mechanical ventilation with limited inspiratory pressure and low tidal volume has been shown to reduce morbidity and mortality. Assisted ventilation has physiological benefits over controlled ventilation in these patients. Therefore, higher 'patient control' of ventilator assist may be preferable in ARDS patients. However, assisted modes may also increase the risk of excessive tidal volume and lung-distending pressure.

OBJECTIVES. To quantify how differences in freedom to control the ventilator, affect tidal volume, lung-distending pressures, breathing pattern variability, and patient-ventilator-interaction in ARDS patients.

METHODS. Twelve ARDS patients were ventilated in randomized order with assist pressure control ventilation (PCV), pressure support ventilation (PSV) and neurally adjusted ventilatory assist (NAVA). Transpulmonary pressure, tidal volume and diaphragm electrical activity were recorded. Patient-ventilator interaction was determined with a new automated index (Neuro-Sync index), that calculates timing errors between airway pressure and EAdi. Respiratory variability was assessed using the coefficient of variation of recorded parameters.

RESULTS. Transpulmonary pressure was different between ventilator modes (27.1 ± 1.1 , 28.2 ± 1.2 , and 26.9 ± 1.2 cmH₂O for PCV, PSV, and NAVA; $P < 0.01$). Tidal volume was not significantly different between modes (6.6 [5.7-7.0], 6.4 [5.8-7.0] and 6.0 [5.6-7.3] ml/kg for PCV, PSV, and NAVA), but its coefficient of variation was higher with NAVA (8.0 [6.4-10.0], 7.1 [5.9-9.0], and 17.0 [12.0-36.1] % for PCV, PSV, and NAVA; $P < 0.001$). Patient-ventilator interaction improved with NAVA (6 [5-8] % error) compared to PCV (29 [14-52] % error) and PSV (12 [9-27] % error); $P < 0.0001$.

CONCLUSIONS. Increasing freedom to control the ventilator is feasible in selected patients with ARDS, without increasing tidal volume and lung-distending pressure. In addition, neural control of ventilation improves patient-ventilator interaction and preserves respiratory variability.

0552 GAS EXCHANGE AND LUNG FUNCTION IN SEVERE ARDS PATIENTS NEEDING PRONE POSITION

G. Zani¹, S. Spadaro¹, A. Gioia¹, M. Polese¹, C. Carrieri¹, E. Marangoni¹, R. Ragazzi¹, S. Zardi¹, M.V. Colamussi¹, A. Romanello¹, V. Alvisi¹, C.A. Volta¹

¹University of Ferrara, Anesthesia and Intensive Care, Department of Morphology, Surgery and Experimental Medicine, Ferrara, Italy

INTRODUCTION. In ARDS patients the primary causes of abnormal gas exchange are pulmonary shunt and low V/Q. Previous studies have reported an improvement in oxygenation in patients with ARDS when placed in prone position. This amelioration might suggest a better ventilation/perfusion mismatching since re-expansion of non aerated compartment is usually associated with increased oxygenation. However, shunt and low V/Q investigation is difficult and cumbersome in clinical practice as it requires invasive methods. Recently it has been proposed a non invasive instrument (Automatic Lung Parameter Estimator - ALPE) to estimate O₂-loss and shunt, using step changes in inspired oxygen fraction.

OBJECTIVES. The aim of this study was to investigate changes in respiratory mechanics, shunt and gas exchange in severe ARDS patients while lying supine or prone.

METHODS. We prospectively studied patients with severe ARDS requiring prone position and admitted to our ICU from October 2013 till March 2014. We evaluated the following variables: static compliance (Cst,rs), pulmonary shunt and gas exchange at four PEEP levels (0, 5, 10, 15 cmH₂O). These levels were randomly applied: while patients were in supine position (S1); 30 min (P1) and 24 h (P2) after patients were placed in prone position; 30 min after patients returned to supine position (S2). Measurements were made 30 min after each step of the study.

RESULTS. 7 patients with severe ARDS were enrolled (mean SAPS II score was 43 ± 11). Patients were pronated on average 4.3 ± 0.5 days after ICU admission and remained in this position 33 ± 12 h on average. Prone position was associated to: 1) better Cst,rs at ZEEP and till PEEP of 10 cmH₂O. At PEEP of 15 cmH₂O, Cst,rs decreased both in supine and prone position; 2) lower shunt at each level of PEEP. The lower shunt was obtained in prone position at PEEP of 15 cmH₂O, value responsible of a sharp decrease of Cst,rs; 3) further amelioration of Cst,rs and shunt after 24 h of prone position. Returning to supine position was associated with a worsening of Cst,rs and shunt, although to better values than those

registered in supine position at the beginning of the trial. Of note, PEEP of 15 cmH₂O reduced the shunt fraction to a value comparable to those obtained in prone position.

CONCLUSIONS. Prone position was associated with improvement of Cst,rs and shunt that partially remains even after re-supination. By using PEEP of 15 cmH₂O, returning to supine position was associated to a worsening of Cst,rs but amelioration of shunt.

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0553 PROGNOSTIC VALUE OF CHANGES OF OXYGENATION INDEX, PCO₂ AND MECHANICAL PROPERTIES OF THE LUNG FOR THE COURSE OF ACUTE RESPIRATORY FAILURE

J.C. Lewejohann¹, F. Fogt¹, L. Kamprad¹, M. Hansen¹, E. Muhl¹, T. Keck¹

¹Universitätsklinikum Schleswig-Holstein-Campus Lübeck, Surgery - Intensive Care Unit, Lübeck, Germany

INTRODUCTION. Prone position ventilation (PPV) can improve gas exchange in acute respiratory failure (ARF) by recruiting alveoli situated in dorsal dependent regions of the lung and by alteration of ventilation/perfusion ratio. Its effectiveness can be demonstrated at the bedside by an improvement of oxygenation index and compliance of the lung as well as a decrease of pCO₂.

OBJECTIVES. The aim of our study is to analyse the effects of PPV on oxygenation index, compliance and pCO₂ in the course of ARF after its initiation.

METHODS. We studied n = 110 consecutive patients with ARF according to the Berlin definition of acute respiratory distress syndrome (ARDS) at a mean age of 63 ± 13 years [\pm SD] in a clinical follow-up design at a surgical ICU in a university hospital over a period of 41 month. All patients were ventilated intermittent in supine (SP) and in prone position (PP: 135° left/right-side-position) for at least six hours per day for supportive treatment of ARF. The measure was performed by trained employees of the ICU. Responder and non-responder each after a time interval of 8, 16, 24, 48 or 72 h after starting PPV were defined by an improvement of pO₂ > 20 mmHg, a decrease of pCO₂ > 1 mmHg or significant improvement of dynamic compliance (C_{dyn}) in each time interval. Data collection included apart from baseline characteristics individual PaO₂/FiO₂, pCO₂ and C_{dyn}.

RESULTS. PPV was well tolerated in all n = 110 patients, no relevant complications were noted. It was initiated 5.4 days [mean; min 1, max 31] after ICU admission and applied 4.6 ± 3.5 times to each patient with a duration of 9.5 ± 1.3 h [mean \pm SE]. Mean ICU stay was 33.3 days. ICU scoring showed a TISS 10 at 539.5 ± 89.8 and SAPS II at 1200 ± 38.9 [mean \pm SEM]. PPV lead within the first 8 h to a significant increase of PaO₂/FiO₂-Ratio (SP 191.6 ± 52.7 vs. PP 254.0 ± 68.0), and neither to a significant decrease of pCO₂ (SP 43.3 ± 5.74 vs. 45.5 ± 6.2 mmHg) nor C_{dyn} (SP 0.035 ± 0.01 vs. 0.032 ± 0.01 [mean \pm SD]). N = 89 patients survived their ARF, n = 21 died. The responder/non-responder ratio in the time interval of 8, 16, 24, 48 and 72 h yielded for PaO₂/FiO₂ 77/33; 68/42; 74/36; 78/32; 70/38, for pCO₂ 40/70; 49/61; 46/64; 39/71; 41/65 and for C_{dyn} 41/65; 51/55; 58/52; 64/46; 66/42.

CONCLUSIONS. The use of PPV in surgical patients with ARF is safe without relevant complications if applied by trained employees. The low mortality rate of our patients correlates with data of current literature. Our data show that the extent of improvement at bedside is displayed rather better by PaO₂/FiO₂-Ratio than by pCO₂ or C_{dyn}.

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0554 CATHETER MOUNTED CAPNOMETRY IMPROVES THE ESTIMATION OF ETCO₂ DURING INFLOW OF SECRETION INTO TRACHEAL TUBE

W. Kim¹, H. Kang¹, H.J. Choi¹, J. Oh¹, B. Kang¹, Y. Cho¹, T. Lim¹

¹College of Medicine, Hanyang University, Department of Emergency Medicine, Seoul, Korea, Republic of

INTRODUCTION. Capnometer has been widely used to aid in the proper placement of tracheal tube and monitor ventilation. But, Capnometer can malfunction under the conditions such as pulmonary edema and hemorrhage due to the vulnerability for water.

OBJECTIVES. We hypothesized that the use of catheter mount will reduce the malfunction of capnometers during inflow of secretion into tracheal tube.

METHODS. We performed a prospective, randomized crossover study of 25 healthy adults using mainstream capnometers and microstream capnographs. Primary endpoints were the malfunction rate and the cumulative survival rates of capnometer whether or not to use catheter mount under the conditions of water.

RESULTS. The median malfunction rates of capnometers significantly decreased in catheter mount using group under the conditions of water 5 ml (100 vs 70 in mainstream capnometer, $p = 0.001$; 100 vs 43.3 in microstream capnograph, $p < 0.001$). Under the conditions of water 10 ml, the malfunction rate of capnometers was also decreased when catheter mount was applied to microstream capnometer (100 vs 40, $p = 0.001$) and not reduced in mainstream capnometer (90 vs 90, $p = 0.08$). The cumulative survival rates of capnometers were significantly higher when using catheter mount under the conditions of water regardless of capnometer type (Mainstream in water 5 ml, $p < 0.001$; Microstream in water 5 ml, $p < 0.001$; Mainstream in water 10 ml, $p = 0.001$; Microstream in water 10 ml, $p < 0.001$).

CONCLUSIONS. The use of catheter mount might reduce the malfunction of capnometer during inflow of secretion into tracheal tube.

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0555**EVALUATION OF VARIABLES AFFECTING THE EVOLUTION OF ARDS ACCORDING TO THE BERLIN DEFINITION**

S. Spadaro¹, G. Zani¹, A. Fogagnolo¹, F. Tartari¹, V. Carpanese¹, C. De Fazio¹, S. Bertacchini², C.A. Volta¹

¹University of Ferrara, Anesthesia and Intensive Care, Department of Morphology, Surgery and Experimental Medicine, Ferrara, Italy

INTRODUCTION. The Berlin definition (BD) of ARDS has various advantages, one of the most interesting being the ability to divide patients in three groups, based on the severity of the disease. From the clinical point of view, patients can improve to a less severe ARDS, can remain stable or can worsen their severity class. Hence the BD should allow clinician to better evaluate the progression of the disease.

OBJECTIVES. Our primary objective was to identify which are the determinants of clinical progression of ARDS and their relationship with prognosis.

METHODS. We performed a retrospective analysis on patients admitted to our Intensive Care Unit in 2013 with a diagnosis of ARDS based on BD. Patients were classified as having mild, moderate and severe ARDS. We considered the progression of ARDS in several days from baseline and the clinical characteristics of patients, respiratory variables and ventilator setting were daily recorded.

RESULTS. We included 43 ARDS patients, 13 in the group mild, 24 in the group moderate and 6 in the group severe. No differences were found for demographic characteristics, SAPS II and SOFA score. During ICU stay, 16 patients (37 %) developed a worst ARDS, 8 (19 %) remained stable and 19 (44 %) improved their ARDS. Multivariate analysis indicates that the worsening of the disease and the ICU mortality were statistically related to the PEEP level ($p < 0.001$). Patients experiencing a worsening of their ARDS were ventilated with an average PEEP of 6.6 ± 2.2 cmH₂O; patients who remained in the same group had an average PEEP of 8.9 ± 1.1 cmH₂O, while patients who improved to a less severe ARDS were treated with an average PEEP of 10.2 ± 2.2 cmH₂O ($p < 0.001$).

CONCLUSIONS. Since low level of PEEP can be responsible of worsening of ARDS, our data seems to suggest that at least 10 cmH₂O of PEEP should be used even in patients with mild ARDS.

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0556**FLOW CHARACTERISTICS AND TIDAL VOLUME DISTRIBUTION**

P. Somhorst^{1,2}, M.S. van Mourik^{1,2}, R. de Vries^{1,2}, P. Blankman¹, D. Gommers¹

¹Erasmus MC, Adult Intensive Care, Rotterdam, Netherlands, ²University of Twente, Institute of Technical Medicine, Enschede, Netherlands

INTRODUCTION. Electrical impedance tomography (EIT) has proven to be a useful tool in visualizing the distribution of tidal volume. Previously studies have shown differences in tidal volume distribution when comparing different ventilatory modes and pressure levels. We hypothesized that ventilation distribution is also influenced by flow characteristics like peak flow and flow rise time.

OBJECTIVES. To elucidate the flow characteristics and resulting tidal volume distribution in patients ventilated with neurally adjusted ventilatory assist (NAVA) or pressure support ventilation (PSV) at three different assist levels.

METHODS. Flow curve characteristics of twelve ICU patients with mild ARDS were recorded during different ventilatory modes. Electrical activity of the diaphragm (EAdi), pressure, flow and EIT were recorded simultaneously. Inspiratory flow curves were categorized into accelerating flow (AcF) or decelerating flow. The latter was divided into three grades of slope steepness between peak flow and cut-off (DcF1, DcF2 and DcF3; DcF3 has the steepest slope). Ventilatory parameters, EAdi signal amplitude, tidal volume and EIT images were compared between the four categories.

RESULTS. For each of the four flow curve categories, sixty flow curves were analyzed. AcF occurred mainly during NAVA ventilation and PSV with low assist level (5 cmH₂O). DcF1, DcF2 and DcF3 occurred mainly during PSV with low assist level (5 cmH₂O), intermediate assist level (10 cmH₂O) and high assist level (15 cmH₂O) respectively. The peak flow was higher during breaths categorized as DcF2 and DcF3, but did not differ between AcF and DcF1. The time to peak flow was significantly longer during AcF compared to DcF1, DcF2 and DcF3, and longer in DcF1 compared to DcF2 and DcF3. EAdi amplitude was similar in DcF1 and AcF, but was lower in DcF2 and DcF3. EIT showed more dependent ventilation during AcF and DcF1 compared to DcF2, whereas there was more non-dependent ventilation during DcF3. **CONCLUSIONS.** Both accelerating and decelerating flow with a low peak flow promote dependent ventilation while decelerating flow with high peak flow promotes non-dependent ventilation. The peak flow and flow rise time might be useful to titrate ventilator settings for improving dependent lung ventilation.

0557**INFLUENCE OF TIDAL VOLUME ON VENTILATION INHOMOGENEITY ASSESSED BY ELECTRICAL IMPEDANCE TOMOGRAPHY AT DIFFERENT PEEP LEVELS**

T. Becher¹, G. Zick¹, D. Bläser², T. Meinel², N. Weiler², I. Frerichs¹

¹University Medical Center Schleswig-Holstein, Campus Kiel, Anesthesiology and Intensive Care Medicine, Kiel, Germany, ²University Medical Center Schleswig-Holstein, Campus Kiel, Kiel, Germany

INTRODUCTION. The global inhomogeneity (GI) index is a global parameter of ventilation inhomogeneity that can be calculated from images of tidal ventilation distribution obtained by electrical impedance tomography (EIT) [1]. It has been suggested that the GI index may be useful for individual adjustment of positive end-expiratory pressure (PEEP) and for guidance of ventilator therapy [2]. However, the influence of tidal volume (VT) on the GI index has not been evaluated.

OBJECTIVES. To assess the influence of VT on the GI index values at high and low levels of PEEP.

METHODS. We retrospectively analyzed EIT data from 5 patients with acute respiratory distress syndrome who were ventilated with a VT of 6 and 10 ml per kg predicted body weight (VT₆, VT₁₀) at a high and a low level of PEEP (PEEP_{high}, PEEP_{low}). PEEP_{high} and PEEP_{low} were set 2 cmH₂O above and 5 cmH₂O below the lower inflection point of a quasi-static pressure volume loop, respectively. The patient characteristics and detailed study procedure are described in Ref. [3]. The GI index was calculated as described in [1] from the lung region of interest (ROI). The lung ROI was defined by a threshold value of 20 % of the

maximum tidal impedance change. The mean values of the GI index at the high and low VT were compared using a paired two-sided t-test.

RESULTS. The lower inflection point was identified at 8 ± 1 (mean \pm SD) cmH₂O, resulting in a PEEP_{high} of 10 ± 1 and a PEEP_{low} of 3 ± 1 cmH₂O. At PEEP_{high}, we found a weak trend towards a higher GI index with VT₆ when compared to VT₁₀ (0.61 ± 0.05 with VT₆ vs 0.56 ± 0.07 with VT₁₀, $p = 0.22$). At PEEP_{low}, we found a significantly higher GI index with VT₆ compared to VT₁₀ (0.78 ± 0.07 with VT₆ vs 0.70 ± 0.06 with VT₁₀, $p = 0.02$).

CONCLUSIONS. Higher tidal volumes may lead to lower levels of the GI index, especially at low PEEP settings. This should be taken into account when attempting to minimize the GI index for individual PEEP titration.

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0558**IMPACT OF PERI-OPERATIVE EVENTS ON EARLY MORTALITY AFTER LUNG TRANSPLANTATION**

S. Abbas¹, P. Piednoir¹, M. Desmard¹, P. Montravers¹

¹AP-HP, Hôpital Bichat, Surgical Intensive Care Unit, Paris, France

INTRODUCTION. Lung transplantation (LT) is subject to a high morbidity and mortality especially in perioperative period. The occurrence of some early intraoperative and post-operative events could impact on mortality especially during the first 30 postoperative days.

OBJECTIVES. We wanted to describe these events and assessed their impact on the short-term prognosis of transplant patients.

METHODS. Single center retrospective analysis of 173 consecutive LT Between 2006 and 2011. The main objective of this study is to assess the impact on mortality during the 30 days post-transplant occurred: - Intraoperatively: a significant hemodynamic instability defined by a volume expansion than 2500 ml or high dose catecholamines (greater than 2.5 mg/h or associated with dobutamine or noradrenaline/adrenaline), hypoxemia Extended (SpO₂ less than 90 % for more than 30 min) and use of extracorporeal circulation (ECC). - Post-operative renal replacement therapy (RRT) or a early (within 72 h after the transplant) massive transfusion (higher than 5 red blood cells). Qualitative variables were analyzed using the Chi square test. Odds ratio (OR) and 95 % confidence intervals were calculated. A value of $p < 0.05$ was chosen to consider the results as significant.

RESULTS. Of 173 cases, 143 were analyzed. General anesthesia duration was 376 min (+/- 119). The operation was performed under cardiopulmonary bypass in 21 % of cases. High doses of catecholamines and massive volume expansion were necessary in respectively 32.2 % and 71 % of cases. An RRT or a massive transfusion was required during the perioperative period in 11.9 % and 10.1 % respectively. The mortality rate in our cohort is 13.4 % in the 30 days post-transplantation. The main risk factors for mortality are found high doses of catecholamines intraoperatively (OR 3.73 [1.34 to 10.4], $p = 0.0086$), an early use of the ERA (OR 9.69 [3.06 to 30.65] $p < 0.0001$) and massive transfusion (OR 4.15 [1.22 to 14.4], $p = 0.015$) with mortality rates in these three sub-groups respectively 24, 47 and 33 %. The prolonged intraoperative hypoxemia, vascular filling or the need for intervention in the CEC does not seem to influence early mortality.

CONCLUSIONS. In our cohort, more than one in eight patients died during the first postoperative month. This study identified a population at high risk of mortality marked by the need for high doses of catecholamines, a massive transfusion or early RRT.

0559**EXCELLENCE IN INTENSIVE CARE MEDICINE**

C.L. Sprung¹, R. Cohen², J. Marini³

¹Hadassah Hebrew University Medical Center, Jerusalem, Israel, ²Hebrew University Faculty of Medicine, Medical Education, Jerusalem, Israel, ³University of Minnesota, St Paul, United States

INTRODUCTION. Although doctors strive to be excellent, the characteristics of the excellent physician remain elusive.

OBJECTIVES. To identify the characteristics of excellent ICU physicians.

METHODS. Questionnaires were distributed to intensive care healthcare professionals who received an award for excellence or who were chosen by a professional organization as leaders in the field to develop guidelines or recommendations. They were asked to send names of the excellent physicians with whom they had direct and indirect contact, to identify the attributes of excellence that characterized them and 4 attributes of excellence independent of those identified for the physicians they listed.

RESULTS. One hundred and twenty seven health care professionals practicing in North and South America, North, South and Central Europe, Australia, Hong Kong and South Africa were selected. Ninety six (77 %) of the 127 ICU professionals responded listing 155 names and 53 attributes. Similar attributes were condensed into 20 generic characteristics (Table).

CONCLUSIONS. The attributes of excellent physicians were identified. Future study should focus on the settings and teaching methodologies that are optimal for medical trainees to acquire these attributes. Development of reliable and valid assessment tools and methods for providing effective feedback to trainees also need to be developed.

Table. Total Number (%) Top 20 Attributes

Attribute	Overall Total
1. Commitment	92 (10)
2. Knowledge	92 (10)
3. Compassionate	88 (10)
4. Clinical Skills	75 (8)
5. Outstanding Teacher	73 (8)
6. Enthusiasm	47 (5)
7. Leadership Skills	46 (5)
8. Intelligent	36 (4)
9. Professional	36 (4)
10. Innovative	34 (4)
11. Integrity	34 (4)
12. Outstanding Researcher	33 (4)
13. Mentor	32 (4)
14. Approachable	31 (3)
15. Team Work	27 (3)
16. Communicator	24 (3)
17. Hard Working	23 (3)
18. Inspirational	23 (3)
19. Colleague	21 (3)
20. Modesty	20 (2)
Total Count	887 (100)

Optimisation of ICU services & education: 0560–0573

0560

THE RELATIONSHIP BETWEEN THE ALLOCATION OF MEDICAL WORKFORCE AND ADMISSION RELATED WORKLOAD IN INTENSIVE CARE IN THE UK

J.H.S. Littler¹, A.J. Parker¹, C.L. Johnstone¹, J.M. Eddleston¹

¹Manchester Royal Infirmary, Manchester, United Kingdom

INTRODUCTION. In the UK Consultant/Patient ratio should not exceed 1:15[1] and the Resident/Patient ratio 1:8[1]. There should be twice-daily consultant ward round and a maximum time from admission to consultant review of 12 hours¹. ICU outreach duties must be staffed by additional personnel². New admissions place additional demands on staff resources and unplanned admissions the highest and most unpredictable. For this reason it would be helpful to analyse trends in planned and unplanned admission times to allow adjustment in the unit workforce to account for these.

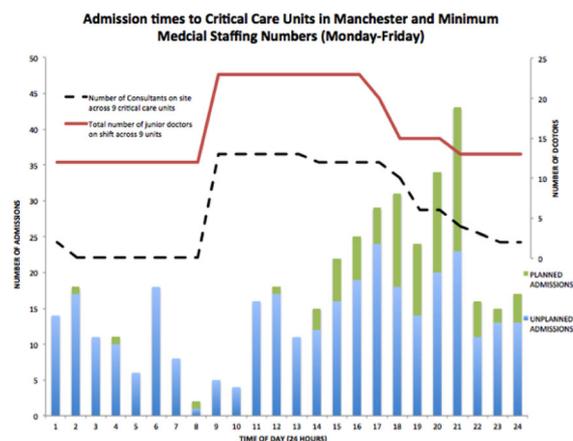
OBJECTIVE: Assess distribution of admission times to ICU and compare minimum medical staffing levels at these times.

METHOD. A retrospective audit was undertaken of the time of admission to 9 closed Adult General Critical Care Units in Manchester over a 28 day period from 08:00 9th September 2013 (2 University and 7 District Hospitals). All units participate in the Intensive Care National Audit & Research Centre Case Mix Programme (CMP). The time of admission and planned or unplanned status were recorded as defined in the CMP's dataset definitions. The medical workforce data was sourced from the individual hospital rotas.

RESULTS. There were 413 admissions to 107 beds over 28 days. 321 (78 %) admissions were unplanned and 92 (22 %) were planned. Total admission rates in the 9 units ranged from 0.5 to 4.9 patients per day (Unplanned 0.3 to 3.1 and planned 0.04 to 1.8 patients per day). Admissions increased from 1100 to a peak admission time of 2000 to 2100 (Graph 1). Lowest admission rates occurred from 0700 to 1100. 35 % of patients were admitted during normal working hours of 0800 to 1700. 32 % of admissions were in the 4-hour period from 1700 to 2100 and 33 % from 2100 to 0800. For all sites mean Consultant/Patient ratio was 1:8.5 from 0800 to 1700 and Resident/Patient ratio 1:4.7. From 1700 to 2100 Resident/Patient ratio was 1:7.4 and from 2100 to 0800 it was 1:8.7. No consultant was contracted to be onsite at any ICU from 0100 to 0800.

CONCLUSIONS. During the hours of 0800 to 1700 Consultant and Resident workforce meet standards outlined in the Core Standards for Intensive Care¹. Ratios decrease after this time and demands on workforce from planned and unplanned admissions increase. Resident/Patient ratios are close to recommended¹ levels after 2100 but demand from unplanned admissions remain high until 0200. This data does not capture demand from work outside but not admitted to ICU that should be staffed separately².

Workforce levels do not currently match the demand from admission peaks. Individual units should audit their own admissions and consider if their workforce plan corresponds to the demands of their workload.



[GRAPH 1]

REFERENCES. 1 Core Standards for Intensive Care Units, FICM and Intensive Care Society 2013, Edition 1 2 College of Critical Care Medicine of Australia and New Zealand, 2011, Minimum Standards for Intensive Care Units

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DIFFERENCES IN ECONOMIC EFFECTS OF ABANDONING ROUTINE CHEST RADIOGRAPHS IN ACADEMIC AND REGIONAL CARE INTENSIVE CARE UNITS

D. Lehberr-Eichinger¹, B. Gutenbrunner², B.-A. Tudor¹, A. Reiter², G.A. Roth¹, C.G. Krenn¹

¹Medical University of Vienna, Vienna, Austria, ²LK Amstetten, Amstetten, Austria

INTRODUCTION. Clinical procedures in intensive care units (ICU) and published guidelines still comprise daily chest radiographs (CXRs), especially in patients on mechanical ventilation or suffering from cardiopulmonary disorders¹. Contrarily current evidence underlines furthermore the restriction of CXRs to specific clinical indications such as placement of indwelling devices or changes of respiratory status².

OBJECTIVES. Medical costs should thus be minimized without reducing diagnostic and treatment quality to ensure optimal distribution of financial resources. Hence, we analysed medical costs and calculations underlying of radio diagnostic pathways in an university and a regional ICU.

METHODS. The study was conducted in three parts.

First, we performed a prospective observation for one week within five different ICUs at the university hospital of Vienna, to analyse diagnostic pathways including radiodiagnostic measures and their supply chain by activity-based costing. Secondly, the application and

costing of CXRs within a six months period were retrospectively assessed for academic ICUs and compared to corresponding costs of a regional ICU (LK Amstetten, Lower Austria). In a third step we analysed cost savings attributable to omission of daily CXRs in the academic ICU, including all admissions six months before and after abandoning routine CXRs.

RESULTS. The analysis of radio diagnostic pathways by activity based-costing, showed a mismatch between accounted and real costs. Calculated working time costs were the most important item of expenditure, though we could demonstrate an overestimation of about one-tenth in the official cost calculation. Also accounted costs for material did not correlate to real effort, most likely due to continuous implementation of improvements in handling and technical equipment.

The comparison between academic and regional ICU revealed differences in CXR cost accounting. The regional hospital administration charges 24 Euro per CXR including working time for two radio technicians, consumable materials, initial costs and costs of upkeep, administration, and electricity. Medical diagnosis was not accounted. In contrast, financial controlling of the academic institution calculated 54 Euro per CXR also including medical diagnosis.

Abandoning routine CXRs in an academic ICU lead to a reduction of CXRs performed of 34 % and a calculated cost reduction of roughly 23,000 Euro within six months.

CONCLUSION. Routine procedures should be continuously questioned with regard to their contribution to diagnosis and treatment, economic aspects, and the patients' overall benefit. Institutions Controlling cost calculations for interventions should be regularly adapted to real economic demand including changes in working flow and technical equipment to enable an optimal distribution of resources.

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THE CRITICAL CARE NETWORK: TOWARD A GLOBAL UNDERSTANDING OF CRITICAL CARE ORGANIZATION AND MANAGEMENT

Y.-L. Nguyen^{1,2}, G. Hejblum³, P.H.J. Van Der Voort⁴, R. Ferrer⁵, M. Tavola⁶, M. Capuzzo⁷, J.M. Kahn⁸, J. Marshall⁹, A. Rhodes¹⁰, R. Moreno¹¹, A. Valentin¹², B. Guidet^{2,13}, AMIBNet, ANZICS, ASDI, AZURéa, CCCTG, CCCCTG, BRICNet, CUBRNet, ECCRN, EDUSepsis, GiVITI, Infact, NICE, OUTCOMERéa, PROSAFE, REVA, SCCTG, SEPNET, USCITG

¹Cochin, Surgical Thoracic ICU, Paris, France, ²Inserm-UPMC UMR S 1136, Paris, France, ³Inserm-UPMC UMR S 1136, Public Health Department, Paris, France, ⁴Onze Lieve Vrouwe Gasthuis, ICU, Amsterdam, Netherlands, ⁵Sabadel Hospital, ICU, Terresa, Spain, ⁶Genova University, ICU, Genova, Italy, ⁷Ferrara University, ICU, Ferrara, Italy, ⁸UPMC, ICU, Pittsburgh, United States, ⁹Toronto University, ICU, Toronto, Canada, ¹⁰St George's Healthcare NHS Trust, ICU, London, United Kingdom, ¹¹Lisbon University, ICU, Lisbon, Portugal, ¹²Vienna University, ICU, Vienna, Austria, ¹³Saint Antoine Hospital/UPMC, MICU, Paris, France

INTRODUCTION. The majority of large observational studies and randomized trials developed in critical care are conducted through national or international critical care research networks. To our knowledge, there is currently no description of ICUs belonging to these networks.

OBJECTIVES. To describe ICUs organizational and managerial patterns within and across critical care research networks and to investigate associations between ICU annual volume of admissions and organizational patterns.

METHODS. A multicenter prospective observational study was conducted across 19 critical care research networks (AMIBNet, ANZICS, ASDI, AZURéa, CCCTG, CCCCTG, BRICNet, CUBRéa, ECCRN, EDUSepsis, GiVITI, Infact, NICE, OUTCOMERéa, PROSAFE, RéVA, SCCTG, SEPNET, USCITG). ICU data were collected with an e-survey on Survey Monkey between May and December 2013.

RESULTS. 380 ICUs completed the survey questionnaire. Responses originated from Australia (n = 26; 7 %), Austria (n = 19; 5 %), Brazil (n = 44; 12 %), Canada (n = 13; 3 %), China (n = 36; 9 %), Denmark (n = 7; 2 %), France (n = 33; 9 %), Germany (n = 17; 4 %), Italia (n = 45; 12 %), Netherlands (n = 58; 15 %), New-Zealand (n = 6; 2 %), Poland (n = 5; 1 %), Saudi Arabia (n = 1; < 1 %), Spain (n = 52; 14 %), Switzerland (n = 2; 1 %) and the United States of America (n = 17; 4 %).

Most ICUs were located in academic hospitals (N = 306; 80 %) and in public hospitals (n = 325; 85 %). Half reported the existence of an intermediate care unit (n = 197; 52 %). Median number of ICU beds was 18.5[10;44]. Many ICUs were adult ICUs (n = 354; 98 %) and had a mixed patient case-mix (n = 284; 75 %). Many ICUs had a closed ICU model (n = 332; 87 %) and had an intensivist involved in bedside care at night (n = 270; 71 %). A multidisciplinary ICU daily round occurred among three quarter of participating ICUs (n = 275; 75 %). Around two-thirds of ICUs had a computerized physician order entry (n = 240; 64 %), an electronic medical record system (n = 243; 65 %) and a medical error reporting system (n = 243; 65 %). Repartition of annual volume of admissions among ICUs was < 200pts/yr (n = 14; 4 %), 200-400 (N = 67; 18 %), 401-600 (n = 56; 15 %); 601-800 (n = 73; 19 %), 801-1000 (n = 43; 11 %), > 1000 (n = 122; 33 %). An increasing ICU annual volume of admissions was associated with a closed-intensivist staffing model (p < 0.001) and with the presence of a multidisciplinary daily round (p < 0.002).

CONCLUSIONS. ICUs belonging to critical care research networks are mostly located in academic and public hospitals. Many ICUs are organized as a closed-unit with the presence of an intensivist involved at bedside at night. ICU volume of admissions is associated with organizational patterns.

GRANT ACKNOWLEDGMENT. Participating ICUs of AMIBNet, ANZICS, ASDI, AZURéa, CCCTG, CCCCTG, BRICNet, CUBRéa, ECCRN, EDUSepsis, GiVITI, Infact, NICE, OUTCOMERéa, PROSAFE, RéVA, SCCTG, SEPNET, USCITG.

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SIMULATION-BASED TRANSTHORACIC ECHO TEACHING: A TERTIARY CENTRE EXPERIENCE

P.R. Madhivathanan¹, A. Smith¹, S. Jain¹, D. Walker¹

¹University College London Hospital NHS Foundation Trust, London, United Kingdom,

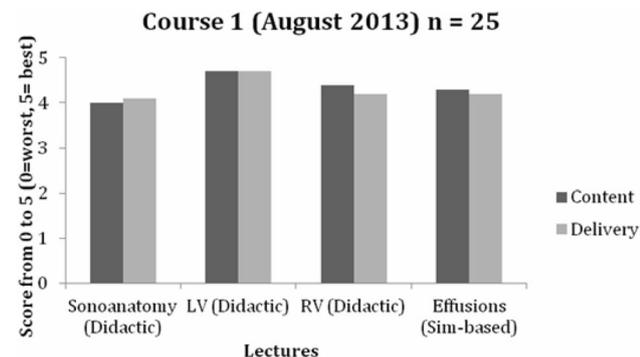
²Homerton University Hospital NHS Foundation Trust, London, United Kingdom

INTRODUCTION. Transthoracic echocardiography (TTE) is a well-established clinical tool for haemodynamic management of critically ill patients (1). Teaching TTE for echo naive non-cardiologists can be challenging. Simulation-based training has recently been shown to be an effective teaching approach to train echo naïve doctors in TTE (2). We present data on our experience in simulation-based TTE teaching.

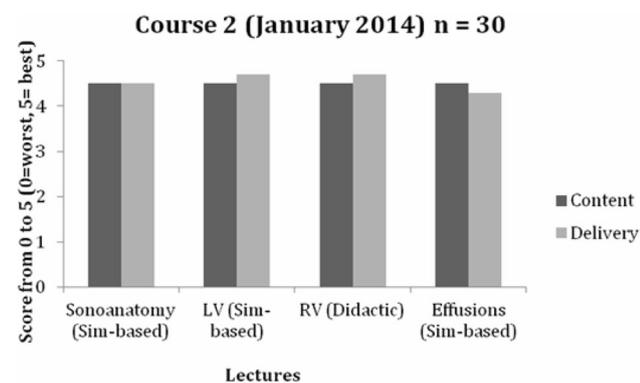
OBJECTIVES. To evaluate a simulator-facilitated teaching approach in training echo naïve doctors in TTE.

METHODS. Following a successful pilot course and approval from the Intensive Care Society (UK), we developed a one-day course to teach basic transthoracic echo, for echo naïve intensive care medicine doctors. The Heartworks® transthoracic echo simulator (HS) is a novel teaching tool that allows one to visualise, live 3D anatomy of the heart and understand how manipulations of the echo probe transform into TTE images. The course incorporated simulation-based training using the (HS), in addition to didactic lectures, video-based teaching, expert demonstrations and delegate hands on training with live models. Lecture elements on the course included sonoanatomy of the heart, left and right ventricular function and effusions. On our first course (August 2013) one of the four core lectures (Effusions) was delivered using the HS. We included more simulation-based elements on our second course - three of the four core lectures were delivered using the HS. The HS was also available for the candidates throughout the course for hands on training. Handouts were given to candidates incorporating image clips from the HS.

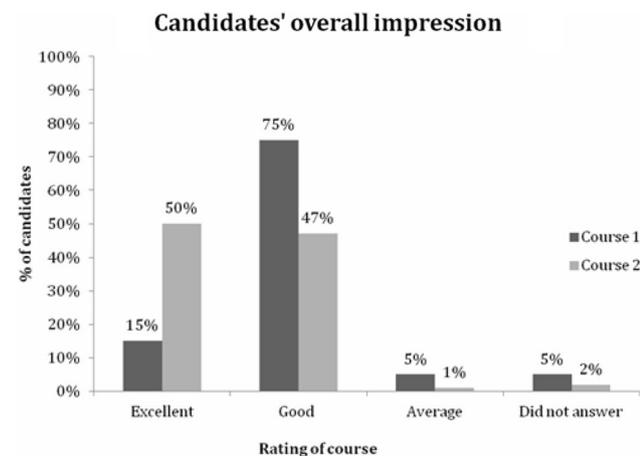
RESULTS. We evaluated candidates' feedback from both courses. The core lectures were categorized as either simulator-based or didactic. The data from candidates' feedback on lectures are presented in figures (1) and (2).



[Figure 1s]



[Figure 2]



[Figure 3]

Feedback data from both courses reveal that the scores were more or less similar between the simulator-facilitated lecture teaching and didactic lectures. However, the candidates' overall impressions on the second course were significantly better than our first as shown in figure (3). This may be due to the fact that our second course had more simulation-based elements incorporated.

CONCLUSIONS. In our experience we found that the HS is an excellent simulation tool that allows better understanding of the cardiac sonoanatomy. We believe that, simulation-based approach in an effective method to teach TTE for echo naïve doctors.

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0564

THE INSINCC (INSURANCE STATUS IN CRITICAL CARE) STUDY: CHARACTERISING THE RELATIONSHIP BETWEEN PATIENTS' INSURANCE STATUS AND MORTALITY RISK IN THE ICU

L. Gabriel¹, M. Bailey², R. Bellomo³, N. Orford¹, F. McGain⁴, J. Santamaria⁵, D. Pilcher⁶
¹Barwon Health, Geelong, Australia, ²Monash University, Melbourne, Australia, ³Austin Health, Melbourne, Australia, ⁴Western Health, Melbourne, Australia, ⁵St Vincent's Hospital, Melbourne, Australia, ⁶Alfred Health, Melbourne, Australia

INTRODUCTION. Disparities based on health insurance status or payer status have been demonstrated in the detection, treatment, and outcomes of several disease conditions. However, the impact of health insurance status on access, delivery and outcome of critical care is not well established (1). Within Victoria, Australia, patients in public hospitals may elect to claim under their private insurance allowing the treating medical team to bill the insurer. Public insurance schemes including Worksafe, Veteran Affairs and Transport Accident Commission, similarly are billed on the patient's behalf.

OBJECTIVES. Our objective was to determine if health insurance status was independently associated with mortality after admission to the Intensive Care Unit.

METHODS. A retrospective cohort study was undertaken at five public hospitals in Victoria comprising patients admitted to the ICU between 2007 and 2012. Data was obtained on: age, gender, severity of illness, chronic health status, insurance category, length of stay and mortality. Socio-economic indices of relative socio-economic advantage and disadvantage (Australian Bureau of Statistics) were matched to postcodes. The primary outcome was in-hospital mortality.

RESULTS. After exclusion of readmissions, age < 18 years and unknown insurance status, the study population comprised 33,306 patients (7,046 private, 26,260 public). Privately insured patients were older (61.3 ± 16.7 v 59.3 ± 19.6 years, P < 0.0001), and had greater illness severity on admission (APACHE III-j scores 55.9 ± 26.0 v 53.8 ± 24.8, P < 0.0001). Coronary artery graft surgery, post-operative gastrointestinal and cardiothoracic patients comprised the most frequent diagnostic categories in both groups. ICU length of stay (LOS) was longer for private patients [median 2.0 days (IQR 1.0 - 4.6) v 1.8 (IQR 0.9-3.8)] as was hospital LOS [median 13.0 (IQR 7.3-23.8) v 10.7 (IQR 6.3-20.3)]. Observed in hospital mortality was higher in public patients 13.4 % (3522/26280) v 10.6 % (757/7122, P < 0.0001). After adjusting for age, severity of illness, diagnosis, and socio-economic status, public insurance status was independently associated with increased mortality (odds ratio = 1.30, 95 % CI 1.20-1.42, P < 0.001).

CONCLUSIONS. Among ICU patients treated in public hospitals, compared to private insurance, public insurance status was independently associated with an increase in mortality. This may reflect barriers to access, differential models of care or variables that remain unaccounted for.

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0565

RISK PROFILE FOR THE BURDEN PHENOMENON IN FAMILY CAREGIVERS OF INPATIENTS AT THE INTENSIVE CARE UNIT (ICU)

E.M. Olivares Durán¹, M.A. Medina-Cuellar^{1,2}

¹El Bajío Regional High Specialty Hospital (HRAEB), NICU, Coronary Care Unit & Adult ICU, León, Guanajuato, Mexico, ²University of Guanajuato, Department of Nursing and Obstetrics, Campus León, León, Guanajuato, Mexico

INTRODUCTION. There is scarce information about the risk profile for the burden phenomenon in family caregivers at the intensive care units (ICUs).

OBJECTIVES. To evaluate the frequency with which family caregivers of inpatients at the Adult-ICU and the Pediatric-ICU of a regional high-specialty hospital are submitted to burden and to describe the risk profile of such family caregivers.

METHODS. The Zarit Burden Inventory (ZBI) was applied (Zarit SH et al., 1980) to 121 family caregivers of inpatients at the Adult and Pediatric ICUs of the HRAEB Hospital. The interviews were conducted individually, in a private setting, and within a context of confidentiality and anonymity. Other items were added to those ones of the original ZBI in order to identify a general profile of the caregiver and a risk profile of the caregiver with burden. The classification and interpretation of the ZBI were carried out following two methodologies: a) the one originally described by Zarit et al. (Zarit SH, 1980); and b) the one recently proposed by Bayen (Paris, France, 2012). The Chi square test was used for the statistical analysis of differences in frequencies or percentages among diverse sub-groups; values of p lower than 0.05 were considered significant.

RESULTS. The incidence of burden in the 121 surveyed family caregivers was 59.50 % with the methodology of Zarit and 71.90 % according to the Bayen's method. The caregiver profile in our series was: women, housewives with elementary and middle schooling with low socio-economic level. The risk factors for burden in family caregivers, identified in this study using both methodologies were:

1. The respondent feels *excessively burdened* by giving care to his/her relative (last question of the ZBI);
2. Two or more physical disorders are shown (gastrointestinal, cardiovascular, skeletal muscle, headache);
3. The patient had been in bed months or years before the current hospitalization. Likewise, there were significant factors identified in at least one of the two methodologies;
4. Two or more psychological disorders are shown (insomnia, depression, anxiety, anguish, stress, fear);
5. The caregiver sees the patient 6 or 7 days a week;
6. The caregiver has difficulties to understand the medical reports, either to go to receive them;
7. The caregiver considers that his/her socio-economic level as low.

CONCLUSIONS. In this survey, applied in the waiting room of the ICUs of a Mexican high-specialty hospital, the incidence of burden in family caregivers was high (59.50 % to 71.90 %) and it was possible to identify in these a profile with 7 risk factors for this phenomenon.

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GRANT ACKNOWLEDGMENT. This research did not receive any grant from any funding agency of the public, commercial, or not-for-profit sectors.

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INCOMING MEDICAL RESIDENT PERCEPTION OF COMPETENCY AND KNOWLEDGE BASE OF BASIC MEDICAL PROCEDURE ENHANCED BY PROCEDURAL WORKSHOP AND EDUCATIONAL MATERIAL

K. Habeeb¹, J. Axelband¹¹St Lukes University Hospital, Medical Critical Care, Bethlehem, United States

INTRODUCTION. Incoming resident physicians education of bedside procedures often occurs in an unstandardized manner leading to uncomfortable residents performing procedures¹. Studies have evaluated resident perceptions of simulation training report a desire for early educational initiatives or perceived competency upon completion of residency training but none have evaluated a structured procedural skills workshop conducted prior to formal intern commencement and the assessment of competency²⁻³.

OBJECTIVE. This study will evaluate perceived competency and knowledge level of bedside procedures prior to and following an educational initiative.

METHOD. The subjects were incoming interns of various specialties who underwent training in the placement of CVC (central venous catheters) and ETT (endotracheal tube) during orientation in the month of July between 2010 and 2013. This quasi experiment was performed at 480-bed teaching hospital. A procedural workshop coordinated by an emergency medicine critical care physician and instructed by critical care fellows. The workshop included didactic education with concurrent hands on experience. Residents competencies were assessed on all the skills performed during the workshop.

RESULTS. Over a 4 year period 180 interns underwent the procedural skills workshop. Emergency medicine interns represented 26.7 % of the participants, family medicine represented 24.4 %, internal medicine 17.8 % and the remaining 31.1 % included surgery, transitional year and orthopedics. Residents had improvement in perception of competency in placement of CVC [pre-initiative median (raw range) = 25 (0-97) post-initiative median (raw range) = 65 (3-100) $p < 0.0001$] and ETT [pre-initiative median (raw range) = 49.50 (0-100); post-initiative median (raw range) = 80 (2-100); $p < 0.0001$]. Residents' knowledge also improved significantly [pre-initiative median (raw range) = 8 (2-10) post-initiative median (raw range) = 9 (3-10); $p = 0.003$]. Finally, residents' perceptions of the educational initiative as a useful training tool improved significantly [pre-initiative median (raw range) = 81 (0-100); post-initiative median (raw range) = 86 (15-100); $p = 0.04$].

CONCLUSIONS. Implementation of an educational initiative including a didactic and procedural workshop coupled with an educational handbook improved both perception of procedural competence and level of procedural knowledge in incoming resident physicians.

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0567

IMPLEMENTATION OF THE NATIONAL EARLY WARNING SCORE IN A TEACHING HOSPITAL

R. D'Cruz¹, F. Rubulotta²¹Imperial College Healthcare National Health Service Trust, London, United Kingdom,²Imperial College London, London, United Kingdom

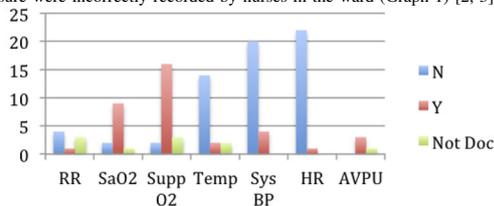
INTRODUCTION. To evaluate the use of the recently implemented National Early Warning Score system (NEWS) in a major London teaching hospital (500 beds).

OBJECTIVES. Early detection of deteriorating patients in the ward and early intervention improves morbidity/mortality [1,2] - NEWS was introduced in our teaching hospital in December 2013 - Doctors, nurses, healthcare assistants received one month training in the trust - Authors assessed the implementation of this system and whether NEWS was used correctly.

METHODS. Prospective, observational, single centre cohort study done from 15th January until 15th March 2014. Patients were enrolled from the neurosurgery, medical and general surgical ward. Authors reviewed medical records and vital signs as measured by ward nurses, they reviewed the number of NEWS score measured correctly, the number of appropriate action undertaken (including escalation if NEWS > 4) and the change in NEWS measurement frequency according to the trust protocol.

ANALYSIS. Mean values and percentages were used for the purpose of this study.

RESULTS. Data from 99 consecutive patients were reviewed. 38 patients (38 %) were male and 62 (62 %) were female. 28 patients (28 %) were in the general surgery ward, 38 (38 %) were in the neurosurgical ward and only 32 (33 %) in the medical ward. Heart rate and blood pressure were incorrectly recorded by nurses in the ward (Graph 1) [2, 3].



Graph 1 vital signs documented in the chart by the nurses:

N= not correct

Y= correct

Not Doc= not documented

RR, respiratory rate

SaO2, oxygen saturation

SuppO2, need for supplementary oxygen

Temp, is the temperature

Sys BP, systolic blood pressure

HR, heat rate

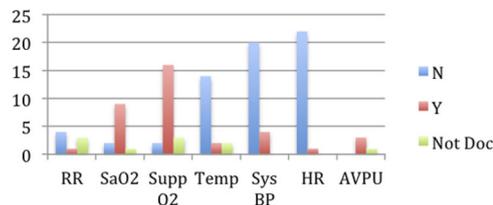
AVPU, alert, verbal pain unresponsive

[Graph 1]

Only 50 % of the patients with NEWS > 4 were escalated (5 patients of total 10 with NEWS > 4). NEWS measurement frequency was not increased in 100 % of the cases, even if required.

CONCLUSIONS. The NEWS was introduced in a large teaching hospital in London. Nurses were empowered to document the NEWS score in the chart. One month after implementation only 50 % of all patients deteriorating were escalated to the response team. No increase in the number of measurement was recorded if needed in all wards.

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HR, heat rate

AVPU, alert, verbal pain unresponsive

[Graph 1]

0568

"BUGS" AND ANTIBIOTICS. IMPACT OF THE IMPLEMENTATION OF PROTOCOLS IN CRITICAL ILL PATIENTS

H.M. Calderón¹, M.A. Pereira², J.M. Arduan¹, C. Granja¹¹Centro Hospitalar do Algarve, Unidade de Cuidados Intensivos Polivalentes, Faro, Portugal,²Centro Hospitalar do Algarve, Serviço de Patologia Clínica, Faro, Portugal

INTRODUCTION. The reorganization of the Intensive Care Unit of the Hospital de Faro resulted in an increase from 09 to 16 beds and the development of a policy of continuous quality improvement which included the implementation of several protocols as follows:

- prevention of infection associated with central venous catheter and ventilator-associated pneumonia
- Treatment of community - acquired pneumonia
- Treatment of primary and secondary peritonitis
- Surgical prophylaxis

OBJECTIVES. To assess the impact of the implementation of those protocols on the use of antibiotics and type of microorganisms isolated during the year 2013 compared to the year 2012.

METHODS. Retrospective analysis of crop yield from blood cultures, bronchial secretions and tips of central venous catheters, antibiotic consumption and costs of antibiotics

RESULTS. In the year 2012, 437 patients were admitted in the ICU with a mean length of stay of 9.1 days. In 2013, 539 patients were admitted. The number of beds increased by 44 % (09 to 16 beds), the number of admissions increased by 20 % and the mean length of stay decreased to 8.3 days (10 % reduction). Yields of products for microbiological examination increased by 55 % globally, the number of agents isolated in blood cultures increased 52 %, which allowed the practice of de-escalation, consumption of antibiotics by category decreased by 55 % over the carbapenems, 38 % in antifungals and 14 % in antipseudomonal beta-lactams, and there was a 16.2 % reduction in costs with antibiotics. There was no significant difference in mortality.

CONCLUSIONS. The implementation of protocols resulted in the modification of the profile of isolated microorganisms, namely the reduction of some multi-resistant strains, the practice of antibiotic de-escalation, the reduced consumption of broad-spectrum antibiotics such as carbapenems and antipseudomonal beta-lactams and consequent cost reduction without increasing mortality.

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0569

INTEGRATING PATIENT CARE AND LEARNING DURING CLINICAL ACTIVITIES: TWO CONTEXTS, TWO STRATEGIES

D. Piquette^{1,2,3}, C.-A. Moulton^{2,3}, V. Leblanc^{2,3}¹Sunnybrook Health Sciences Centre, Critical Care Medicine, Toronto, Canada, ²The³Wilson Centre for Research in Education, Toronto, Canada, ³University of Toronto, Toronto, Canada

INTRODUCTION. Clinical supervisors are expected to assume a dual responsibility towards patient care and learning during clinical activities (1). Certain supervisory behaviors and teaching strategies have been recommended in the literature to foster clinical learning (1, 2). However, the practical ability for the supervisors and trainees to engage in such learning interactions in acute care environments has been insufficiently studied.

OBJECTIVES. The goal of this study was to develop a theoretical framework describing the integration of learning interactions into patient care activities within two different acute clinical contexts: critical care multidisciplinary rounds and acute medical crises.

METHODS. We conducted an observational study based on grounded theory methodology. Two observers completed 350 h of participant observation (74 acute care episodes and 10 multidisciplinary rounds) in the intensive care units (ICU) of two tertiary academic centers. Inductive thematic analysis, theoretical sampling, constant comparison, memo writing, and theoretical sufficiency were used during the iterative process of data collection and analysis.

RESULTS. During multidisciplinary rounds, patient care and learning were completed in series: patient care was interrupted by *learning bubbles*, i.e. a prolonged sequence of structured learning interactions loosely related to a case. During medical crises, patient care and learning were completed in parallel: participants engaged simultaneously in patient care and *learning flashes*, i.e. short, unstructured learning interactions closely related to a case. These two models of integration appeared adaptive to clinical contexts that differed in terms of priorities, supervisors' prior knowledge of the patient, and number of individuals involved in the interaction. The two models also presented different educational challenges and opportunities in terms of explicitness of the learning content, ability to tailor to individual trainees, and focus on trainees' knowledge gaps.

CONCLUSIONS. Learning interactions can be integrated within many kinds of clinical activities, including the most time-pressured ones. However, the nature and educational consequences of these interactions differed according to the clinical context. The effects of these differences on learning outcomes should be further explored.

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0570 ALL VERY OLD PATIENTS TO ICU? HOSPITAL WARDS PHYSICIANS' OPINION

J.A. Silva Obregón¹, J.E. Romo Gonzales¹, C. Martín Dal Gesso¹, C. Marian Crespo¹, S. Saboya Sanchez², M.A. Romera Ortega²

¹Hospital Universitario de Guadalajara, Unidad de Cuidados Intensivos, Guadalajara, Spain, ²Hospital Universitario Puerta de Hierro - Majadahonda, Unidad de Cuidados Intensivos, Madrid, Spain

OBJECTIVES. To analyze the opinion of physicians in charge of patients ≥ 80 years old admitted to our hospital, regarding these patients should be admitted to an intensive care unit (ICU) whenever necessary. Limitations on procedures (PRO) and extraordinary measures (EM), thus application of "limitation of the therapeutic effort" (LTE) were evaluated in potential candidates to ICU admission.

METHODS. Cross-sectional study on 12/13/2013. All patients ≥ 80 years old were included. The age, gender, Charlson (CH), Barthel (BA) and Geriatric Depression Scale (GDS) were evaluated. Therapeutic limitations to be evaluated: 1) PRO: Central venous catheter (CVC), catecholamines (CAT), permanent pacemaker (PP) and emergency surgery (ES); 2) EM: Noninvasive mechanical ventilation (NIV), renal replacement therapy (RRT) and intubation (IT); 3) Advanced resuscitation (CPR); 4) LTE if no early improvement. (Results expressed as Mean ± standard deviation, p < 0.01**).

RESULTS. A total of 378 patients admitted in hospital wards were evaluated, 90 (23.8 %) were ≥ 80 years old, but finally 79 (20.9 %) were analyzed; 11 were excluded (physicians in charged not found). Age 86.7 ± 4.7 years old [p25 (83), p75 (90)], 55.7 % (44) males. Scales: 3.5 ± 2.0 Charlson [p25(2), p75(5)]; Barthel 63.6 ± 35.7 [p25(25), p75(100)]; GDS 2.6 ± 1.6 [p25(1), p75(3)]; 38/79 patients (48.1 %) were considered potential candidates to ICU admission. Of these potential candidates, LTE was applied in 21/38 (55.3 %) and 4/38 (10.5 %) were not CPR patients.

Analysis of therapeutic limitations in this 38 patients revealed:

- 1) *No limits (NL)* 31 (81.6 %): 100 % PRO and EM; LTE 14/31 (45.2 %); CPR 100 %.
 - 2) *With limits (L)* 7 (18.4 %): PRO [CVC, PP and ES (700 %); CAT 6/7 (85.7 %)]; EM [NIV 100 %; RRT 2/7 (28.6 %); IT (0 %)]; LTE 100 %; CPR 3/7 (42.9 %).
- Comparative analysis NL vs L: Age (84.2 ± 3.1 vs 86.6 ± 3.5), p = NS; Gender p = NS; CH (2.9 ± 1.7 vs 3.7 ± 1.5) p = NS; BA ** (94.8 ± 10.8 vs 63.6 ± 30.1); GDS (1.5 ± 0.6 vs 2.3 ± 1.1) p = NS; CPR **; LTE **
- Global evaluation "ICU vs Non ICU": Age ** (84.7 ± 3.3 vs 88.6 ± 5); Gender p = NS; CH(3.1 ± 1.7 vs 3.8 ± 2.1) p = NS; BA ** (89.1 ± 19.8 vs 40 ± 30.6); GDS ** (1.6 ± 0.8 vs 3.4 ± 1.7).

CONCLUSIONS. Almost half of the patients were potential candidates for ICU admission, 81.6 % with no limits. LTE was applied in 55.3 % of cases if no early improvement was achieved, 100 % if admitted with limits. Age, degree of dependence and cognitive impairment are important factors when ICU admission is considered, but only dependency influence to decide on therapeutic limitations.

0571 PLANNING AHEAD: EMERGENCY ROOM MONTHLY ADMISSIONS FORECASTING MODEL

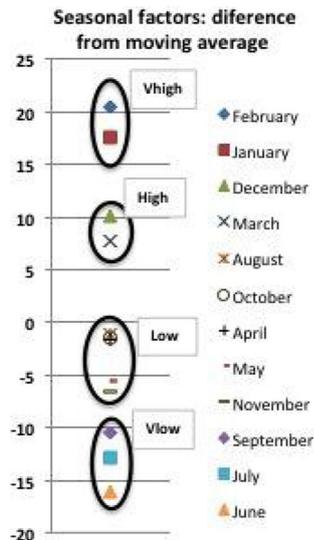
C. Carvalho¹, R. Antunes¹, I. Aragão¹

¹Centro Hospitalar do Porto, Unidade de Cuidados Intensivos Polivalente (UCIP), Porto, Portugal

INTRODUCTION. The Emergency Room (ER) is the mainstay for critically ill patients in the Accidents and Emergency Department (A&E). If its resources are exceeded patient safety will be at risk. In a financially constrained period, predicting ER demand is essential to allocate adequate resources, but is particularly difficult due to its great variability.

Time series is the usual method for evaluating change in ER monthly admissions over time. **OBJECTIVES.** This study aimed to develop a time series model that allows forecasting of the Number of Patients Admitted per Month (PTM) to the emergency room of a university, tertiary care 600-bed hospital dealing with 130,000 admissions to the accidents and emergency department per year. The forecasting accuracy was evaluated both in-sample and post-sample.

METHODS. A retrospective study was performed, during which PTM were extracted from the hospital records between January 2010 and January 2014 (49 months). The first 37 months (January 2010 through to January 2013) were used for estimating the model, with the remaining 12 months (February 2013 through to January 2014) serving as the post-sample period used to evaluate the forecast accuracy. Using PTM as the dependent variable, a time series analysis was performed using the following components: intercept, trend, dummy variables to model seasonality and a 12 month moving average [MA(12)] element. Five steps were undertaken concerning the dummy variables: PTS was deseasonalized and seasonal monthly factors were obtained by the additive method; a hierarchical cluster was performed in order to obtain the clustering coefficients; the optimal cluster number was determined by the Elbow Method; the months were grouped in 4 clusters using k-means with running means (figure 1).



[Figure 1] The final estimation equation is defined in figure 2.

$$\widehat{ptm}_t = \hat{c} + \hat{\beta}_2 trend_t + \hat{\beta}_3 MA(12)_t + \hat{\beta}_4 Vhigh_t + \hat{\beta}_5 High_t + \hat{\beta}_6 Low_t$$

[Figure 2]

RESULTS. The regression was statistically significant (F-statistic p = 0,0000) and accounted for 78 % of the PTM variation. All explanatory variables are individually statistically significant (Table 1).

Variable	Coefficient	p
C	32,73	0,0014
Trend	1,89	0
Vhigh	39,73	0
High	22,75	0,0002
Low	12,47	0,0063
MA(12)	-0,961282	0

[Table 1]

The trend coefficient shows that the number of PTM is growing by 1,89 a month, *ceteris paribus*. On average, a Vhigh month has 39,73 more patients than a Vlow month; a High month has 22,75 patients more than a Vlow month and a Low month has 12,47 more patients than a Vlow month. The forecasting accuracy measured by Mean Absolute Percentage Error (MAPE) was 10.52 % in in-sample forecasting and 9,60 % in the post-sample forecasting.

CONCLUSIONS. The clustered dummy variables group months with similar PTM and allow a direct comparison with months in other groups. The obtained model produced an out-sample forecast just as accurate as the in-sample forecast and therefore can contribute to a better planning and allocation of resources.

0572 IMPLEMENTATION OF A RAPID RESPONSE TEAM (RRT) IN A TERTIARY HOSPITAL. OUTCOMES AFTER 4 YEARS OF EXPERIENCE

C. Lorenzo Cárdenas¹, J. Gonzalez Londoño¹, A. Taché Sala¹, P. Pujol Valverde¹, A. García Fragua¹, A. Baró Serra¹, J.M. Sirvent Calvera¹

¹Hospital Dr Josep Trueta, Intensive Care Unit, Girona, Spain

INTRODUCTION AND OBJECTIVES. Description of the activity of the RRT of an Intensive Care Unit (ICU) in a tertiary hospital after four years of operation.

METHODS. In October 2009, the RRT was introduced in our center, formed by an attending physician and an intensive care resident. Its main objective is early detection and treatment of hospitalized patients with life-threatening conditions outside of the ICU, including the Emergency Department (ED). The RRT is previously activated according to predefined criteria. The RRT provides patient care in less than 3 min during 24 h a day. The RRT carries a bag with the necessary equipment to attend to critical patients in situ. In addition, each ward has its own Cardiopulmonary resuscitation (CPR) equipment to provide support if necessary to the RRT. The activity of RRT was collected prospectively in a database, in order to perform a descriptive evaluation of the interventions.

RESULTS. During the 4 years of operation, the RRT has made a total of 1718 interventions. 66 % of patients (1133) treated were men and the mean age was 59.3 years of age. The reasons for activation of RRT were: Acute Respiratory Failure (23.63 %),

Polytraumatism (19.73 %), Severe Sepsis and Septic Shock (11.93 % and 6 %), Decreased Level of Consciousness (7.86 %) and Cardiorespiratory Arrest (4 %) among others. The main consulting services of the RRT were ED (58.38 %), Internal Medicine (8.32 %), General Surgery (6.40 %) and Anesthesiology (3.78 %). 46.74 % of the interventions (803) led to ICU admission. 109 patients seen by the RRT (6.34 %) resulted in death and in 81 cases (4.71 %) treatment-limiting decisions were taken by a multidisciplinary team.

CONCLUSIONS. The implementation of RRT has allowed an early assessment of patients with poor clinical outcome who are hospitalized in our center out of the ICU, and has provided the opportunity of early diagnostic and/or therapeutic intervention in many cases. The existence of RRT has favored the multidisciplinary assessment of patients treated between ICU staff and the different specialties involved, and in some cases even the social environment, since in many cases the decisions and interventions of the RRT were extended to the family context.

0573

FACTORS ASSOCIATED WITH ICU ADMISSION AFTER DISCHARGE FROM PROLONGED POST-ANESTHESIA CARE UNIT STAY

T. Fujii¹, K. Saito¹, S. Uchino¹, M. Takinami¹

¹Jikei University School of Medicine, Intensive Care Unit, Tokyo, Japan

INTRODUCTION. Some postoperative patients need overnight PACU stay and are taken care of by intensivists. In those patients, there are cases who die or admit to ICUs in short-term after discharge from PACUs to general wards. Many previous studies examining factors associated with ICU readmission and all studies have demonstrated association between readmission and increased hospital mortality, however, data on PACU factors associated to ICU admission after PACU discharge are scarce.

OBJECTIVES. The aim of this study is to determine the epidemiology, hospital mortality, patient characteristics and factors of ICU admission or death soon after discharge from overnight PACU.

METHODS. We performed a retrospective study, including all adult patients who stayed overnight at our PACU and discharged to general wards within 24 h between Jan 2010 and Dec 2012. Electronic medical records in operation room, PACU, ICU, and hospital were screened. The main outcome is a composite of death at general wards or unexpected ICU admission within 7 days after PACU discharge. Multivariate analyses for the main outcome were performed using factors which are thought to be clinically significant. The institutional ethics committee approved the study and waived the need for informed consent.

RESULTS. 3,093 cases were included and 40 (1.3 %) of them fulfilled the main outcome. Hospital length of stay (LOS) and hospital mortality was significantly higher in a group of early ICU admission or death in general wards (LOS [days]: 12.0 vs 38.0; $p < 0.001$, mortality [%]: 0.7 % vs 12.5 %; $p < 0.001$). Patient characteristics were similar in presence of chronic diseases, preoperative physical status or vital signs during 6 h before discharge from PACU, though the group with worse outcome had longer operation time (4.0 vs 6.5 [hours]; $p < 0.001$), worse APACHEII score (11.0 vs 13.0; $p = 0.03$), excessive fluid balance (total of intraoperative and postoperative balance),

Fluid balance mL (%)	no ICU admission or death within 7 days	ICU admission or death within 7 days	$p < 0.001$
<1000	899 (30.0)	4 (10.0)	
1000-3000	1595 (53.3)	16 (40.0)	
3001-5000	385 (12.9)	15 (37.5)	
≥5001	114 (3.8)	5 (12.5)	

[Total fluid balance in OR and PACU]

and used mechanical ventilation in PACU.

Mechanical Ventilation (%)	no ICU admission or death within 7 days	ICU admission or death within 7 days	$p < 0.001$
Not required	2743 (89.8)	26 (65.0)	
Less than 6 h	182 (6.0)	11 (27.5)	
More than 6 h	128 (4.2)	3 (7.5)	

[Mechanical Ventilation]

Multivariable analyses showed fluid overload (3000-5000 mL; OR 5.2 [95 %CI: 1.7-20.0], $p = 0.007$; > 5000 mL; OR 5.2 [95 %CI: 1.2-24.8], $p = 0.03$) and the use of mechanical ventilation in the PACU (less than 6 h: OR 4.2 [95 %CI: 1.9-8.9], $p < 0.001$) were associated with worse outcome.

CONCLUSIONS. Approximately one in a hundred patients who stayed overnight in the PACU admitted to ICU or died early after discharge to general wards. They had longer hospital stay and higher in-hospital mortality. Excessive positive fluid balance, and use of mechanical ventilation in PACU were associated with the outcome.

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Fungal & viral infections: 0574–0587

0574

USE OF ECHINOCANDINS IN SOLID-ORGAN TRANSPLANTATION IN ICU OF TERTIARY HOSPITAL

H. Puigderrajols¹, C. López¹, I. Troncoso¹, C. Maldonado¹, M. Pérez¹

¹Vall d'Hebron University Hospital, Intensive Care Department, Barcelona, Spain

INTRODUCTION. Invasive fungal infection (IFI) has become an increasing cause of morbi-mortality in critical care patients. Recently, echinocandins have been described as a new class of antifungal agent with promising results in the treatment of IFI.

OBJECTIVES. To aim the use of echinocandins in prophylaxis or treatment of IFI in solid organ transplant (SOT) recipients admitted in intensive care unit (ICU). To evaluate types of patients, indications, duration of treatment, complications and outcomes.

METHODS. Conducting a descriptive study with all SOT recipients admitted in ICU of tertiary hospital during 2012-2103, who received prophylaxis or treatment with

echinocandins. Recorded data included demographics, diagnostic category, acute and underlying conditions. For statistical analysis, Pearson's Chi squared, Fisher and Mann-Whitney U tests have been used. Data are expressed as frequency (percentage) or median (25th-75th inter-quartile range).

RESULTS. 1973 patients were admitted in ICU, 152 SOT recipients, 30 of them required treatment with echinocandins (63.3 % male; median age, 56 years (IQR 46-63), median APACHE II 24 (IQR 18-28)). Most of the cohort were lung transplants (19 treated with micafungin and 3 with anidulafungin) and rest liver transplants (all of them treated with anidulafungin).

Almost all patients had been treated with corticoid therapy (83.3 %) and antibiotic therapy over seven days (80 %); only two patients presented severe neutropenia.

Echinocandins were used as prophylaxis in 9 patients (30 %). Patients who received echinocandins as treatment had been indicated as prove IFI (2) and putative IFI (18). Etiological agent was identified in 14 patients, being mainly located in lung (63.3 %). Median days of antifungal administration were 13 (5-29) and no complications were described. Neither breakthrough infection nor treatment resistance were observed in patients.

During ICU stay, a total of 26 (86.7 %) patients required mechanical ventilation, 29 (96.7 %) received vasopressors, 8 underwent continuous renal replacement therapy (26.7 %) and 7 (23.3 %) received parenteral nutrition. None of these therapies were related with ICU outcome, only APACHE II score were associated with significant differences in mortality (median 22 (IQR 17-25) vs. 25 (IQR 23-39); $p = 0.23$). Furthermore no differences were observed between treatment groups. Only 4 patients that received echinocandins as treatment had an unfavorable microbiological outcome. Median ICU LOS was 24 (11-68) days and overall mortality rate was 36.7 % with only two cases related to IFI.

CONCLUSIONS. Use of echinocandins SOT patients was effective and safe. Micafungin was preferred in lung transplant recipients while anidulafungin dominated in liver transplant recipients.

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0575

INVASIVE FUNGAL INFECTIONS: THE ACHILLES HEEL OF CRITICAL CARE

S. Pacheco Noriega¹, J. Iglesias Franco¹, A. Gutiérrez¹, R. Andino Ruiz¹, E. Díaz¹, C. Santa¹, A. Pérez Blanco¹

¹Hospital Universitario de la Princesa, ICU, Madrid, Spain, ²Hospital Universitario de la Princesa, Microbiology, Madrid, Spain

INTRODUCTION. In the ICU of the Hospital Universitario de La Princesa, we collect the Fungi Protocol (FP) samples of: tracheal aspirate, gastric juice, and urine, rectal and axillary swab in patients with risk factors for hematogenously disseminated candidiasis (HDC), specifically. Considering colonization whenever *Candida* species (*C.Sp*) was isolated in a non-sterile localization. Candida Score (CS) was calculated in every patient in order to predict infection.

OBJECTIVES. To identify:

- 1) the *C.Sp* most commonly isolated
- 2) the fungal infection most commonly diagnosed based on microbiological data
- 3) the most prevalent risk factors for developing HDC
- 4) whether CS is an efficient tool to predict HDC
- 5) the most effective antifungal agent.

METHODS. A prospective study of consecutive patients from September 2013 to April 2014.

Setting: polyvalent adult ICU 20 beds.

Inclusion criteria: patients admitted to ICU with sepsis who stayed > 7 days, had CS score ≥ 3 and, positive FP samples. FP was considered positive if 3 or more *Candida* species samples were isolated. Patients were followed until discharge from hospital. Microbiology samples were collected before the beginning of antifungal treatment and during the follow up.

RESULTS. 42 patients were included, 58.5 % were men. Mean age 67 ± 14, Apache II score 24 ± 7, sofa score 10 ± 5, SAPS II score 50 ± 18, mean stay in ICU 29 days (IQR :14-55 days). 19.5 % were neutropenic. Mean CS was 3. *C. Albicans* was the most commonly isolated species (58 %). Urinary tract infection was the most commonly diagnosed infection (27 %) with *C.glabrata* the most common causal agent. 36 blood cultures were collected, being positive 8 % of them. Catheter-related infection caused by *C. glabrata* and *C. parapsilopsis* was diagnosed in 2 patients. The risk factors most frequently associated with fungal infection were: indwelling central venous catheter (CVC) 100 %, broad-spectrum antibiotic exposure 95.1 %, invasive mechanical ventilation 87 %, parenteral nutrition 73.2 %, and steroids 63.4 %. CS value (3 points) was the same for the patients with *Candida* infection and for patients with *Candida* colonization. Doctors in ICU choose Fluconazole in 39 % and anidulafungin in 17 % of patients diagnosed with *Candida* infection. After knowing the results of cultures doctors decided to initiate treatment in 56 % of patients. Patients with septic shock with poor response to initial treatment an antifungigram was performed.

CONCLUSIONS. *C. albicans* was the species most commonly isolated in the Fungi Protocol samples. An indwelling CVC was the most common risk factor associated with *Candida* infection. CS does not help to predict the presence of *Candida* infection. Fluconazol continues to be a good choice of treatment for stable patients. The performance of an antifungigram is reserved for patients responding poorly to initial treatment.

REFERENCE(S). ESCMID*2012: Management of *Candida* diseases non-neutropenic adult patients.

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0576

REVIEW OF THE MANAGEMENT OF INVASIVE CANDIDIASIS WITH FIVE INTERNATIONAL GUIDELINES

L. Jack¹, A. Bal²

¹NHS Greater Glasgow and Clyde, Glasgow, United Kingdom, ²NHS Ayrshire and Arran, Kilmarnock, United Kingdom

INTRODUCTION. Several international guidelines on the management of candidaemia have been published between 2009 and 2013.¹⁻⁵ A recent critique of these guidelines demonstrated significant variation in several major areas of candida BSI management.⁶

	Primary Therapy	Alternative Therapy	Step-down oral therapy	Optimal length of treatment	CVC removal	Ophthalmic Investigation	TTE/TOE	Follow-up blood culture
ISA	ECH in HD unstable, elderly, DM, cancer or those with priorazole to be exposure, FLC in others	AMB-D, lipid-AMB or VCZ	FLC after 3-5 days if patient stable and yeast likely to be susceptible	14 days after clearance of Candida BSI and resolution of symptoms	Strongly advised	Advised	Not specified	Daily or every other day
CCP Guideline	ECH if HD unstable (not for CP); FLC or ECH if HD stable and noazole exposure specified	AMB or lipid-AMB	FLC if yeast susceptible, patient improving, No specific time suggested	Not specified for patients without neutropenia	Advised	Not specified	Not	
ESCMID	ECH	L-AMB, AMBZ or FLC	After 10 days if patient stable, tolerates oral route and if yeast susceptible	14 days from the end of Candida BSI	Strongly advised	Advised	TOE	
GSMS-PES	FLC (avoid in focal/ongoing infection or for CG/CK) or ECH (avoid for CP)	Lipid-AMB	FLC/VCZ after 4-10 days if patient improving, BC sterilised and yeast susceptible	14 days after negative BC with resolution of signs of infection	Advised	Advised	Not routinely indicated	Not specified
Brazilian Guideline	ECH for initial therapy (not if persistent positive BC with CP)	FLC in stable patients or lipid-AMB	FLC if clinically improved and depending on the yeast, No specific time point	14 days after negative BC and resolution of signs and symptoms of Candida BSI	Advised in severe sepsis and in persistent and breakthrough infections	Advised if visual symptoms present, If not, advised after 1 week	Not specified	Serial BC but at least on days 3 and 5

[Table 1 Comparison of Guidelines on Key Areas]

OBJECTIVES. We review the management of candida BSI patient data against each of these guidelines.

METHODS. The audit was carried out in two university hospitals comprising about 950 beds. All patients with proven candidaemia from April 2011-March 2014 were included in the study. Fifty four patients were identified. Each of the guidelines was applied to the information in this database. **RESULTS.** Results are summarized in table 2.

	Primary Therapy	Alternative Therapy	Step-down oral therapy	Optimal length if treatment	CVC removal	Ophthalmic Investigation	TTE/TOE	Follow-up blood cultures
ISA	42/54 (77.78 %)	2/12 (16.67 %)	26/27 (96.3 %)	42	27/29 (93.10 %)	7 (12.96 %)	n/a	No
CCP	37/54 (68.51 %)	1/17 (5.88 %)	27/27 (100 %)	n/a	27/29 (93.10 %)	n/a	n/a	n/a
ESCMID	36/54 (66.67 %)	15/18 (83.33 %)	2/27 (7.40 %)	42	27/29 (93.10 %)	7 (12.96 %)	12	TOE
GSMS-PES	46/54 (85.19 %)	1/8 (12.5 %)	13/27 (48.15 %)	42	27/29 (93.10 %)	7 (12.96 %)	n/a	n/a
Brazilian	46/54 (85.19 %)	14/18 (77.78 %)	11/27 (40.74 %)	42	27/29 (93.10 %)	7 (12.96 %)	n/a	No

[Table 2 Comparison of patient data with guidelines]

The results demonstrate that while we complied with several performance measures individually, we were not fully compliant with any single guideline. Compliance regarding primary treatment was between 66.7 % and 85 %. Alternative therapy was appropriate between 5.9 % and 83.3 % of cases. The only area in which management was fully compliant with any one of the guideline criteria was appropriate step down therapy according to Canadian Clinical Practice Guideline. Timely removal of central venous catheter occurred in 93.1 % of applicable patients. 12.96 % of patients underwent ophthalmic examination. Follow up blood cultures were not taken daily, every other day or reliably on day 3 and day 5 in any patient.

CONCLUSIONS. This review demonstrates the wide variety of advice available, which is, in some areas, conflicting. Poor compliance with each of the guidelines is attained in spite of the disparity of guidance on offer. These five international guidelines have only one area of consensus which is the removal of central venous catheters.

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0577
CMV REACTIVATION IN CRITICALLY ILL PATIENTS: EPIDEMIOLOGY, OUTCOME AND ASSOCIATED HOST'S INFLAMMATORY RESPONSE

F.G. Frantzeskaki¹, E.-S. Karampi¹, N. Nikitas¹, S. Tsaousi², C. Kottaridi³, M. Alepaki³, D. Vasilatadi⁴, E. Paramythiotou¹, M. Theodorakopoulou¹, C. Routsis⁵, A. Armaganidis¹, V. Papaevangelou⁶, I. Dimopoulou¹

¹Attikon University Hospital, 2nd Department of Critical Care, Athens, Greece, ²Evangelismos Hospital, 1st Department of Critical Care, Athens, Greece, ³Attikon University Hospital, Cytopathology, Athens, Greece, ⁴Attikon University Hospital, 2nd Department of Internal Medicine, Athens, Greece, ⁵Evangelismos Hospital, 1st University Critical Care, Athens, Greece, ⁶Attikon University Hospital, 3rd Department of Pediatrics, Athens, Greece

INTRODUCTION. Cytomegalovirus (CMV) is a major herpes β virus, long recognized as a significant cause of morbidity and mortality in immunocompromised hosts. However, CMV reactivation, might affect “immunocompetent” seropositive critically ill patients.

OBJECTIVES. The aim of our study was to record the incidence and risk factors of CMV reactivation in critically ill immunocompetent patients and the associated morbidity and mortality. We also studied the correlation of reactivation with patients’ inflammatory response.

METHODS. This prospective observational study was conducted in a 23-bed polyvalent adult intensive care unit (ICU), of the “Attikon” University Hospital and in a 30-bed polyvalent ICU of “Evangelismos Hospital”, between June 2010 and July 2012. All the mechanically ventilated patients with positive anti-CMV IgG titers, were tested for CMV plasma DNAemia on day of study entry (day 0) and further followed once a week. A quantitative real-time PCR amplification reaction specific for a region of the CMV MIEA gene was performed using the extracted DNA. Plasma samples were drawn on the same days for subsequent determination of the concentration of IFNγ, IL-10, IL-17A, IL-2, IL-6 and TNFα, using a multiplex bead-based assay. Disease severity at study entry, presence of sepsis or septic shock, laboratory data, specific therapeutic interventions, as infusion of vasopressors, steroids, insulin, propofol, transfusion of red blood units and continuous renal replacement therapy were recorded on each protocol day.

RESULTS. 80 patients fulfilled the inclusion criteria (51 men, 29 women, median age: 63yo, APACHE 11:20, SOFA:8). Reactivation of CMV infection, documented by CMV plasma DNAemia ≥ 500 copies/ml has occurred in eleven patients (13.75 %). Median day of reactivation post ICU admission was day 7. Reactivators received higher dose of nor-adrenaline compared to non reactivators. Lactate (2 mg/dl vs 1 mg/dl, p = 0.02), creatinine levels (2 mg/dL vs 1 mg/dL p = 0.005) and CRP (120 mg/L vs 90 mg/L, p = 0.01) were significantly higher in the reactivators, group. No significant difference was observed on cytokines levels. Mortality rates and duration of ICU stay and of mechanical ventilation were comparable between the two groups of patients. Multivariate analysis showed that the number of transfusions (OR: 1.61; CI: 1.6-1.3, p = 0.009), bilirubin on day 7 (OR: 3.5; CI: 1.2-10, p = 0.02), and CRP on day 0 (OR: 1.01; CI: 1-1.02, p = 0.04), were independently associated with reactivation of CMV infection.

CONCLUSIONS. CMV DNAemia was recorded in 13.75 % of critically ill immunocompetent patients. Independent risk factors were the degree of inflammation, the bilirubin levels and the number of transfused red blood cells units. Larger prospective studies are required, in order to elucidate the clinical meaning of reactivation of latent viruses during critical illness.

0578
OUTCOME OF H1N1 PNEUMONIA IN A TERTIARY CARE ICU FROM SOUTH INDIA

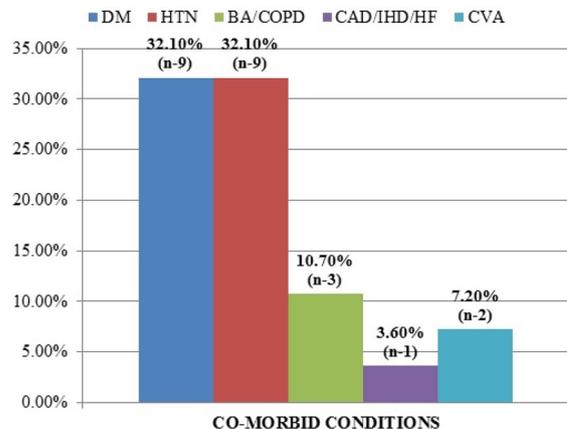
Y.E. Varghese¹, A.K. Anandabhavan Sukumara Menon¹, M.S. Kalaiselvan¹, A.S. Arun Kumar¹

¹Sri Ramachandra Medical College, Critical Care, Chennai, India

INTRODUCTION. Influenza virus causes mild to severe acute respiratory illness. The 2009 H1N1 influenza pandemic has been one of the leading causes of severe acute respiratory distress syndrome especially in young causing significant mortality and morbidity. The pandemic started in India in August 2009. This epidemic was notoriously seen to affect the younger population.

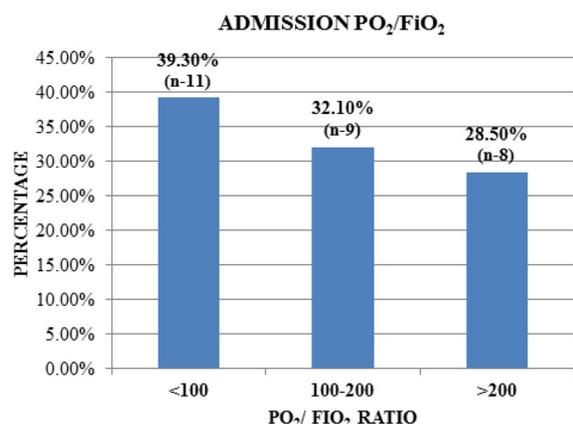
OBJECTIVES. We studied the clinical profile of critically ill patients with H1N1 influenza, and their outcome, admitted to our intensive care unit from January 2010 to December 2013 **METHODS.** Data was collected retrospectively for all patients admitted to ICU, with the confirmed diagnosis of H1N1 influenza by RTPCR method. Data pertaining to demographic profile, severity of illness, clinical features and course in ICU was collected. Non-parametric variables were compared using Mann-Whitney U test. A two tailed probability of P < 0.05 was considered significant. Risk factors for death was analysed using a univariate and multivariate logistic regression.

RESULTS. Total of 28 patients were admitted to ICU with H1N1 infection of whom 17 (60.7 %) were female and 7(25 %) were pregnant or in immediate postpartum period. The mean age was 50.46 years with 32.1 % of patients below 30 years.



[Comorbid conditions]

Admission APACHE II was 17.7 and SOFA was 5.2. Mean PO2/FiO2 ratio was 148.9. PO2/FiO2 ratio was less than 100 for 11 patients (39.3 %), 100-200 for 9 patients (32.1 %) and more than 200 for 8 patients (28.6 %).



[Admission PO₂/FI_O2]

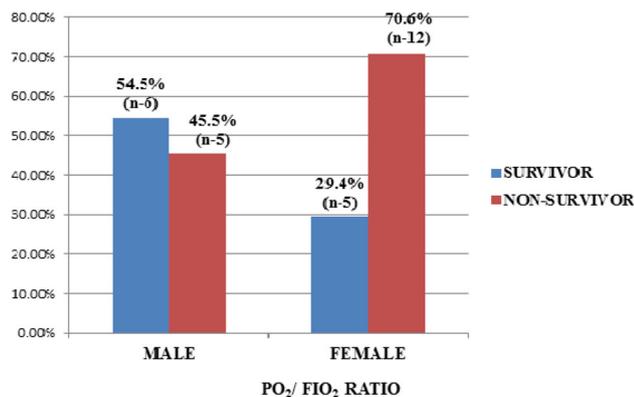
27 patients (96.4 %) required mechanical ventilation and 23 patients (82.1 %) required invasive ventilation. Mean duration of ventilation was 6.7 days.

	NUMBER OF PATIENTS	PERCENTAGE
ANY FORM OF VENTILATION	27	96.4 %
INVASIVE VENTILATION	23	82.1 %
NON INVASIVE VENTILATION	11	39.3 %
FAILED NIV	7	25 %
NIV ONLY	4	14.3 %
NONE	1	3.6 %

[MECHANICAL VENTILATION]

12 patients (42.9 %) developed AKI.

Mortality was 60.7 % (n=17). All seven female patients in the peripartum period died.



[Survival analysis -Male vs Female]

Younger age group, low PO₂/FI_O2 on admission, higher SOFA score on Day 3, positive fluid balance and pregnancy was associated with significantly higher mortality in univariate analysis ($P < 0.005$).

PARAMETER	SURVIVOR (MEAN ± SD)	NON SURVIVOR (MEAN ± SD)	P VALUE
AGE(years)	62.1 ± 10.8	42.9 ± 19.7	<0.05
HEART RATE	103.2 ± 14.1	118.5 ± 18.5	0.05
MAP (mm Hg)	86.9 ± 14.3	89.9 ± 11.4	0.54
Respiratory Rate	26 ± 3.4	31.6 ± 7.3	0.06
PO ₂ /FI _O 2	207.5 ± 40	110.9 ± 71.9	<0.05
GCS	14.2 ± 1.5	12.2 ± 4.2	0.14
Total Count	12083 ± 4880	9594 ± 5187	0.21
Apache II	15 ± 4.0	19.5 ± 7.2	0.72
SOFA	4.5 ± 1.9	5.7 ± 1.6	0.96

[Survival Analysis - Admission parameters]

	SURVIVORS		NON SURVIVORS		P-VALUE
	MEAN	STD DEVIATION	MEAN	STD DEVIATION	
ICU LOS (days)	8.8	7.6	7.7	3.6	0.60
VENTILATOR DAYS	5.6	7.1	7.3	4.0	0.42
VENTILATOR FREE DAYS	3.7	1.4	0.4	1.2	<0.05
MEAN TIDAL VOLUME(ml)	411	20.4	387	27.2	0.19
MAXIMUM PEEP	9	2.5	15.4	3.6	<0.05
FLUID BALANCE	558	423	1062	452	<0.05
WORST PO ₂ /FI _O 2	178.8	41.7	73.5	42.5	<0.05

[OTHER OUTCOME MEASURES]

Number of ventilator free days was significantly higher among survivors ($P < 0.005$). Multivariate analysis however did not show any significant predictor of mortality.

DISCUSSION AND CONCLUSIONS. H1N1 causes significant mortality as per our study. Our mortality rate of 60.7 % is higher compared to Cherit et al¹ and Chacko et al². The higher mortality rate in our study was probably because of the higher severity of illness of our patient population compared to Chacko et al.

25 % (n=7) of our patients were in the peripartum period and their mortality was 100 %. All these patients had severe ARDS mean PO₂/FI_O2 ratio 70.15 ± 15.82)

85.7 % (n=24) of our patients had more than one organ dysfunction at the time of admission to ICU. Patients who died had rapidly worsening organ failure.

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0579

VIRAL H1N1 RESPIRATORY TRACT INFECTION ADMITTED IN ICU

C. Joya Montosa¹, M.C. Martínez González¹, E. Curiel Balsera¹, E. Trujillo-García¹, H. Molina Díaz², G. Gómez Gallego¹, E.E. Aguiar Flores¹

¹Hospital Regional Universitario de Málaga-Carlos Haya, Málaga, Spain

OBJECTIVES. Describing a cohort of patients admitted in ICU after H1N1 influenza virus respiratory infection and analysing differences between these patients and those admitted in ICU with non H1N1-community acquired pneumonia (CAP).

METHODS. We have analysed patients admitted in ICU after influenza H1N1 respiratory infection from 2011 to 2013 and compared with patients with CAP admitted to ICU due to bacterial infection or without microbiological confirmation. We used mean and standard deviation for quantitative data and percentage for qualitative. We performed Fisher exact test and student-t test as necessary with maximum alpha error less than 5 %.

RESULTS. A total number of 125 patients with CAP were analysed, 24 of them with H1N1 infection (19.2 %). Mean age was 46 ± 15.2 years, 54.2 % male gender and APACHE II 15.75 ± 7.8. Length of stay in ICU was 24.7 ± 21.8 days and in the hospital 37.6 ± 28.1. Up to 33.3 % had no comorbidities. Most frequent were high blood pressure 33.3 % and smoking 37.5 %. 3 cases (12.5 %) were under immunosuppressive agents.

All patients developed new lung infiltrates, fever (79.2 %) and white count cells above 10,000 just in few cases (16.7 %). 75 % showed bilateral infiltrates in admission chest ray. Non-invasive mechanical ventilation were used in 33.3 % of patients with failure rate of 50 % needing finally invasive mechanical ventilation. Global rate of mechanical ventilation was 62.5 %, and tracheostomy for weaning was needed in 45.8 %. 37.5 % suffered some type of respiratory infection after H1N1 infection.

Observed mortality was 12.5 % and predicted by APACHE II 27.54 %. Mortality of patients with H1N1 was significantly lower than the other causes of CAP (12.5 % vs. 34.6 %) $p = 0.034$ OR 0.26 (0.07-0.96). H1N1 patients suffered some type of respiratory infection after H1N1 37.5 % vs 13.8 %, $p = 0.016$ OR 3.7 (1.3 to 10.1) and increased ICU and hospital stay ($p = 0.007$ and $p = 0.0001$ respectively). Specific scores (PSI and CURB) overestimated the mortality of patients with H1N1 infection, including APACHE II, which had better discriminative power with an area under COR curve 0.92 (0.78 to 1).

CONCLUSIONS. H1N1 pneumonia was a cause of ICU admission in 19.2 % of CAP. It occurs in younger patients, often without comorbidities. More than half of patients needed MV and presented higher rates of respiratory superinfections and hospital stay, but a lower mortality vs non-H1N1 CAP.

0580

WEB-BASED DELPHI CONSENSUS FOR THE DIAGNOSIS AND MANAGEMENT OF INVASIVE PULMONARY ASPERGILLOSIS IN CRITICALLY ILL PATIENTS

J. Garnacho-Montero¹, D. Martínez-Hernández², P.M. Olaechea³, Group for Study Pulmonary Fungal Infection

¹Hospital Universitario Virgen del Rocío, Critical Care and Emergency Department, Seville, Spain, ²San Carlos Clinic Hospital, Faculty of Medicine, Complutense University, Department of Preventive Medicine and Public Health, Madrid, Spain, ³Hospital de Galdakao-Usansolo, Critical Care and Emergency Department, Vizcaya, Spain

INTRODUCTION. Consensus-based studies are increasingly used because they provide results rapidly with relatively low production cost. The great majority of information about management of invasive aspergillosis in critically ill patients is derived from studies and trials carried out in onco-haematological patients. The objective of this study is to achieve consensus about unsolved issues in the diagnosis and management of invasive aspergillosis in critically ill patients.

METHODS. A group of twelve experts from two Spanish scientific societies (The Spanish Society for Chemotherapy and The Spanish Society of Intensive Care and Coronary Units) developed a document with practical recommendations for prevention, diagnosis and

treatment of invasive aspergillosis in critically ill patients (Rev Esp Quimioter 2013; 26: 173-88). Based on this manuscript, a digital web-based structured questionnaire of 23 questions was designed to be completed by intensivists selected by their special dedication in the field of infections in the critically ill patients. The consensus procedure was performed using Delphi technique (variant RAND/UCLA) with two rounds.

RESULTS. 95 invitations were sent obtaining 53 responses (55.8 %). All responders participated in the two rounds. Voriconazole was identified as the first line agent and liposomal amphotericin B as the alternative in case of contraindication. Consensus was not achieved in 7 questions (30.4 %): need of treatment in patients with risk factors and Aspergillus in respiratory samples but without respiratory insufficiency and normal imaging study, use of voriconazole in renal insufficiency (glomerular filtration < 50 ml/min) or with impossibility of serum level measurements, use of nebulized amphotericin B as adjunctive therapy in pulmonary aspergillosis or with the diagnosis of colonization, usefulness of serum galactomannan levels, and the optimal length of therapy.

CONCLUSIONS. Expert consensus was achieved on two-thirds of the questions concerning the diagnosis and treatment of invasive aspergillosis in the ICU. Clinical studies should be carried out to solve the uncertainties.

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H1N1 INFLUENZA A INFECTION WITH ICU ADMISSION. UNDERSTANDING THE DIFFERENCES BETWEEN 2009 PANDEMIC AND THE FOLLOWING FLU WAVES

A. Robles¹, B. Civantos¹, L. Fernández¹, C. Guallar¹, S. Yus¹, A. García de Lorenzo¹

¹Hospital Universitario La Paz, Intensive Care Unit, Madrid, Spain

INTRODUCTION. In 2009 a novel H1N1 influenza A virus emerged and was declared a public health emergency of international concern due to the acute respiratory failure it produced. Developing ARDS and needing intensive care admission in severe cases.

Consequences of this pandemic flu were not as catastrophic as first believed in terms of mortality when compared with seasonal flu. However, the final results did show that certain population groups were especially vulnerable, such as young healthy people and pregnant and postpartum women.

OBJECTIVES. Our aim was to analyze the demographic and clinical differences of H1N1 flu strain patients with ICU admission at the Hospital Universitario La Paz, from 2009 H1N1 influenza A pandemia to the newer waves between 2011-2014.

METHODS. This is a retrospective comparative study between two groups: patients from the 2009-2010 H1N1 pandemia (Group 1) and subsequent H1N1 flu cases from 2011-2014 (Group 2).

We collected all the H1N1 cases treated in our ICU between August 2009 and February 2014. Including demographics (age and sex), severity scores (APACHE II, SOFA), days of ICU and hospital admission, comorbidities, pregnancy, time for diagnosis and treatment, symptoms and blood parameters at admission, ARDS criteria, requirement and time of mechanical ventilation, intensive treatment required, outcome and mortality.

RESULTS. The 2011-14 group (n = 16) was significantly older than those of 2009-10 (n = 13) [Group 1 38.69 ± 13.99; Group 2 60 ± 15.24; (p < 0.003)]. We found a significant association with previous COPD diagnosis in Group 2 (p < 0.008). There were no young healthy patients, nor pregnant women, in this group. Group 2 patients tend to have longer ICU admissions, as well as more days of mechanical ventilation; but with no statistical significance. And we found no differences in mortality or clinical outcome between groups; nor in comorbidities, severity scores (APACHE II, SOFA), complications, hemodynamic values or blood measured parameters. (Table 1).

Variable	Group 2009		Group 2011/14		p
	N	Mean ± SD	N	Mean ± SD	
Age	13	38.69±13.99	16	60±15.24	0.003
Sex (Male/Female)	13 (3/10)		16 (6/10)		0.454
Mean hospital stay	13	30.46±22.20	15*	49.62±21.49	0.690
Mean ICU stay	13	20.85±19.03	15*	33.25±17.33	0.995
ICU mortality	2/13		1/15		0.573
Hospital Mortality	2/13		3/16		1.000
APACHE	13	14.77±6.50	16	16.56±6.62	0.471
SOFA	13	8.69±3.25	16	7.26±3.11	0.180
Concomitant bacterial Infection	3/13		2/16		0.632
COPD	2/13		11/16		0.008
Pregnancy or puerperal	3/13		0/16		0.192
PaFi	13	105.54±46.40	16	129.81±56.50	0.196
Mechanical Ventilation	9/13		10/16		1.000
Days of MV	9	26.09±22.57	10	31.00±48.51	0.450
Tracheostomy	5/13		8/16		0.711
Shock	11/13		11/16		0.410
RxTorax	13	2.46±0.967	16	2.31±1.078	0.702

*One patient not included due to outlier data

[Table 1]

CONCLUSIONS. Our data suggest that people with H1N1 Influenza A infection and ICU admission after the 2009 outbreak are older and tend to have other comorbidities (COPD) than those affected in the first wave, behaving as a seasonal flu.

Early treatment should be established every time the infection is suspected, since this may be related to the development of a worse ARDS.

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0582

EPIDEMIOLOGY OF FUNGAL COLONISATION AND INFECTION IN ICU OF AN INDIAN TERTIARY CARE CENTRE

A.K. Baronia¹, A. Ahmed¹, R.S.K. Marak², A. Azim¹

¹Sanjay Gandhi Postgraduate Institute of Medical Sciences, Critical Care Medicine, Lucknow, India, ²Sanjay Gandhi Postgraduate Institute of Medical Sciences, Microbiology, Lucknow, India

INTRODUCTION. Local epidemiology plays a major role in the treatment of invasive fungal infections in ICU.

OBJECTIVES. (1) to study the epidemiology of fungal colonisation and infection in ICU and (2) to perform external validation of four risk prediction models for invasive candidiasis (Candida score, colonization index, corrected colonization index (CCI) and Ostrosky' clinical prediction rule)¹⁻³

METHODS. 50 consecutive critically ill non-neutropenic adults were enrolled in the study. Patients' characteristics, severity of illness and risk factors for colonisation and candidemia were noted. Microbiology samples were collected at admission, 3rd day and then weekly for 3 weeks. Patients were divided into two groups (Group 1- No Candidemia, Group 2- Candidemia). Risk prediction models were calculated at admission.

RESULTS. Mean age was 44.8 ± 14.22 and sex ratio (M/F) was 25/25. Median admission APACHE II was 16 (range 3-39) and SOFA was 10 (range 2-17). There were 45 patients in group 1, and 5 patients (10 %) in group 2. Out of 755 samples processed for colonisation 348 (46 %) samples were positive for fungal growth. Most common coloniser was *C. zeylanoides* (29.4 %) followed by *C. tropicalis* (20.8 %) and *C. haemulonii* (19.2 %). Multispecies colonisation was seen in 80 % patients. Most common species causing candidemia was *C. tropicalis* (60 %). Among the various factors studied length of pre-ICU hospital stay, length of ICU stay, duration of mechanical ventilation and duration of antibiotic therapy were found to be significantly different in the two groups (p < 0.05). In general, all the four risk prediction models showed poor PPV (0 % to 9 %) and good NPV (92 % to 96 %). Among the four models tested CCI had the best performance (AUC 0.621, PPV 9.09 %, NPV 96.43 %, sensitivity 66.67 %, specificity 57.45 %).

CONCLUSIONS. High prevalence of multifocal multispecies colonisation exists in ICU patients with high incidence of candidemia. In this study, all the four risk prediction models had good NPV but poor PPV.

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0583

LOCAL PRACTICE OF ANTIFUNGAL THERAPY IN PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT AND ITS EFFECT ON MORTALITY- A RETROSPECTIVE, SINGLE CENTER, DATA ANALYSIS

R. Dhar¹, H. Patel²

¹Fortis Hospital, Respiratory Medicine, Kolkata, India, ²MSD Pharmaceuticals Pvt. Ltd., Critical Care, Mumbai, India

INTRODUCTION. Incidence of Invasive Fungal Infections (IFIs) is on the rise in Indian Intensive Care Units (ICUs).^[1,2] Since IFIs are associated with high mortality, a high degree of suspicion is required in order to diagnose and treat early for better patient outcomes.^[3,4]

OBJECTIVES. To observe the local practice of initiating empiric antifungal treatment in high risk patients with suspected IFIs and its correlation with mortality.

METHODS. A retrospective, single center data analysis was conducted to evaluate practice of antifungal therapy and its effect on mortality in patients at high risk for developing IFIs. Data was analyzed for patients admitted to the ICU and who received antifungal from Jan 11 to Mar 12 using SPSS v.16.

RESULTS. Of 95 patients, 89 were included in the analysis and were divided into 3 groups. Group 1- patients with fungal culture positive (n = 14), group 2- patients with fungal culture negative but bacterial culture positive (n = 38) and group 3 patients with both cultures negative (n = 37). Of the 14 patients with positive fungal cultures, *C. tropicalis* was isolated in 9, *C. albicans* in 3 and *A. fumigatus* in 2.

Non-responsiveness to broad spectrum antibiotics > 4 days, immunosuppressants, hemodialysis, uncontrolled DM, major abdominal surgery, sepsis, total parenteral nutrition and mechanical ventilation were the common risk factors. There was no difference in average number of risk factors between groups (1.6, 1.8 and 1.9). Presence of co-morbidities in different groups (2.1, 2.6, 2.7) correlated significantly with presence of risk factors (p = 0.039). 83.15 % (74/89) patients received azole as monotherapy, mainly fluconazole (72/74). 10.1 % (9/89) patients received echinocandin as monotherapy, mainly caspofungin (8/9). 6.74 % (6/89) patients received multiple antifungals. Average time to start antifungals was 4.7 days in patients with any positive culture. Average duration of antifungal treatment was 5 days irrespective of culture growth. Overall mortality was 37.1 % (33/89) and was comparable between groups.

CONCLUSION. Patients with IFIs had high mortality irrespective of culture positivity. Invasive candidiasis due to *C. tropicalis* was the most common cause of fungal infection. However, the time of initiating antifungal was not within the first hour of recognizing severe sepsis^[5]. This implies lack of clarity on use of antifungals for optimal benefit. Hence, we conclude that a high index of clinical suspicion based on existing risk factors & co-morbidities combined with early initiation of an effective empirical antifungal would result in a better clinical outcome.

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0584

TREATMENT OF CANDIDEMIA IN CRITICALLY ILL PATIENTS: A SNAPSHOT OF EVERYDAY

J.E. Barrueco-Francioni¹, J. Mora-Ordoñez¹, F.J. de Miguel Aparicio¹, M.J. Furonos-Lorente¹, E. Curiel-Balsera¹

¹Malaga General University Hospital, Intensive Care Unit, Malaga, Spain

INTRODUCTION. Candidemia is a common and lethal infection in critically ill patients, guidelines for treatment have been made, but in daily practice clinicians should decide individualized treatments pending on context of the pathology, patient and environment.

OBJECTIVES.

- Determine which are the type and time of use for anti-fungals, in patients with candidemia
- Determine the association of incorrect treatments with mortality

METHODS. Retrospective observational study in a Spanish ICU of a tertiary university hospital with 54 beds, from June 2009 to June 2013. We included all patients over 18 years admitted to the UCI, having positive blood cultures for any species of *Candida*. 22 patients met inclusion criteria. Clinical and epidemiological variables were analyzed, as well as type of species of fungi that grew, delays in treatment and duration. Continuous variables are presented as mean \pm standard deviation. Categorical variables are presented as percentages. We used Fisher's exact test and Mann-Whitney U to compare variables as needed with maximum alpha error of 5 %.

RESULTS. Of 22 patients, 63.6 % were men, mean age 59 ± 14.9 years, APACHE II at admission 18.5 %. Mean ICU stay was 32.6 days and 87.9 days in-hospital. Crude ICU mortality was 40.9 % and 50 % in-hospital. Reasons for admission were: medical 54.5 %, surgical 36.4 % and trauma 9.1 %. Candidemia were classified as albicans(54.4 %) and non-albicans (45.6 %) being 80 % *C. parapsilosis*.

No prophylactic or preemptive treatments were made. Of the 22 patients, 18.2 % did not receive anti-fungal treatment because limitation of therapy or die before diagnosis. 27.3 % of patients received empirical treatment and 54.5 % received targeted treatment. Antifungal type doses used were revised finding that 83.3 % of 18 treated patients received appropriate treatment. Patients were admitted to the ICU on day 19 of in-hospital admission (mean 19.4 ± 22.6 days). Candidemia was diagnosed on day 26 (mean 25.7 ± 21.1 days) and treatment started the day 25 (mean 24.9 ± 20.7 days). The mean duration of anti-fungal treatment was 18.9 ± 17 days.

Of 28 treatment regimens (initiation, escalation or de-escalation) Fluconazole was the most used drug (60.7 %) followed by echinocandins (21.4 %) and amphotericin B liposome (17.9 %). Improper treatment was associated with mortality, with an OR of 12 (1.1-128.8)

CONCLUSIONS. • Although the guidelines recommend echinocandins in critically ill patients in our sample fluconazole was the most commonly used treatment

- The candidemia is usually detected in the cultures of ICU admission which means that patients acquire infection outside the ICU.
- Improper treatment is associated with mortality

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0585

RETROSPECTIVE STUDY ON THE REASONS TO USE MICAFUNGIN IN LUNG TRANSPLANTATION PATIENTS (REMIT)

C. López¹, H. Puigderrials¹, L. Dono¹, A. Parra¹, M. Pérez¹

¹Vall d'Hebron University Hospital, Intensive Care Department, Barcelona, Spain

INTRODUCTION. Lung transplant recipients(LTR)present high risk of invasive fungal infections(IFI), mainly invasive aspergillosis and candidiasis. Micafungin has been described as a new echinocandin with promising results in prophylaxis and treatment of IFI.

OBJECTIVES. To aim reasons to use micafungin in prophylaxis or treatment of IFI in critically ill LTR admitted to intensive care unit(ICU).To evaluate indications, time of treatment, complications and outcomes.

METHODS. Conducting a retrospective study on all LTR admitted to ICU during 2012-2013, who received prophylaxis or treatment with micafungin. Recorded data includes demographics, diagnostic category, along with acute and underlying conditions. For statistical analysis, Pearson's Chi squared, Fisher and Mann-Whitney U tests have been used. Data are expressed as frequency(percentage) or median(25th-75th inter-quartile range).

RESULTS. During study period, 48 patients with micafungin treatment were admitted to ICU,19 were LTR(57.9 % male;median age 55(IQR 44-58),median APACHE II 23(IQR 8-39).Main indication for lung transplantation was pulmonary fibrosis(42 %)followed by chronic obstructive pulmonary disease(31 %).Bilateral lung transplant were performed in 57 %,unilateral right side transplant in 31 % and left side in 10 %(without significant differences).Almost all patients were treated with corticoid therapy (94 %),antibiotic treatment over seven days in 78 %,and only one patient(5 %) presented severe neutropenia. Micafungin was used as prophylaxis in 7 patients(38 %),directed therapy in 2 (10 %),empirical treatment in 2(10 %) and as pre-emptive in 8 patients(42 %).

Etiological agent was aspergillus spp in 63 %.Lung was the main site of infection(68 %).Median days of antifungal treatment were 12(IQR 5-27) and no complications were described. Most of the patients received prophylaxis with desoxycholate amphotericin. Additionally, 9 patients were previously treated with voriconazole(3 cases;27.3 % in bilateral transplant recipients and 6 cases;75 % in unilateral graft($p = 0.07$).Doses of micafungin over 100 mg daily were given to one patient. Microbiological evolution was successful in 100 % of prophylaxis group, compared to 75 % in treatment group($p = 0.01$).During ICU stay, almost all patients required vasopressors and mechanical ventilation. Continuous renal replacement therapy was required in one case(5 %).Neither therapies received in ICU, nor anti-fungal treatment indication was related to ICU outcomes.ICU LOS 23(7-72)days and overall mortality rate was 26 %.Only one case was related to IFI.

CONCLUSIONS. Use of micafungin as prophylaxis or treatment of IFI in LTR was effective and safe. Microbiological evolution was favorable in all patients in prophylaxis group.

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0586

COMPARATIVE ANALYSIS OF TWO INFLUENZA A OUTBREAKS IN INTENSIVE CARE UNIT (2009-2014)

C. Trujillano-Fernández¹, M.A. Estecha¹, C. Reina-Artacho², N. Zamboschi², L. Ruiz-del Fresno², M.V. de la Torre-Prados²

¹Hospital Virgen de la Victoria, Intensive Care Unit, Málaga, Spain, ²Hospital Virgen de la Victoria, Málaga, Spain

INTRODUCTION. Influenza A epidemic outbreaks have meant a major care and economic impact, both 2009/10 (October 09 to April 10) and 2014 (January and February). This encouraged us to compare both periods.

OBJECTIVES. To describe epidemiological and clinical characteristics in patients admitted in our intensive care unit by Influenza A in both periods. We compare personal health history, analytical and clinical parameters and correlate to mortality.

METHODS. We did a retrospective observational study according to variables: qualitative variables with percentages by categories and square Chi; quantitative variable with mean, standard deviation and T Student; or median, interquartile rank and U Mann Whitney; or regression, depending on the statistical distribution.

RESULTS. We admitted 42 patients (22 in the first period, 20 in second), being the reason for admission primary viral pneumonia 77 % in 2009, and all patients in 2014. The mean age was higher in second period (49.4 vs 47.8 years). We had more patients in second period (60 vs 50 %), but mortality in women was higher in 2009 (35.4 vs 25 %). According to the severity APACHE II (16.35 vs 13.7) and SOFA score (8.45 vs 3.95) and mortality (35 vs 22.7 %), in 2014 and 2009 respectively. In relation to analysis data: CPK (1435 VS 186), Creatinine (1.4 vs 0.9), and procalcitonine (6.5 vs 3.5) had higher levels in second period. We chose oseltamivir in all patients, median to start treatment (7 vs 5 days) in 2014 and 2009 respectively, and treatment duration was longer in second period (12.7 vs 5) days. Radiographic pattern was more severe in 2014, 50 % of patients had 3 or 4 quadrants affected in the Xray, only 31.4 % in 2009. We have not found differences of risks factors between periods. 4 patients received non invasive ventilation in the two outbreaks, and in 2014 we had more percentage of failure (75 %). Our patients needed mechanical ventilation 80 % (n = 16) in 2014 and 50 % (n = 11) in 2009. In the second outbreak 45 % (n = 9) developed mechanical ventilation acquired pneumonia, more than the second period 31 % (n = 7), and this was associated with more days in mechanical ventilation and a longer stay in intensive care unit.

CONCLUSIONS. Due the small number of patients we have not found differences between the two periods. The care impact have been greater in the second period (2014), having similar number of patients in two months. We have observed a higher severity in 2014, in APACHE II and SOFA score, analytical and radiographic findings and more mortality.

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INFLUENZA TYPE A EPIDEMIC IN A SECONDARY HOSPITAL

R. Rodríguez Castaño¹, A. Alonso Marín¹, P. Nieto Guindo², J.Á. Ramos Cuadra¹

¹Hospital Torrecárdenas, Medicina Intensiva, Almería, Spain, ²Hospital Torrecárdenas, Farmacia, Almería, Spain

OBJECTIVES. To describe the epidemiological and clinical features of patients with Influenza infection diagnosed by real-time quantitative polymerase chain reaction (RT-qPCR) in the season 2013-2014.

METHODS. We perform a prospective observational study of all patients admitted to a secondary hospital during the 2013-14 influenza virus epidemic period. Results are expressed as mean and standard deviation or percentage. A bivariate analysis using the t Student test for quantitative variables after checking its fit to normality is done.

RESULTS. A total of 45 patients (41 adults and 4 infants) were analyzed. Influenza infection was diagnosed by real-time quantitative polymerase chain reaction (RT-qPCR) in nasopharyngeal swab or tracheal aspirate specimens. Patients in childhood were discarded. Average age was 51 ± 16 years, range 21-80. 56.1 % were women. Only 14.6 % got the influenza vaccine, 58.5 % were not previously vaccinated against influenza and in 26.8 %, this parameter was unknown. Acute renal failure occurred in 7.3 % patients. The most common risk factors were: 29.2 % hypertension, 19.5 % diabetes mellitus, heart disease of any type and chronic lung disease, 14.6 % chronic renal failure, 12.1 % hypothyroidism and obesity, and 7.3 % pregnancy. 12.2 % were immunocompromised. 29.2 % had not risk factors. The average stay in hospital was 16.5 ± 18.7 days (two patients are still admitted). APACHE II medium was 7.4 ± 5.9 . 92.6 % of patients treated with oseltamivir over a average period of 7.8 ± 1.9 days. 78 % of patients continued antibiotic treatment after confirming diagnosis and with a positive RT-qPCR. In-hospital mortality rate was 4.9 %. Vaccinated patients had higher APACHE II scores than unvaccinated but did not differentiate significantly (9.8 ± 4.3 in vaccinated patients, unvaccinated 5.7 ± 6.1 , mean difference $+4.0$, 95 % confidence interval $(-1.4$ to $9.5)$ $p = 0.14$). For other variables like smoking or renal failure there were no significant differences between the two groups. Nine patients (22 %) needed intensive care. Six patients (66.6 %) received invasive mechanical ventilation and four (44.4 %) non-invasive ventilation. Score average of APACHE II was 13.9 ± 5.2 with an average stay in the ICU of 21.1 ± 31.5 days. No patients died in ICU.

CONCLUSIONS. Infection with type A influenza is a disease that mainly affects young adults mostly with some previous risk factor. Particularly striking is the low rate of vaccinated despite indications in many cases of patients with multiple personal medical history. It is a clinical picture with low morbidity and mortality AND only few patients require ICU admission.

Cardiovascular dynamics: Experimental studies: 0591-0599

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USEFULNESS OF THE CENTRAL VENOUS-TO-ARTERIAL CARBON DIOXIDE DIFFERENCE (CVACO₂ GAP) AND THE CVACO₂/ARTERIAL-VENOUS OXYGEN CONTENT DIFFERENCE RATIO (CVACO₂ GAP/CAVO₂ RATIO) IN THE HEMODYNAMIC RESUSCITATION PROCESS IN SEPTIC SHOCK

P. Saludes¹, J. Mesquida¹, E. Torrents¹, G. Gruartmoner¹, C. Espinal¹, A. Artigas¹

¹Consorci Sanitari Parc Taulí, Critical Care, Sabadell, Spain

OBJECTIVE. To evaluate the usefulness of the central venous-to-arterial carbon dioxide difference (cvaCO₂ gap) and the cvaCO₂/arterial-venous oxygen content difference ratio (cvaCO₂ gap/CavO₂ ratio)¹ in the hemodynamic resuscitation process in septic shock.

METHODS. Prospective observational study. Septic shock patients within the first 24 h of ICU admission were studied. Once normalized values of mean arterial pressure (MAP > 65 mmHg) and central venous oxygen saturation (ScvO₂ > 70 %) were achieved, simultaneous blood samples were obtained from a central venous line and an arterial catheter. The cvaCO₂ gap and the cvaCO₂ gap/CavO₂ ratio were calculated. Consecutive paired blood samples (arterial and venous) were obtained for each studied patient within the following hours. According to current literature, altered cvaCO₂ gap was defined for values ≥ 6 mmHg², and lactate improvement was defined as the decrease of at least 10 % of the previous lactate value². All paired blood samples obtained within the first 48 h were also computed.

RESULTS. Twenty-four septic patients were studied, with a mean age of 66 ± 12 years old. At inclusion, patients had values of MAP of 76 ± 12 mmHg, ScvO₂ 71 ± 8 %, and venous lactate of 41 ± 59 mg/dL. The cvaCO₂ gap was 5.7 ± 1.8 mmHg, and the cvaCO₂ gap/CavO₂ ratio was 1.6 ± 0.7 . The cvaCO₂ gap was correlated to venous lactate and, inversely, to ScvO₂. The cvaCO₂ gap/CavO₂ ratio significantly correlated with both lactate and ScvO₂. The first gasometric control was obtained after 3 ± 2 h. Those patients whose initial lactate values did not decrease had higher cvaCO₂ gap/CavO₂ ratio values at inclusion (1.9 ± 1 vs 1.4 ± 0.5 , $p < 0.05$). During the follow-up, 57 paired blood samples were obtained. No-improvement in lactate values was associated to higher cvaCO₂ gap/CavO₂ ratio values in the previous gasometric control ($p < 0.01$). ROC analysis showed an AUC 0.75 (95 % CI $0.6-0.9$, $p < 0.01$), and a cvaCO₂ gap/CavO₂ ratio cut-off value of 1.4 had S 0.83 and E 0.7 for lactate improvement prediction. The odds ratio of an adequate lactate clearance was 0.22 (95 % CI $0.06-0.86$, $p < 0.03$) in those patients with an elevated cvaCO₂ gap (> 6 mmHg), and 0.12 (95 % CI $0.03-0.5$, $p < 0.01$) in those with an elevated cvaCO₂ gap/CavO₂ ratio (> 1.4).

CONCLUSIONS. In a population of septic shock patients with normalized MAP and ScvO₂, the presence of elevated cvaCO₂ gap or elevated cvaCO₂ gap/CavO₂ ratio significantly reduced the odds of adequate lactate clearance. Including these parameters in future resuscitation algorithms might prove useful in order to obtain real-time information on the adequacy of tissue perfusion.

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0594

LEFT VENTRICULAR PERFORMANCE IS SIGNIFICANTLY AFFECTED BY INCREASING EXTRACORPOREAL BLOOD FLOW ON VA ECMO

P. Ostadal¹, M. Mlcek², A. Kruger³, P. Hala³, S. Lacko², M. Mates³, P. Neuzil³, O. Kittnar²

¹Na Homolce Hospital, Cardiovascular Center, Dept. of Cardiology, Prague, Czech Republic, ²Charles University in Prague, Prague, Czech Republic, ³Na Homolce Hospital, Prague, Czech Republic

INTRODUCTION. Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) offers bridge to recovery or to other therapeutic procedure in severely compromised circulatory conditions caused by advanced left ventricular dysfunction. However, current evidence on the relation between the extracorporeal blood flow (EBF) and left ventricular performance variables remains insufficient.

OBJECTIVES. To assess the relationship between EBF on VA-ECMO and left ventricular function in porcine model of acute hypoxic cardiogenic shock.

METHODS. Five pigs (50 kg) under general anesthesia and artificial ventilation underwent VA-ECMO implantation. Subsequently, acute hypoxic cardiogenic shock was induced by left anterior descending (LAD) coronary artery perfusion with venous blood. Marked cardiac dysfunction and cardiogenic shock with signs of tissue hypoxia developed after 60 to 90 min of myocardial hypoxia. Hemodynamic and cardiac performance parameters were then measured at different levels of EBF (from 1 to 5 L/min) using arterial and venous catheters, pulmonary artery catheter and PV-loop catheter introduced into the left ventricle (LV).

RESULTS. All animals survived myocardial hypoxia and underwent successfully all study procedures. Myocardial hypoxia resulted in a drop of cardiac output (CO) to 2.87 L/min and systolic blood pressure (SBP) to 60 mmHg. With increasing EBF from 1 to 5 L/min we observed increase in SBP to 97 mmHg ($P < 0.001$); however CO decreased to 2.07 L/min ($P < 0.001$), LV end-diastolic volume increased from 105 to 126 mL ($P = 0.005$), LV end-systolic volume increased from 61 to 87 mL ($P = 0.002$), LV ejection fraction decreased from 42 % to 31 % ($P < 0.001$), and stroke volume decreased from 44 to 39 mL ($P < 0.05$). Highly significant changes were detected also in stroke work ($P < 0.001$). LV end-diastolic pressure was not affected by changes in EBF ($P = 0.59$).

CONCLUSIONS. Our data indicate that the higher levels of VA-ECMO blood flow in cardiogenic shock may negatively affect left ventricular functions. It can be, therefore, anticipated that optimal VA-ECMO blood flow should be as low as possible to maintain adequate tissue perfusion.

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0598

EFFECTS OF FLUID THERAPY ON BLOOD LOSS AND COAGULATION IN CARDIAC SURGERY

B. Montalban Moreno¹, P. Maiorano², A. Galan Cabezas³, M.T. González López¹, V. Jimenez Jimenez², P. Cuesta Montero¹, R. Peyro García¹

¹Area Integrada de Albacete, Dept of Anaesthesiology & Intensive Care, Albacete, Spain, ²Hospital Reina Sofía de Córdoba, Cardiovascular Surgery, Córdoba, Spain, ³Hospital Reina Sofía de Córdoba, Dept of Anaesthesiology & Intensive Care, Córdoba, Spain

INTRODUCTION. There is controversy about the optimal management of perioperative fluids in patients undergoing cardiac surgery.

Preventing overloads of perioperative fluids has been associated with less complications after the surgery. The transfusion requirements has been associated with an increase of morbidity and mortality after cardiac procedures.

OBJECTIVES. Comparing the loss of blood in chest tube drainage among the patients who received crystalloids, in the form of Ringer's lactate, as main intraoperative fluid management during the cardiac surgery in liberal or restrictive fluid therapy.

METHODS. This randomized, single-centre trial. Inclusion criteria were: patients undergoing elective cardiovascular surgery on cardiopulmonary bypass. Exclusion criteria were, preoperative anaemia, coagulation disorders and renal dysfunction.

The patients were randomized into two groups:

In group A ($n = 19$): the reposition was made with a restrictive fluid therapy of $15-20$ ml/kg. In group B ($n = 25$): the dose was between 25 and 50 ml/kg

Anaesthesia technic: Induction: midazolam, propofol, fentanyl and cisatracurium. Maintenance: sevoflurano and fentanyl. The CPB circuit was primed with 1.000 ml of RL and 500 ml Hidroxietilalmidon and 100 ml of mannitol 20 %.

Patients received tranexamic acid as antifibrinolytic. Hypothermia was induced between $28-34$ °C. Swan Ganz or Vigileo/Flotrac were used to monitor myocardial performance and the impact of fluid loading and inotropic support on ventricular function.

RESULTS. A total of 44 patients randomized into two groups were included in the study Table 1.

	Group A	Group B	p-value
Male/female (n)	9/10	15/10	0,695
Age (yr)	66	62	0,438
LVEF (%) 50/30-50/30	10/6/3	16/8/1	0,389
Type of surgery (%) CABG VR Combined procedure	12/0/7	12/2/11	0,348
Duration (min) CPB	122	133	0,400
Use of vasopressors (%) Low High	25/58	75/42	0,026*
Time to extubation (h)	13	30	0,068
ICU stay (day)	1,6	2,8	0,134
RL the first 24 hafter surgery (cc)	3500	4200	0,248

[Table 1 Patients' characteristics]

We found that fluid therapy with therapy study caused increased external blood loss via chest tubes after operation. However, transfusion of packed red blood cells during the first 24 h was significantly different ($p < 0.001$) between the groups.

They were significantly different ($p < 0.001$) on renal dysfunction and coagulation disorder. Table 2.

	Group A	Group B	p-value
Chest tube drainage (ml)	340	890	$p < 0,001$ *
Packed red blood cells	0,11	1,2	$p < 0,001$ *
Coagulation disorder (%)	10,5	56	$p = 0,002$ *
Renal dysfunction (%)	10,1	64	$p < 0,001$ *

[Table 2 Results the first 24 h after surgery]

CONCLUSIONS. We found out that the liberal fluid therapy increases the loss of blood loss via chest tubes after surgery. Besides it causes bigger deterioration in the renal dysfunction and coagulation disorder. It also produces an increase in the transfusion of packed red blood cells requirements in the first 24 h. We must do a wider study and compare patients who received other fluids and check if this trend repeats.

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0599

SEVERE HYPOTHERMIA AND THE QTC INTERVAL

A.T. Kleinsasser¹

¹Medical University of Innsbruck, Critical Care Medicine/Anesthesiology, Innsbruck, Austria

INTRODUCTION. Severe Hypothermia is known to affect the conductive system of the heart. Particularly during rescue of hypothermia victims, slow heart rates, long QT intervals, Osborne waves and occasionally ventricular fibrillation have been reported. It remains uncertain, below which body temperature significant alterations of the EKG occur.

OBJECTIVES. As there is little information available on the EKG in hypothermia we aimed to define the temperature dependency of intervals in the EKG.

METHODS. In this study we examined 4 anesthetized pigs during submersion hyperthermia and 4 control animals (normothermic submersion). Examination group animals were submerged in 8°Celsius water, control group animals in 39°Celsius water. Core temperature was gauged using a Swan-Ganz catheter. Measurements were taken after every single degree Celsius drop in body temperature or every three minutes in the controls. Variables observed included heart rate, PQ, QRSc (c denotes rate corrected), QT, QTc and JTc interval of the EKG, blood pressure and blood gas variables.

RESULTS. Hypothermic, but not normothermic submersion led to significant prolongation in EKG intervals. At 24°Celsius QTc was prolonged to 710 ms vs 370 ms in normothermia. In hypothermic subjects, we found a tight positive linear correlation between drop in body temperature and cardiac intervals. This was particularly true for the rate corrected QT interval.

CONCLUSIONS. Thus, in this porcine model, it is possible to calculate body core temperature from the EKG's QTc in hypothermia. This may be useful for gauging the degree of hypothermia during rescue in the field.

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0602

INCIDENCE OF LATE COMPLICATIONS AFTER PERCUTANEOUS TRACHEOSTOMY

N. Carrizo¹, R. Avila¹, C. Zuchella¹, L. Morano¹, A. Gamboa¹, M.M. Filippi¹

¹Hospital Cullen, Santa Fe, Argentina

INTRODUCTION. Given the operational benefit and lower mortality Percutaneous dilational tracheostomy (PDT) is one of the most common elective invasive procedures in critically ill patients with prolonged need for mechanical ventilation (MV).

Perioperative complications (hemorrhage, pneumothorax, desaturation, etc.) have been well documented by numerous series and meta-analysis. However the record of late complications, particularly tracheal stenosis is difficult due to the high mortality in this group of patients, difficulty of access to specialized medical centers and persistent medical problems.

OBJECTIVE. To determine the incidence of tracheal stenosis and other late complications in those patients underwent PDT during their stay at intensive care unit.

METHOD. Between January 2009 to December 2013 were performed 515 PDT, using two techniques: Guide Wire dilating forceps (GWDF) and Single Step dilatational Tracheostomy (SSDT), both without fiberoptic guidance. There were 363 long-term survivors (70.5 %), 126 (34.7 %) of whom were interviewed and offered further evaluation by fiberoptic laryngotracheoscopy (FOL).

RESULTS. Demographic characteristics: Age 32 ± 14.7 , 96 Male (76.1 %), APACHE II 17 ± 5.4 . Timing of tracheostomy 10.4 ± 4.1 days, Mechanical Ventilation 22.3 ± 11.9 days, Months since tracheostomy to FOL 2.7 ± 1.6 . Cause of admission: TBI 62 (49.2 %), Polytrauma 17 (13.5 %), Injury gun fire: 12 (9.5 %), Stab wound 5 (3.9 %), Stroke 7 (5.5 %), Respiratory failure 6 (7.7 %), Septic Shock 4 (3.1 %), Guillain-Barre 3 (2.3 %) Other 10 (7.9 %).

Techniques: GWDF 87 (69.0 %), SSDT 39 (30.9 %)

Late complications:

FOL: Mild stenosis 5 (3.9 %), Moderate stenosis 7 (5.5 %), Severe stenosis 8 (6.3 %), Critical stenosis 2 (1.5 %), tracheo- esophageal fistula 3 (2.3 %), vocal cord paralysis 1 (0.7 %), delayed stoma closure 9 (7.1 %), granuloma 5 (3.9 %).

CONCLUSION. Despite the low perioperative complication rate and other perceived benefits of PDT, long-term follow-up of both symptomatic and asymptomatic patients indicates that the incidence of tracheal stenosis is significant. In our research 22 patients (17.4 %) had some grade of stenosis and required some kind of intervention (surgery, dilation or stenting).

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0603

CONTINUOUS CONTROL OF DOUBLE-LUMEN ENDOTRACHEAL TUBE CUFF PRESSURE VS. STANDARD CUFF MANAGEMENT FOR THE PREVENTION OF INTRA-OPERATIVE PULMONARY ASPIRATION

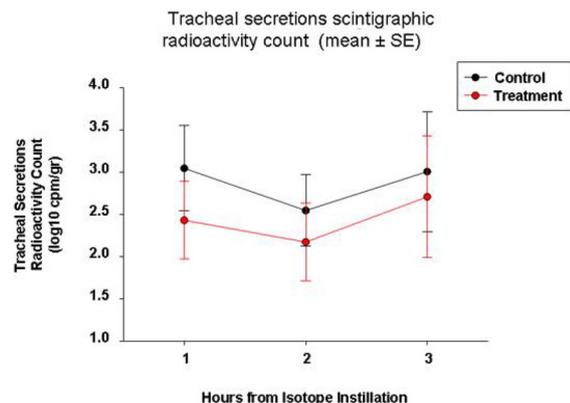
V. Díaz-Ravetllat¹, G. Li Bassi², F. Campos³, M. Mayor³, N. Navales³, R. Navarro⁴, M.J. Jimenez², C. Gomar⁴, M.J. Arguis⁴, E. Aguilera Xiol², J.D. Martí², N. Fabregas⁴, F. Lomeña³, L. Molins¹, A. Torres²

¹Hospital Clinic, Thoracic Surgery, Barcelona, Spain, ²Hospital Clinic, Pulmonary and Critical Care Medicine, Barcelona, Spain, ³Hospital Clinic, Nuclear Medicine, Barcelona, Spain, ⁴Hospital Clinic, Anesthesiology, Barcelona, Spain

INTRODUCTION. Standard double-lumen endotracheal tube comprises a high-volume low-pressure cuff to seal the trachea. Leakage of colonized oropharyngeal secretions across the cuff frequently occurs, particularly when the cuff is underinflated. This potentially leads to post-operative pneumonia.

OBJECTIVES. We tested the impact of continuous control of the tracheal cuff pressure (P_{TCuff}), in comparison with standard cuff management on the prevention of pulmonary aspiration.

METHODS. Twenty-seven patients (64.7 ± 10.8 yr) undergoing elective lobectomy for lung cancer were enrolled into the study. Tracheal diameter was computed through CT scan. Tracheal cuff diameter was measured with a caliper. A 20-G epidural catheter was attached to the double-lumen tube to allow instillation into the subglottic region. Following intubation, patients were randomized to receive continuous control of P_{TCuff} (treatment group, 12 patients) through an electronic controller (Mallinckrodt pressure control, Covidien, USA) or standard care of P_{TCuff} (control group, 15 patients). In the treatment group, P_{TCuff} was maintained at 28 cm H₂O. In the control group, following intubation, the P_{TCuff} was set at 28 cm H₂O through a manometer, and adjusted in cases of consistent air leakage. Throughout the surgical procedure, nitrous oxide was never administered. Following placement of the patient into the lateral position for thoracotomy, 4-mL solution of methylene blue and 3.7 megabecquerels of ^{99m}Tc-DTPA was slowly instilled into the subglottic region. The half-life of the isotope is 6 h and is not orally absorbable. After 1, 2 and 3 h from instillation, we collected oropharyngeal and tracheal secretions to assess macro-aspiration through presence of methylene blue. Radioisotopic counting was performed using a gamma counter to evaluate micro-aspiration. Scintigraphic results were corrected for background activity, decay, and expressed as log₁₀ of the counts per minute (cpm) per gr. **RESULTS.** Sixteen patients were intubated with a left double-lumen tube; whereas, eleven with a right one. The median double-lumen tube diameter was 39 Fr (range 35-41). The ratio between cuff and tracheal diameter was 1.71 ± 0.2 , without difference between groups ($p = 0.990$). Macro-aspiration was detected in 20.0 and 23.3 % of the samples in the treatment and control groups, respectively ($p = 0.736$). Mean oropharyngeal radioactivity was 5.5 ± 1.5 log₁₀ cpm/gr. As depicted in figure 1, tracheal secretions radioactivity was 2.4 ± 1.6 log₁₀ cpm/gr in the treatment group and 2.8 ± 1.8 in the control group ($p = 0.213$). Additionally, tracheal secretions radioactivity was consistent at 1 h (2.8 ± 1.8), 2 h (2.4 ± 1.6) and 3 h (2.8 ± 1.8) after instillation ($p = 0.437$).



[Figure 1]

CONCLUSIONS. These results strongly corroborate that during thoracic surgery pulmonary aspiration across the double-lumen tracheal cuff is common, irrespective of continuous control of internal cuff pressure.

0604

EMERGENT ENDOTRACHEAL INTUBATION: MEDICATIONS AND DEVICE CHOICES BY CANADIAN RESUSCITATION PHYSICIANS

R.S. Green¹, D.A. Fergusson², A.F. Turgeon³, L.A. McIntyre⁴, G. Kovacs⁵, D. Griesdale⁶, M.B. Butler⁷

¹Nova Scotia Trauma Program, QEII Health Sciences Centre, Dalhousie University, Departments of Emergency Medicine and Anesthesia, Division of Critical Care Medicine, Halifax, Canada, ²University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Clinical Epidemiology, Ottawa, Canada, ³CHU de Québec Research Center, Hôpital de L'Enfant-Jésus, Université Laval, Department of Anesthesiology, Division of Critical Care Medicine, Québec, Canada, ⁴University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Critical Care Medicine, Ottawa, Canada, ⁵Dalhousie University, Department of Emergency Medicine, Halifax, Canada, ⁶Vancouver General Hospital, University of British Columbia, Department of Anesthesia, Pharmacology and Therapeutics, Department of Medicine, Division of Critical Care Medicine, Vancouver, Canada, ⁷Dalhousie University, Department of Anesthesia, Division of Critical Care Medicine, Halifax, Canada

INTRODUCTION. Emergent endotracheal intubations (EETIs) are life-saving procedures performed by emergency medicine (EM) and critical care medicine (CCM) physicians. However a standard approach to EETI does not exist, and various medications and equipment may be used. Information on these intubation practices is required to inform investigations of EETI.

OBJECTIVES. To determine the medications and devices utilized for intubation by Canadian EM and CCM physicians.

METHODS. As part of a clinical scenario-based survey, physicians were asked to indicate which medications they would administer to facilitate EETI, their 1st choice of intubation device, and a backup procedure should the 1st choice fail. The survey was distributed to all non-trainee members of the Canadian Association of Emergency Physicians and the Canadian Critical Care Society via web-based and postal methods. Physicians were asked questions based on 3 scenarios (trauma; sepsis; heart failure) and provided responses using a 5-point scale ranging from "always" to "never" to capture usual practice.

RESULTS. A total of 1758 physicians were sent the survey, with a response rate of 50.2 % (882/1758). Most physicians indicated that direct laryngoscopy with a MacIntosh blade would "always/often" be their first choice of intubation device in the 3 scenarios (avg 85.1 %, range 79.0-88.9 %; OR = 24.6; CI: [20.8, 29.2]; $P < 0.001$), followed by video laryngoscopy (avg 37.5 %, range 29.9-49.5 %) and bougie-assisted intubation (avg 19.5 %, range 15.9-24.9 %). The backup device that physicians chose to use most often ("always/often") was an extraglottic device (avg 58.7 %, range 56.2-60.4 %), followed by percutaneous cricothyrotomy (avg 4.5 %, range 4.0-5.7 %) and open cricothyrotomy (avg 3.6 %, range 1.9-5.1 %).

The medications most commonly selected ("always/often") by physicians to use in the EETI scenarios were fentanyl (avg 45.3 %, range 42.3-50.7 %, NS), etomidate (avg 38.2 %, range 24.6-50.5 %, NS), and propofol (avg 28.3 %, range 25.7-36.1 %, NS). EM physicians chose to paralyze patients more often than CCM physicians (OR = 3.40; CI: [2.90, 4.00]; $P < 0.001$), with 28.6 % of EM physicians and 9.1 % of CCM physicians responding they would "always/often" give patients a paralytic for EETI. Other medication choices varied between clinical scenarios.

CONCLUSIONS. Most emergency and intensive care physicians in Canada utilize direct laryngoscopy with a MacIntosh blade as a primary device for EETI, with an extraglottic device as a backup. Paralysis for intubation was not used in the majority of cases, but was more likely to be used by EM physicians.

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0605

FEASIBILITY OF A PNEUMATIC DEVICE IN CONTROLLING TRACHEAL CUFF PRESSURE IN INTUBATED CRITICALLY ILL PATIENTS

A. Rodriguez¹, P. Saludes¹, S. Nseir², J. De Jonckheere², J. Vallés¹, A. Artigas¹, I. Martin-Loeches¹

¹Critical Care Center, Hospital de Sabadell, Sabadell, Spain, ²Intensive Care Unit, Salengro Hospital, Lille, France

INTRODUCTION. Cuff pressure control is mandatory for an adequate management in the mechanically ventilated patient. Microaspiration and the development of tracheal ischemia are the most important threats if pressure control is not adequately managed. Several automatic devices have been designed however expensive and not universally used, thus the use of manual manometer is still the most extended method in Intensive Care Unit (ICU).

OBJECTIVES. The primary objective of the present trial was to determine the feasibility and efficacy of PressureEasy[®] device (Smiths medical cuff pressure controller) in the continuous control of tracheal cuff pressure (P_{cuff}) in patients intubated with polyvinyl chloride (PVC)-cuffed tracheal tubes.

METHODS. Prospective, randomized, intention-to-treat (ITT), controlled study, (blinded during the automatic control). All patients requiring intubation with a predicted duration of mechanical ventilation ≥ 48 h were eligible.

18 patients randomly received continuous control of P_{cuff} with Pressure easy[®] device for 24 h, followed by discontinuous control (every 4 h) with a manual manometer for 24 h; or intermittent control of P_{cuff} followed by continuous control of P_{cuff} . P_{cuff} and airway pressure were continuously recorded. P_{cuff} target was 25 cmH₂O in the two groups.

RESULTS. The percentage of time spent with P_{cuff} 20-30 cmH₂O (median [IQR]) 34 % [17-57] versus 50 % [35-64], $p = 0.184$), and percentage of time spent with $P_{cuff} < 20$ cmH₂O (23 % [5-63] versus 43 % [16-60], $p = 0.5$) were similar during continuous control of P_{cuff} and routine care, respectively. However, percentage of time spent with overinflation (> 30 cmH₂O) of tracheal cuff was significantly higher during continuous control compared with routine care of tracheal cuff (26 % [14-39] versus 7 % [1-18], $p = 0.002$). No significant difference was found in P_{cuff} (25 [18-28] vs 21 [18-26], $p = 0.17$), airway pressure (14 [10-17] vs 14 [11-16], $p = 0.679$), or coefficient of variation of P_{cuff} (19 % [11-26] vs 20 [11-25], $p = 0.679$) during continuous control compared with routine care of tracheal cuff, respectively.

CONCLUSIONS. PressureEasy[®] could not demonstrate a better control of P_{cuff} between 20-30 cmH₂O compared with routine care using a manometer. Moreover, overinflation time of tracheal cuff was more frequent, which might increase the risk for tracheal ischemic lesions.

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0606

COMPLICATIONS OF ENDOTRACHEAL INTUBATION IN AN INTENSIVE CARE UNIT

B. Lobo-Valbuena¹, M.A. Romera-Ortega¹, I. Fernández-Simón¹, N. Martínez-Sanz¹, B. Balandin-Moreno¹, R. Fernández-Rivas¹, L. Pérez-Pérez¹, A. Naharro-Abellán¹, A. Ortega-López¹, J.J. Rubio-Muñoz¹, P. Galdós-Anuncibay¹

¹Hospital Universitario Puerta de Hierro, Intensive Care Unit, Madrid, Spain

INTRODUCTION. ETI is one of the most frequent procedures at the ICU. There is limited time for optimization before ETI (which differs significantly from ETI carried out in the operating theatre). Hence, the number of complications associated with ETI in critically ill patients is usually much higher than those in the operating room.

OBJECTIVES. To assess complications related to ETI and their possible relationship with prognosis in critically ill patients admitted to a 20-bed medical ICU.

METHODS. Observational prospective study of patients undergoing ETI performed by the ICU team between 15/12/2012-30/6/2013. Demographic data, indications of ETI, intubation conditions, expertise level of the physician, number of attempts, associated complications, need for vasoactive support (VAS) and mortality were recorded. Data are expressed as mean \pm standard deviation, median (interquartile range) and relative risk (RR).

RESULTS. From 353 patients admitted to ICU, 151 patients were intubated, 106 by ICU staff, 95 patients included. 37 women (38.9%), 57.5 \pm 16 years-old (range 16-83). APACHE II 18.5 \pm 9.1. Indications for ETI: 50 (52.6%) respiratory failure, 17 (17.9%) neurological. 86 (90.5%) intubated in the ICU ward, 1 in hospital ward, 8 in the Emergency Department. ETI were performed: 31 in the morning, 29 in the evening and 35 at night shifts. Most common hypnotics: etomidate in 76 (80%) (0.26 \pm 0.7 mg/kg), propofol in 13 (13.7%) (0.96 \pm 0.40 mg/kg), ketamine in 12 (12.6%) (1.36 \pm 2.5 mg/kg). Opioids: 87 (91.6%); fentanyl in 81 (93%) (1.22 \pm 2.7 μ g/kg). Rocuronium in 94 (99%) (0.79 \pm 1.4 mg/kg). 56 patients (59%) had airway disorders. Mallampati I-II 78 (82%), Cormack I-II 78 (82.1%), III-IV 17 (17.9%). 76 ETI successfully performed by residents (80%). Difficult intubation in 7 patients (7.4%). Median duration of procedure: 190 s (150-300). Complications occurred in 45 patients (47.3%), 27 of them had 35 severe complications (11 esophageal intubations, 2 endobronchial intubations, 6 aspirations, 8 hypotensions and 8 hypoxaemias). A relationship was observed between complications and Cormack III-IV (RR 9.2, 95% CI 1.97-43, p < 0.001), \geq 3 attempts (p < 0.0001) and day shift (less complications during night shift, p = 0.006). 58 patients required VAS in the first 4 h after ETI, with no relation to the applied anaesthetic. 33 patients died (34.7%); 27 in ICU and 6 in hospital ward. There were neither cardiac arrest nor death during ETI, and no significant differences between complications and number of days of need of a vasopressor, number of days on mechanical ventilation, length of stay in ICU and mortality.

CONCLUSIONS. ETI in the critically ill is associated with potentially serious complications (28% in our series). Cormack \geq III, the number of attempts and day shift were independent risk factors associated with complications. Nevertheless, we found no association between complications during ETI and mortality.

0607

EFFICIENCY OF MALLINCKRODT® ELECTRONIC DEVICE IN CONTINUOUS CONTROL OF TRACHEAL CUFF PRESSURE

A. Rouze¹, E. Parmentier-Decrucq¹, J. De Jonckheere², B. Voisin¹, E. Jaillette¹, F. Zerimech³, A. Durocher¹, S. Nseir¹

¹Centre de Réanimation Médicale, Hôpital Roger Salengro, CHRU de Lille, Lille, France, ²Centre d'Investigations Cliniques - Technologies Innovantes, Inserm Cic-It 807, CHRU de Lille, Lille, France, ³Laboratoire de Biochimie- Biologie Moléculaire, Pôle de Biochimie, Centre de Biologie Pathologie, CHRU de Lille, Lille, France

INTRODUCTION. Despite routine care of tracheal cuff using a manual manometer, cuff underinflation (tracheal cuff pressure, P_{cuff} < 20cmH₂O) and overinflation (P_{cuff} > 30cmH₂O) frequently occur in intubated critically ill patients, resulting in potential complications including microaspiration and tracheal ischemic lesions.

OBJECTIVES. The primary objective of our study was to determine the efficiency of Mallinckrodt® electronic device in continuous control of P_{cuff} . The secondary objective was to determine the impact of this device on the occurrence of microaspiration of gastric contents, documented by measurement of pepsin in tracheal aspirates.

METHODS. We conducted a prospective randomized controlled crossover study. 18 patients requiring mechanical ventilation \geq 48 h through a high volume/low pressure PVC-cuffed tracheal tube (standard-shaped cuff) were included. They randomly received either continuous control (CC) of P_{cuff} with Mallinckrodt® device for 24 h, followed by discontinuous control (DC, every 8 h) with a manual manometer for 24 h, or the reverse sequence. During the two 24 h-periods, P_{cuff} target was 25 cmH₂O. During the 48 h after randomization, P_{cuff} was continuously recorded, and quantitative measurement of pepsin was performed in all collected tracheal aspirates. McNemar and Wilcoxon nonparametric tests were used to compare qualitative and quantitative variables between the two regulation periods, respectively.

RESULTS. Mallinckrodt® device maintained P_{cuff} in the expected range (20-30 cmH₂O) more effectively in CC, compared to DC period (median [25th-75th percentiles] 99.1% of the recording time [97.9-99.9] vs 73.5 [54.4-96.8], p < 0.001). The percentage of recording time spent with cuff overinflation (0.8 [0.1-2.1] vs 2.4 [0.7-9.4], p < 0.001) or underinflation (0.0 [0.0-0.0] vs 9.1 [0.0-36.1], p < 0.001) was significantly lower during CC compared with DC period. Cuff underinflation event (defined by P_{cuff} < 20cmH₂O > 5 mm during the 24 h-period), and prolonged cuff underinflation event (P_{cuff} < 20cmH₂O > 30 mn/24 h) occurred significantly less frequently in CC compared with DC period (0/18 vs 13/18 patient, p < 0.001 and 0/18 vs 12/18 patient, p < 0.001). Regarding cuff overinflation, only prolonged events (P_{cuff} > 30cmH₂O > 30 mn/24 h) were significantly less frequent in CC compared with DC period (4/18 vs 11/18 patient, p = 0.016). Mean P_{cuff} was significantly higher during CC compared with DC period (25.9 cmH₂O [25.5-26.4] vs 22.7 [21.6-24.8], p = 0.001). Pepsin was measured in 78 tracheal aspirates (13 patients). No significant difference was found in pepsin levels between the two regulation periods (mean pepsin level: 191 ng/ml [161-388] vs 288 [162-522], p = 0.953).

CONCLUSIONS. Mallinckrodt® electronic device is efficient in controlling P_{cuff} , compared with routine care using a manometer. Our study did not show decreased microaspiration through the use of this device.

0608

ROLE OF ROUTINE CHEST X-RAY AFTER PERCUTANEOUS DILATATIONAL TRACHEOSTOMY WITH DIRECT BRONCHOSCOPIC GUIDANCE ON A CARDIOTHORACIC ICU

K. Pilarczyk¹, G. Marggraf¹, M. Dudasova¹, B. Schönfelder¹, H. Jakob¹, F. Dusse¹

¹University Hospital Essen, Department for Thoracic and Cardiovascular Surgery, Essen, Germany

INTRODUCTION. Although some studies have shown that chest X-ray (CXR) after percutaneous dilatational tracheostomy (PDT) is unnecessary and cost-ineffective, it is still regularly performed by many centres.

OBJECTIVES. Therefore, we evaluated the usefulness of post-tracheostomy by analysing CXR detected (tracheostomy-related) complication rates as well as the proportion of cases requiring significant intervention.

METHODS. We retrospectively reviewed the records of all patients who underwent PDT (using the Ciaglia technique) with direct bronchoscopic guidance for prolonged mechanical ventilation on our cardiovascular ICU between 2004 and 2012. CXR is regularly obtained post-tracheostomy. Patients were excluded if CXR was not performed within 6 h after PDT.

RESULTS. We performed 1001 PDT during the study period. Mean age of the patients was 68.2 \pm 13.9 years and 46% of patients were men. The mean time from intubation to PDT was 3.8 \pm 3.3 days (range 0-38). Success rate of PDT was 99.7%. Major procedure-related complications were rare and included 4 major bleedings (one due to laceration of the brachiocephalic trunk, two bleedings from a thyroid vessel and one venous bleeding), a device failure, a pneumothorax, two injuries of the posterior tracheal wall. There were no procedure-related deaths. CXR was performed in 886 patients within 6 h after the procedure. Mean time interval from the last CXR before PDT was 27 \pm 22 h. The remaining 115 patients were excluded as no CXR was performed during this time frame. In 824 patients, CXR did not reveal any new pathological findings (93.2%). In 29 cases (3.3%), new radiological abnormalities were observed and classified as followed: One pneumothorax that was clinically diagnosed and treated before CXR, new/progressive atelectasis (n = 20, 2.3%), new subcutaneous emphysema without pneumothorax (n = 8, 0.9%) of which 4 were clinically observed before CXR. Therefore, only in 24 cases CXR revealed a new pathology not remarked clinically before. From these, only 4 cases (0.5%) required invasive intervention (therapeutic bronchoscopy).

CONCLUSIONS. Perioperative complications detected by CXR during PDT in cardiothoracic patients are rare. In addition, the impact of routine post-tracheostomy CXR findings on management is minimal. Based on our experience, CXR after PDT under bronchoscopic visualization without any clinical deterioration should not be performed routinely.

0609

THE SAFETY OF USE OF DIAGNOSTIC SONOGRAPHY IN PERCUTANEOUS TRACHEOTOMY

A. Fernández Trujillo¹, O. Farré Lladó¹, L. Santos Sánchez², D. Gutiérrez Arámbula², A. Centeno Álvarez², B. Nicolau Miralles³, I. Aguirre Centeno³, J.L. López Negro³

¹Parc Sanitari Sant Joan de Déu Hospital General, Unidad de Medicina Intensiva, Sant Boi de Llobregat, Spain, ²Parc Sanitari Sant Joan de Déu Hospital General, Sant Boi de Llobregat, Spain, ³Universidad de Barcelona, Barcelona, Spain

INTRODUCTION. The procedure known as percutaneous tracheotomy (PCT) has nowadays become a safer technique. Research has proven that its use has had a low level of complications, making this procedure comparable to other surgical techniques in regard to safety. The application of ultrasound using the Seldinger technique in the canalization (tubing) of central catheter lines has become over time more and more common, providing an improved safety measure in such procedures. Its use in PCTs has not yet become standard procedure even though there has been some literature to that regard.

OBJECTIVES.

- To evaluate the possibility of correctly using diagnostic sonography in PCT procedures.
- To safe check this technique in a first try puncture procedure and its possible injuries to contiguous structures.

METHODS. We undertook ultrasound guided PCTs using a Cigalia Dolphin technique on eight corpses from the Anatomy Department of Barcelona University. The neck was placed in hyperextension and an ultrasound was made with a linear probe placed in a sagittal position, in the precise same place it would be without the ultrasound guide. When the thyroid lobes or the thyroidal isthmus were detected, the place of puncture was modified. The puncture was undergone, then the guide was placed with posterior dilation. After the procedure, the guide was left and the anatomical dissection of the corpse was undergone.

RESULTS. From the 8 procedures, 7 could be tubed on 1st try, 7 punctures placement were in the middle line of the trachea and it was one puncture of a blood vessel in an unusual position. Our trial results show that this procedure is feasible; although it is a relatively new technique in the management of airways and therefore lacking enough previous experience. On the other hand, it shows a high incidence of first-try successful punctures, except in cases that may have difficult airway criteria. Our trial also shows that the axial plane orientation combined with previous neck palpation facilitates the correct insertion of the guide (tube, channel), avoiding injury to the thyroid gland when its position is not correct.

CONCLUSIONS. The use of diagnostic sonography in percutaneous tracheotomies (or PCTs) has proven to increase the safety of the procedure, bringing an innovative technique.
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0610

SAFETY AND COMPLICATIONS OF PERCUTANEOUS DILATATIONAL TRACHEOSTOMY WITH DIRECT BRONCHOSCOPIC GUIDANCE PERFORMED BY RESIDENTS OR FELLOWS

K. Pilarczyk¹, G. Marggraf¹, M. Dudasova¹, B. Schönfelder¹, H. Jakob¹, F. Dusse¹

¹University Hospital Essen, Department for Thoracic and Cardiovascular Surgery, Essen, Germany

INTRODUCTION. Although bedside percutaneous dilatational tracheotomy (PDT) on the ICU is considered a high-risk procedure by some authors, it is regularly performed by physicians during their residency in different specialities with only limited experience.

OBJECTIVES. Therefore, we compared the complication rate of PDT performed by board-certified intensivists and fellows or residents in training.

METHODS. We retrospectively reviewed the records of all patients who underwent PDT (using the Ciaglia technique) with direct bronchoscopic guidance for prolonged mechanical ventilation on our cardiovascular ICU between 2007 and 2011. Patients were divided into two groups according to the performing physicians: Group 1 (n = 195): two intensivists; Group 2 (n = 419): one resident/fellow during training in critical care or cardiothoracic surgery under supervision of one intensivist.

RESULTS. Basic demographic data as well as comorbidities of the patients were comparable between the two groups. Mean age was 68.2 ± 13.9 years and 46 % of patients were men. However, all repeat PDT (n = 16) were performed by two intensivists indicating a preselection of patients. The mean time from intubation to PDT was 3.8 ± 3.3 days (range 0-38). 271 patients (44.1 %) had a severe coagulopathy without a group difference. PDT was graded as easy/moderately difficult/very difficult in 170 (87.2 %)/18 (9.2 %)/7 (3.6 %) vs. 359 (84.2 %)/53 (12.6 %)/7 (1.75), p = n.s.). Success rate of PDT was 99.5 % and 99.8 % in the two groups. Incidence of fracture of the tracheal rings was comparable between the two groups with 54 (27.7 %) vs. 132 (31.5 %), p = n.s.). Incidence of a moderate bleeding tended to be higher in group 2 but did not reach statistical significance (30 (7.2 %) vs. 6 (3.2 %), p = 0.05). Major procedure-related complications were rare and included a major bleeding due to laceration of the brachiocephalic trunk requiring emergency surgery as well as a severe bleeding from a thyroid vessel in group 1 and a device failure as well as a pneumothorax in group 2. There were no procedure-related deaths or other major morbidities.

CONCLUSIONS. Perioperative complications during and after PDT in cardiothoracic patients are rare when performed by residents/fellows in training. However, a standardized approach including bronchoscopic guidance during the entire procedure as well as performance under supervision of an experienced intensivist is necessary.

0611

THE ELECTROLARYNX IMPROVES COMMUNICATION IN A SELECTED GROUP OF MECHANICALLY VENTILATED CRITICALLY ILL PATIENTS: A CASE SERIES

P.R. Tuinman¹, S. ten Hoon¹, P.W. Elbers¹, A.R. Girbes¹, REVIVE, Research VUmc Intensive Care

¹Free University Medical Center, Intensive Care, Amsterdam, Netherlands

INTRODUCTION. Critical care professionals who manage ventilator dependent patients often experience difficulties with one of the most basic human functions, namely communication. Patients with endotracheal tubes cannot communicate verbally because of the placement of the tube and inflation of the cuff, which prevents passage of air through the vocal cords, leading to stress and frustration, among others. The electrolarynx (EL) is an oscillating device commonly used in voice rehabilitation after surgical removal of the entire larynx. Recently we presented the first case of the successful use of the EL in an orally intubated patient (1).

OBJECTIVES. We hypothesized that the use of an EL improves communication for awake intubated or tracheostomized critically ill patients on the mechanical ventilator.

METHODS. In a case-series of 10 awake and mechanically ventilated patients in a mixed medical surgical tertiary intensive care unit, the use of the EL was tested. Patients were briefly instructed before use of the EL. Means are given with standard deviation (SD).

RESULTS. The mean age of patients included was 56 (16) years old and half of patients were male. Seven medical and three surgical patients were included. The mean APACHE II score was 24 (5). All patients were ventilated with a pressure support mode, with a mean positive end-expiratory pressure of 6 (2) and pressure support of 10 (6) cm H₂O. All patients were orally intubated, except one who was tracheostomized. In five out of ten patients the EL clearly enhanced communication. Three out of this five could make clear sentences using the EL, where the other two could produce clearly audible words. In one additional patient lip reading was improved by making some sounds using the EL. Higher levels of ICU-acquired weakness and sedation seems to be correlated with unsuccessful use of the EL.

CONCLUSIONS. The use of an electrolarynx improved communication in a selected group of mechanically ventilated critically ill patients. These results suggest further research into this approach.

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0612

INDICATIONS AND COMPLICATIONS OF TRACHEOSTOMY IN INTENSIVE CARE UNIT

A. Pavalascu¹, M.J. Ayala Vargas¹, A. Cuadrado Astray¹, J. Cánovas Robles¹, L. Rosado Bretón¹

¹Alicante University General Hospital, ICU, Alicante, Spain

INTRODUCTION: The tracheostomy is one of the more commonly performed procedures in the ICU to prevent the sequel of prolonged intubation and to facilitate the weaning from mechanical ventilation.

OBJECTIVE. To determine the indications, complications and evolution of those patients in which the tracheostomy is performed.

METHODS. A retrospective, descriptive study for 5 years (2008-2012) of patients admitted to the ICU at the Alicante University General Hospital. The patients included were those aged over 18 years who required elective tracheostomy. Clinical status at admission, reason for needing a tracheostomy, postoperative complications and the situation at discharge were recorded. The categorical variables were expressed as absolute values and percentages and quantitative variables as mean and standard deviations.

RESULTS. A total of 354 patients (70 % males). The average age was 56 ± 17 years. The most frequent pathology that motivates ICU admission and the need for tracheostomy in our series of patients was neurological/severe TBI (48 %), multiple trauma (no severe TBI) (20 %), respiratory (10.7 %), followed by hemodynamic shock (no septic) and septic shock. The APACHE II at admission was 20.5 ± 7 points. The most common cause that motivates the need of tracheostomy was prolonged intubation (> 14 days) in 135 of patients (38.7 %), decreased consciousness level (29.4 %), followed by difficult weaning from mechanical ventilation,

reintubation, facial trauma and difficult intubation. Percutaneous tracheostomy is performed in 156 patients (44 %). The average intubation period until the performing of the tracheostomy was 10 ± 4 days. Early complications (<1 week) were recorded in 3 patients and late in 11 (the most frequent being hemorrhage in 4 cases). The mean ICU stay was 28.7 ± 19 days. 73.4 % of the patients were discharged from the ICU. 37.8 % of them were decannulated during the ICU stay. The distribution of patients decannulated by admission diagnosis was 44.7 % for respiratory illness, 23 % neurological/severe TBI, 42.8 % septic and 28.5 % trauma patients. The average period from the tracheostomy until decannulation was 19.2 ± 11.6 days, higher in septic patients (26.5 ± 11.6 days) and lower in the neurological ones (15.3 ± 8 days). 5 % of the patients were discharged to another hospital. The mortality during the ICU stay was 20 %.

CONCLUSIONS. The most common indication for performing tracheostomy is the need of prolonged mechanical ventilation, followed by inadequate level of consciousness. A reduced rate of perioperative complications was recorded, the most frequent was the bleeding. The decannulation during the ICU stay was more common in patients admitted for respiratory disease. The delay between tracheostomy and decannulation was lower in neurological/severe TBI patients. Most patients who required a tracheostomy needed a permanent one beyond discharge from the ICU.

0613

PROSPECTIVE CASE SERIES STUDY ON 300 PATIENTS UNDERWENT GRIGGS PERCUTANEOUS TRACHEOSTOMY, WITHOUT BRONCHOSCOPIC GUIDANCE IN A TERTIARY ICU

S. Pattnaik¹, B. Ray²

¹Apollo Hospitals, Critical Care Unit, Bhubaneswar, India, ²Apollo Hospitals, Bhubaneswar, India

INTRODUCTION. Percutaneous tracheostomy (PCT) is being increasingly done for critical care unit patients requiring either prolonged ventilation or for airway protection in many hospitals by intensivists at the bedside. All the techniques recommend use of bronchoscopic guidance, but for logistic reasons and ventilation issues it is not possible always. We share our experience of PCT without bronchoscopic guidance and by withdrawing of endotracheal tube looking at expired tidal volume on ventilator and by ensuring the free mobility of the guide wire during each step of the procedure, a safe placement of the tracheostomy tube was achieved.

OBJECTIVES. The purposes of this study are to evaluate the safety and complications related to PCT without bronchoscopic guidance and discuss the pros and cons of this technique in the intensive care unit of our hospital.

METHODS. We conducted a prospective study of consecutive PCTs performed at Apollo Hospitals, Bhubaneswar between August 2010 and December 2013. Demographic information, indications of PCT, time required to perform the procedure, procedural and postoperative (early and late) complications, weaning from ventilator and tracheostomy tube were noted.

RESULTS. 300 PCTs were performed on intensive care unit patients during this time period (85 % men; mean age 64 ± 17.4 years; 60 % neuroscience cases). PCT done with a median of 7 days (range 1-15 days) endotracheal tube. The operating time (from skin incision to placement of the tracheostomy tube inside the airway) was 4.7 min (range 2.5 - 8 min). Ventilator weaned off in mean of 9.7 days (range 0-38 days). Decannulation of tracheostomy tube was done successfully in 77(32 %) patients with mean of 15.4 days (range 4-36 days). All the cases were successfully done without the use of fiberoptic bronchoscope in the first attempt. Complications occurred in 21 (8 %) patients. Early complications included accidental extubation during procedure (n = 6) puncturing of ET pressure cuff (n = 15), bleeding requiring intervention (n = 8). There were no late complications observed and no deaths related to PCT.

CONCLUSIONS. Looking at the expired tidal volume on ventilator, pulling endotracheal tube with partially inflated cuff and ensuring free movement of guide wire back and forth at each step, PCT can be done safely without the use of bronchoscope.

0614

CHARACTERIZATION AND OUTCOME OF PATIENTS THAT REQUIRED TRACHEOSTOMY IN A MEDICAL ICU

C. Hernandez¹, O. Rodriguez¹, C. Gomez¹, M. Rinaudo¹, N. Cobos¹, P. Castro¹

¹Hospital Clinic de Barcelona, Barcelona, Spain

INTRODUCTION. Tracheostomy is a frequent procedure in critical patients under mechanical ventilation. ICU-mortality among these patients is high.

OBJECTIVES. We aim to evaluate the characteristics of patients that required a tracheostomy in a medical intensive care unit and their outcome.

METHODS. A 3-year retrospective observational study of patients admitted to a medical ICU who underwent tracheostomy. Patients who had a tracheostomy for ear, nose and throat pathologies were excluded. The primary outcome was in-hospital mortality.

RESULTS. During the study period, 143 patients underwent tracheostomy, the mean age was 61.2 ± 15.4 years and 58 % were male. On admission, the mean APACHE II was 22.6 ± 6.04 and SOFA was 8.1 ± 3.3 . Prolonged weaning was the main indication of tracheostomy (74.8 %). The tracheostomy was performed at 6.9 ± 6.3 days and 9.6 ± 4.2 days of tracheal intubation, in patients with neurologic impairment and with prolonged weaning, respectively. The mean length of stay (LOS) in ICU was 25.2 days and 54.1 days in hospital ward. The ICU-mortality was 30.1 % (43/143) and ward-mortality after ICU discharge was 27 % (27/100). Only one patient was decannulated in the ICU and 28.4 % patients (20/73) were discharged from hospital with tracheostomy. The time to decannulation was 36.6 (SD 25) days (data only available for 46 patients). We look for factors associated with mortality. Hematological patients had a higher mortality. No differences in mortality were observed according with time of realization of tracheostomy. Patients with lower glasgow had greater mortality, but this association disappeared when Do-not-resuscitate orders (DNRO) were analysed. No differences in mortality were related to the place of discharge after ICU stay (semi-critical vs general ward).

CONCLUSIONS. Patients requiring tracheostomy have long ICU-LOS and hospital-LOS. Their mortality still remains high. A low glasgow score at ICU discharge is not associated with mortality.

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0615

PRE-INTUBATION RESUSCITATION BY CANADIAN PHYSICIANS: RESULTS OF A NATIONAL SURVEY

R.S. Green¹, D.A. Fergusson², A.F. Turgeon³, L.A. McIntyre⁴, G. Kovacs⁵, D. Griesdale⁶, M.B. Büttler⁷

¹Nova Scotia Trauma Program, QEII Health Sciences Centre, Dalhousie University, Departments of Emergency Medicine and Anesthesia, Division of Critical Care Medicine, Halifax, Canada, ²University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Clinical Epidemiology, Ottawa, Canada, ³CHU de Québec Research Center, Hôpital de L'Enfant-Jésus, Université Laval, Department of Anesthesiology, Division of Critical Care Medicine, Québec, Canada, ⁴University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Critical Care Medicine, Ottawa, Canada, ⁵Dalhousie University, Department of Emergency Medicine, Halifax, Canada, ⁶Vancouver General Hospital, University of British Columbia, Department of Anesthesia, Pharmacology and Therapeutics, Department of Medicine, Division of Critical Care Medicine, Vancouver, Canada, ⁷Dalhousie University, Department of Anesthesia, Division of Critical Care Medicine, Halifax, Canada

INTRODUCTION. Respiratory failure in critically ill patients is a common problem in emergency medicine (EM) and critical care medicine (CCM). However, little is known about the resuscitation of patients prior to intubation.

OBJECTIVES. To describe the pre-intubation resuscitation practices including vascular access, fluid administration and vasopressor use by EM and CCM physicians before emergent endotracheal intubation.

METHODS. A clinical scenario-based survey was developed by the investigative team. Respondents were presented three scenarios (trauma, sepsis, heart failure) and asked to indicate their preferred choices of vascular access, pre-intubation fluid resuscitation, and the use of vasopressor medications for intubation using a 5-point scale ranging from "always" to "never". The survey was tested for content validity and retest reliability by members of the Canadian Critical Care Trials Group, and distributed in web-based and postal formats to all members of the Canadian Association of Emergency Physicians and the Canadian Critical Care Society.

RESULTS. Overall, 882 (50.2 %) of 1758 physicians completed the survey. The route most physicians selected "always/often" to establish vascular access in all three scenarios was using multiple peripheral IVs (avg 77.1 %, range 68.2-93.3 %), followed by the use of a single peripheral IV (avg 68.3 %, range 48.2-78.6 %). Most physicians responded they would "never/rarely" insert an arterial catheter (avg 81.5 %, range 79.1-82.8 %) and "never/rarely" insert a central line (avg 63.0 %, range 53.8-67.1 %).

On average, 25.6 % of physicians responded they would "always/often" administer fluid prior to intubation in the three EETI scenarios. When administered, the most common pre-intubation fluid of choice ("always/often") in all three scenarios was a crystalloid bolus (1740/79.8 %) of 500-999 ml. Only 5.2 % of respondents indicated they would "always/often" utilize a vasopressor prior to intubation, with 83.6 % of physicians indicating they would "never/rarely" administer a vasopressor pre-intubation.

When assessed by physician specialty, CCM physicians were more likely to "always/often" administer a vasopressor prior to intubation (OR = 2.23; CI: {1.91, 2.61}; P < 0.001) compared to EM physicians. While most physicians indicated vasopressor administration via a peripheral IV was preferable, EM practitioners preferred the administration of vasopressors via central access (OR = 3.44; CI: {1.87, 6.55}; P < 0.001).

CONCLUSIONS. In this scenario-based survey, pre-intubation resuscitation with intravenous fluids and vasopressor medications was uncommon. Resuscitation practices varied between EM and CCM physicians. Further investigation on the utility of pre-intubation resuscitation is warranted.

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Risk factors of AKI & outcome: 0617-0628A

0617

A PROSPECTIVE STUDY TO EXAMINE THE TIMING AND ACCURACY OF NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN IN PREDICTING ACUTE KIDNEY INJURY IN HIGH RISK CARDIAC SURGICAL PATIENTS

N. Fanning¹, S. Galvin¹, R. Parke¹, R. Bellomo², S. McGuinness¹

¹Auckland City Hospital, Dept of Cardiovascular Anaesthesia and Intensive Care, Auckland, New Zealand, ²Monash University, Department of Intensive Care, Melbourne, Australia

INTRODUCTION. Cardiac surgery using cardiopulmonary bypass (CPB) is one of the commonest major surgical procedures worldwide. Cardiac Surgery Associated - Acute Kidney Injury (CSA-AKI) is a common and serious complication, affecting 25-50 % of patients and associated with increased morbidity and mortality. Multiple interventions have proved unsuccessful in the treatment of CSA-AKI, due in part to the lack of real time sensitive and specific biomarkers which would allow the early diagnosis of CSA-AKI. Neutrophil Gelatinase-Associated Lipocalin (NGAL) has been identified as an early marker of AKI. However multiple timings of NGAL measurement are used, thus creating effective modifiers of NGALs usefulness as a biomarker.

OBJECTIVES. We proposed to measure serum and urine NGAL at baseline and multiple regular time-points thereafter, correlating these results with the patient's Kidney Disease Improving Global Outcomes (KDIGO) stage of AKI, to determine the optimal sampling time for diagnosis of CSA-AKI and to assess the diagnostic ability of NGAL to predict CSA-AKI.

METHODS. Following ethical approval, 50 consenting patients undergoing cardiac surgery with CPB who had normal renal function, but with at least one risk factor for renal failure, were enrolled in the study. Serum and urine samples were taken at baseline, and then hourly for 12 h following initiation of CPB, 2 hourly from 12-18 h and at 24 and 48 h post CPB, giving 18 serum and urine samples per patient. Standard demographic and outcome data was recorded, along with development of AKI by KDIGO classification.

Data was analysed using standard descriptive statistics and the area under the curve of the receiver operator characteristic plotted to assess diagnostic ability.

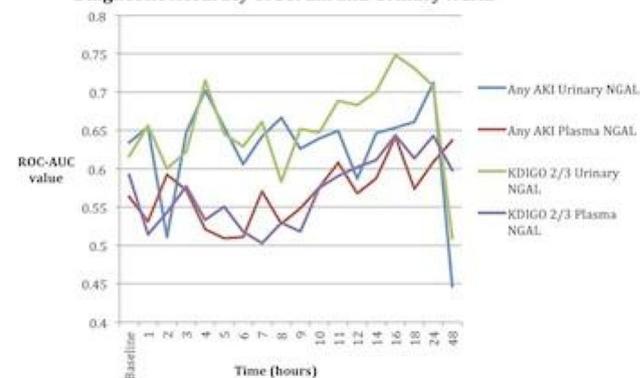
RESULTS. 31/50 patients (62 %) developed CSA-AKI. (KDIGO Stage 1 = 52 %, Stage 2 = 42 %, Stage 3 = 6 %). Urinary NGAL (uNGAL) performed slightly better than serum NGAL (sNGAL) at predicting CSA-AKI though overall performance was disappointing. Sampling at 4 h and then at 16-24 h gave the optimal ROC-AUC values which were only fair predictors of CSA-AKI. Performance was not improved in more severe KDIGO 2 and 3 AKI, or when separating the creatinine and urine components of the KDIGO classification. Absolute values of NGAL were a more accurate predictor of AKI than change in NGAL

CONCLUSIONS. This study demonstrates that NGAL is a fair predictor of the development of CSA-AKI. Urinary NGAL was slightly superior to serum NGAL in predicting CSA-AKI, while change in NGAL was not a good predictor. The optimal time point for sampling was at 4 h post initiation of CPB and then at 16-24 h post initiation of CPB.

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Diagnostic Accuracy of Serum and Urinary NGAL



[Diagnostic accuracy of urine and serum NGAL]

0618

INFLUENCE OF POSTOPERATIVE ACUTE KIDNEY INJURY ON LONG-TERM OUTCOME IN CARDIAC SURGERY PATIENTS WITH NORMAL PREOPERATIVE RENAL FUNCTION. A RISK FACTOR ANALYSIS

M. Riera¹, J. Ibañez¹, R. Amézaga¹, M. Molina¹, M. Rodríguez¹, J.P. Martín¹, L. Vidal², O. Bonñin²

¹Intensive Care Unit, Son Espases University Hospital, Palma de Mallorca, Spain, ²Cardiac Surgery Department, Son Espases University Hospital, Palma de Mallorca, Spain

INTRODUCTION. Acute kidney injury (AKI) after cardiac surgery is associated with poor outcome.

OBJECTIVES. Because preoperative chronic renal dysfunction may confound the interpretation of risk factors of AKI, we studied outcome and risk factors for postoperative AKI and their impact on long-term survival in patients with normal preoperative renal function.

METHODS. We included 1,921 patients operated of cardiac surgery between January 2003 and December 2009. AKI was defined according to AKIN criteria. Pre-operative and postoperative variables usually measured in cardiac surgery were recorded. Multiple logistic regression analysis was used to find predictors of postoperative AKI. The relationship between AKI and long-term survival was analyzed with Kaplan-Meier survival estimates and a risk-adjusted Cox proportional regression model for patients discharge alive from hospital.

RESULTS. AKI was diagnosed in 306 patients (16 %). AKI patients had a 30-day mortality rate significantly higher (4.3 % vs 0.3 %, p < 0.0001) than those without it and a longer length of hospital stay (median 14 vs 10 days, p < 0.0001). Regression analysis showed that urgent surgery, extracorporeal circulation time greater than 90 min, the need of vasoactive drugs and red blood cell transfusion were strong predictors of AKI. Five-year survival rate was as follows: AKI patients 85 % and without it 95 % (p < 0.0001). The Cox model showed that, after adjusting for confounding factors, AKI patients (hazard ratio = 2.12, 95 % CI: 1.46 - 3.09) had a poorer long-term survival.

CONCLUSIONS. AKI is a frequent complication after cardiac surgery in patients with a normal preoperative renal function and is associated with increased 30-day mortality and reduced long-term survival. The development of AKI was associated mainly with perioperative variables.

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0619

FLUID BALANCE AND BIOMARKERS OF ACUTE KIDNEY INJURY

A. Artigas¹, I. Martín-Loeches¹, A. Navas¹, K. Kianoush², L.S. Shawla³, C. Vinsonneau⁴, J.A. Kellum⁵

¹Sabadell Hospital, Critical Care, CIBERES, Sabadell, Spain, ²Mayo Clinic, Division of Pulmonary and Critical Care Medicine, Rochester, United States, ³George Washington University Medical Center, Department of Anesthesiology and Critical Care Medicine, Washington, United States, ⁴Hospital Marc Jacquet, Department of Intensive Care Medicine, Melun, France, ⁵University of Pittsburgh, Department of Critical Care Medicine, Pittsburgh, United States

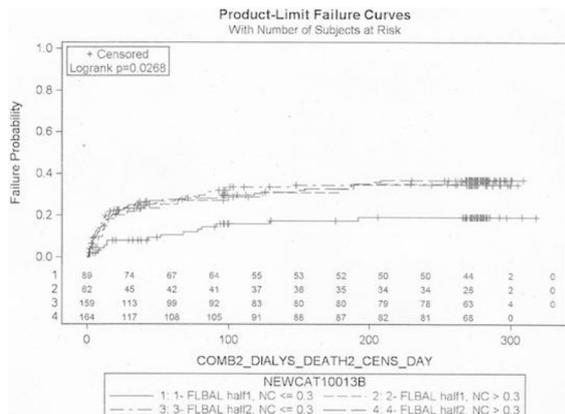
INTRODUCTION. Positive fluid balance with or without acute kidney injury (AKI) is known to be associated with adverse outcomes for critically ill patients. We recently reported a multi-center study (Sapphire) where a biomarker combination of tissue inhibitor of metalloproteinases 2 (TIMP2) and insulin like growth factor binding protein 7 (IGFBP7) were validated for risk stratification for AKI (*Critical Care* 2013;17:R25). Therefore, we conducted the following analysis to investigate the relative contributions of day 1 biomarker results and fluid balance on 9-month outcomes.

METHODS. We stratified 474 patients with complete data based on the median fluid balance and by [TIMP-2]/[IGFBP7] value greater than 0.3 (ng/mL)²/1000 (Am J Respir Crit Care Med 2014, Feb 21). We examined the rates of death or dialysis for 4 groups: low fluid

balance/negative biomarker, high fluid balance/negative biomarker, low fluid balance/positive biomarker, and high fluid balance/high biomarker. We compared the four groups using the log rank test.

RESULTS. The group with low fluid balance and negative biomarker had the lowest rate of death or dialysis. All of the three other groups had similar results with rates of death or dialysis approximately twice as great as the baseline group, $p = 0.027$ (Figure 1).

CONCLUSIONS. Patients with a positive [TIMP-2]-[IGFBP7] test result were at increased risk of death or dialysis over 9 months, similar to those with positive fluid balance within the first day. Patients that were biomarker negative and below the median for fluid balance on day 1 had the best outcomes.



[Figure 1]

0620

INCIDENCE AND RISK FACTORS IN SEPTIC RELATED ACUTE KIDNEY INJURY

N. Betancour-Zambrano¹, V. Gumucio Sanguino¹, J. Sabater-Riera¹, G. Moreno Gonzalez¹, V. Corral Velez¹, P. Cardenas Campos¹, J. Ballus Noguera¹, J.M. Vazquez Reveron¹, M. Huguet Briva¹, E. Santafosta Gomez¹, X. Perez¹

¹Bellvitge University Hospital, Critical Care, Barcelona, Spain

INTRODUCTION. Acute kidney injury (AKI) is a predictor of mortality in ICU patients admitted with severe sepsis.

OBJECTIVES. Evaluate AKI incidence and mortality in severe sepsis patients and identify AKI risk factors.

METHODOLOGY. Retrospective, observational study in a cohort of 285 patients with severe sepsis whom required ICU admission in a tertiary centre. Excluded all those patients with advanced chronic kidney disease (CKD 4-5). 253 patients were finally included in the overall analysis to identify risk factors for Septic AKI and evaluate AKI associated mortality. We evaluated AKI associated risk factors using univariate analysis with T-student test for quantitative variables and Chi square test for categorical variables. Independent risk factors for developing septic AKI were identified using a binary regression multivariate model. Variables introduced in this model were those with clinical or statistical significance in the previous univariate analysis. We finally considered statistically significant those variables with $P < 0.05$.

RESULTS. Mean age was 59 ± 15 years, with mean baseline creatinine of 80 ± 27 $\mu\text{mol/l}$. Mean APACHE II score at ICU admission was 22 ± 8 and 67 % presented septic shock. Male gender 69.6 %. Global mortality at 90 days was 45.8 %. Septic AKI incidence was 41.5 % and mortality related to septic AKI was 56.2 % vs 38.5 % in septic patients with no AKI. Patients with normal glycemia (74 -150 mg/dl) within the first 24 h developed septic AKI in 36 % vs 46 % and high levels of glucose in 45 %. Risk factors for septic AKI: Univariate analysis identified Age, APACHEII, low albumin, low bicarbonate, shock presence, and an initial (24 h) uncontrolled glucose levels as risk factors for septic AKI. However after performing multivariate analysis only Age $p = 0.77$ OR 1.027 (0.997-1.058), APACHE II $p < 0.002$ OR 1.080 (1.029-1.134), Albumin $p < 0.033$ OR 0.943 (0.922-1.051), and Shock $p < 0.015$ OR 2.907 (1.231-6.862) were identified as independent risk factors for septic AKI. We didn't find association between septic AKI incidence and baseline creatinine, time from sepsis to antibiotic, or correct haemodynamic resuscitation.

CONCLUSIONS.

- High AKI incidence in critically ill septic patients.
- The presence of AKI in septic patients increases mortality.
- Septic AKI risk factors were identified: age, APACHE II, albumin at ICU admission, and the presence of shock are independently associated with the presence of Septic AKI.
- We did not find association between septic AKI and baseline creatinine, time from sepsis to antibiotic or early goal hemodynamic resuscitation.

0621

LONG-TERM OUTCOME IN PATIENTS WITH ACUTE KIDNEY DYSFUNCTION AT ICU ADMISSION

G. Sellar-Perez¹, M.E. Herrera-Gutierrez¹, E. Banderas-Bravo¹, D. Arias-Verdu¹, C. Joya-Montoya¹, C. Matinez-Gonzalez¹, I. De-Dios-Chacon¹, G. Quesada-Garcia¹

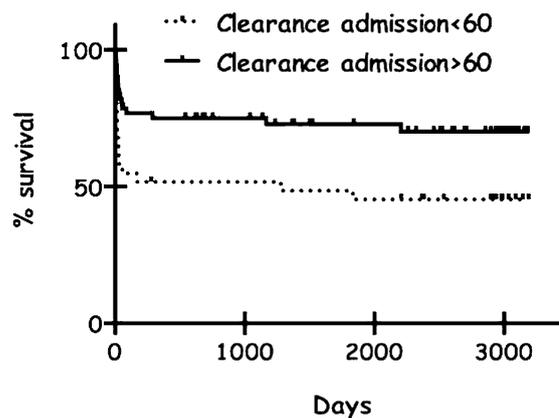
¹Carlos Haya University Hospital, ICU, Malaga, Spain, ²Son Llatzer, ICU, Palma de Mallorca, Spain

OBJECTIVES. To define the impact of kidney dysfunction at ICU admission on survival and renal outcome.

METHODS. Long-term (8 years) follow-up of a cohort of patients enrolled in a prospective study that comprised evaluation of kidney function (measured creatinine clearance) at ICU admission. After 8 years we evaluated kidney function (serum creatinine and Cockcroft-Gault), need for replacement therapy and survival. Among 109 patients included, 17.4 % were lost for long-term follow-up and the rest were included in the survival analysis. In 46

patients we found reliable data for renal function and were analysed for long-term renal prognosis. Data are presented as median (interquartile interval). We performed a Kaplan-Meier, Log-Rank and Cox proportional risks analysis with a significance level of 95 %. **RESULTS.** 109 patients (66.1 % males, 25.7 % trauma, 11.9 % sepsis, 16.5 % cardiac surgery, 11 % emergency surgery). In 31 % we detected AKI at admission (creatinine clearance < 60). During ICU stay 31.2 % developed overt AKI (AKIN ≥ 1). CRRT was needed in 3.7 %. Overall survival was 60 % (mortality in ICU 23.3 %, in ward 10 % and after discharge 6.7 %). Median survival for those with clearance > 60 were 2248 (1884-2611) days against 1506 (976-2036) when < 60 ($p = 0.019$) (Kaplan-Meier graph in Fig 1).

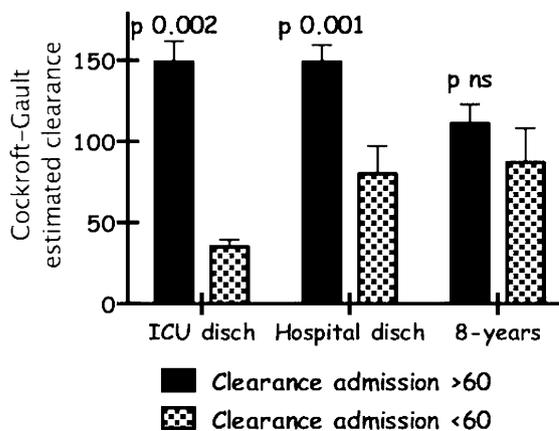
Figura 1.- 8 years survival



[Figure 1]

with a RR of 1.84 (0.93-3.6) ($p = 0.083$). These comparisons were not significant when different AKIN stages were analysed. Changes in estimated kidney function in Fig 2.

Figure 2



[Figure 2]

CONCLUSIONS. Kidney dysfunction at ICU admission marks a group of patients with worse renal and survival outcome. The negative impact on kidney function seems to be maintained for a long time after discharge.

0622

THE PRESENCE OF PRE-OPERATIVE AKI INCREASES THE RISK OF MORBIDITY AFTER PEDIATRIC CARDIAC SURGERY

H. Bangalore¹, P. Checchia¹, E. Ocampo², H. Jeffrey³, L. Shekerdemian¹, A. Akiran⁴

¹Texas Children's Hospital, Baylor College of Medicine, Pediatric Critical Care, Houston, United States, ²Texas Children's Hospital, Baylor College of Medicine, Pediatric Cardiology, Houston, United States, ³Texas Children's Hospital, Baylor College of Medicine, Congenital Heart Surgery, Houston, United States, ⁴Texas Children's Hospital, Baylor College of Medicine, Pediatric Critical Care and Nephrology, Houston, United States

INTRODUCTION. Post-operative acute kidney injury (AKI) is associated with increased morbidity and mortality after surgery for congenital heart disease (CHD). However the impact of preoperative AKI on clinical outcomes is not well known.

OBJECTIVES. We hypothesized that in patients with post-operative AKI after cardiac surgery, the presence of pre-operative AKI would increase the risk of an adverse outcome.

METHODS. Patients aged 1 month - 18 years who had cardiac surgery with cardiopulmonary bypass (CPB) between 2009-2011 were included in the study. The lowest and the highest creatinine during the week prior to the surgery and the highest creatinine one week after surgery were collected, and were used to calculate eGFR (estimated glomerular filtration rate). AKI was defined according to the modified pRIFLE criteria.

The study population consisted of four groups. Group 1: Those without pre or post-operative AKI; Group 2: Pre-operative AKI only; Group 3: Post-operative AKI only and Group 4: both pre-operative and post-operative AKI. The association between AKI and short term

clinical outcomes defined by the length of ventilation, duration of Cardiovascular Intensive Care Unit (CVICU) stay and duration of hospital stay were studied.

RESULTS. There were 860 children in the study population: 338 (39.3 %) in Group 1; 6 (6.9 %) in Group 2; 427 (49.7 %) in Group 3; 35 (4.06 %) in Group 4. The majority of the patients in Group 2-48(80 %) and Group 3-200(46.8 %) were classified as pRIFLE category of "Risk". In Group 4, preoperatively 30(85.7 %) had "Risk" category AKI but postoperatively, 26(74.2 %) had "Failure" category AKI.

The median Length of Ventilation Group 1, 2, 3 and 4 were 0.54 (0, 0.97); 0.8(0.22, 2.15); 1.85(0.78, 4.01) and 4.7(3.1, 10.85) days respectively. ($p < 0.0001$). Similarly the length of CVICU stay were 1.85(1.05, 3.7); 2.81(1.76, 4.84); 4.63(2.01, 7.83) and 8.92(5.65, 19.57) days. ($p < 0.0001$) The hospital length of stay were 6(4, 10); 8(5, 21); 11(6, 21) and 31.5(8.5, 49). ($p < 0.0001$). Using multivariate analysis and adjusting for age, BSA, RACHS-1 category, gender, perfusion and cross clamp time, presence of combined pre and post-operative AKI was independently associated with an increased length of ventilation, length of CVICU and hospital and stay. ($p < 0.0001$).

CONCLUSION. While post-operative AKI is the focus of much investigation, our results implicate a much greater impact on morbidity of preoperative AKI in association with postoperative AKI. These findings may result in a more focused approach to interventional therapies in this at risk population.

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0623

GENERAL OUTCOMES IN ELDERLY PATIENTS WITH ACUTE KIDNEY INJURY AND RENAL SUPPORT

J.E. Echeverri^{1,2}, L.M. Galindo³, A.M. Pardo³, R. Heredia³, J. Cardenas-Roldan⁴, M.A. Huerfano⁵

¹Central Military Hospital - RTS, Nephrology, Bogota, Colombia, ²Nueva Granada Military University, Bogota, Colombia, ³Javeriana University, Bogota, Colombia, ⁴Renal Therapy Service, Bogota, Colombia, ⁵Renal Therapy Service, Nephrology, Bogota, Colombia

INTRODUCTION. Although, a higher age is hypothesized to be a risk factor for mortality, the clinical characteristics and outcomes of older individuals with a need for RRT are not well known.

OBJECTIVE. We set out to describe the clinical features and outcomes of patients aged 65 years or more requiring acute renal replacement therapy in the ICU between January 2009 and December 2012

METHODS. This is an observational study performed on a cohort of 90 critical elderly patients with AKI and acute RRT requirement during ICU stay. Primary outcome was mortality at 3 months and secondary outcomes was dialysis dependence. Bivariate analyses were done and significant associations, as well as clinically relevant variables, were included in the multivariate logistic regression.

RESULTS. Hereby, we present the data of a cohort of 90 elderly subjects with RRT need in an ICU setting. 60 individuals (67 %) were male, and had a mean of 73.4 years (SD \pm 6.19). Sepsis was the primary ICU admission diagnosis (55.6 %), followed by cardiogenic shock (15.5 %) and ventilatory disorders (12.2 %). Mean APACHE II score at 24 h of ICU admission was 26 (SD 4.96). At time of initiation of renal support, 83 % required mechanical ventilation and 63 % vasoactive drugs. Main causes of renal failure were sepsis 55.6 % followed by hypovolemic shock 22.2 %, cardiogenic shock 14.4 %, 70 % of patients had oliguria, anuria or fluid overload as an indication of renal support. The median days of hospital stay was 22.5 days (IQR 10.7), ICU median stay was 10 days (IQR 10.9d), time between AKI diagnosis and dialysis was 2 days (IQR 33d) and time on ventilator 11 days (IQR 9.0d). Global mortality was 55.8 % and general dialysis dependence was 9 %. In the bivariate analysis ever use of tobacco (OR 1.2, $p = 0.047$), the presence of COPD (OR 3.7, $p = 0.012$), the need for mechanical ventilation (OR 12, $p < 0.001$), hypovolemic shock (OR 4.2, $p = 0.02$) and the development of sepsis within 10 days after starting RRT (OR 3.0, $p = 0.019$) were significantly associated with mortality. In the multivariate logistic regression age, gender, BMI, hypovolemic shock and infection within 10 days after RRT initiation were not significantly associated with mortality. The significant association found between COPD and mechanical ventilation was maintained (OR 5.8, $p = 0.007$; OR 14 $p = 0.003$). For chronic dialysis requirement, in the multivariate logistic regression no variable was significantly associated. However, a trend was observed for the presence of type2 diabetes mellitus, and the days in UCI stay (OR 22.8, $p = 0.067$; OR 1.12, $p = 0.065$).

CONCLUSIONS. In elderly patients with a need for RRT in an ICU setting, age was not associated with a higher mortality or the need for a requirement of dialysis after hospital discharge. Nevertheless, adjusted for ages, gender and other clinically significant variables, history of COPD and the need of mechanical ventilation were significantly associated with mortality

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0624

EVALUATION OF AKI IN POST-LIVER TRANSPLANTATION PATIENTS USING THE RIFLE AND AKIN CRITERIA

A. Karapanagiotou¹, C. Kydonia¹, S. Papadopoulos¹, C. Dimitriadis², M. Piperidou¹, M. Passakiotiou¹, N. Gritsi-Gerogianni¹

¹Hippokraton General Hospital, Intensive Care Unit, Thessaloniki, Greece, ²Hippokraton General Hospital, Department of Nephrology, Thessaloniki, Greece

INTRODUCTION. Acute Kidney Injury (AKI) is presented quite often after orthotopic liver transplantation (OLT). Two sets of criteria are applied to define AKI in critically ill patients, these are the RIFLE criteria (2004) and the revised AKIN (2007).

OBJECTIVES. The aim of this study is to evaluate renal dysfunction after OLT using the above criteria along with patients mortality in 30 and 180 days.

METHODS. We evaluated retrospectively the records of patients with OLT from 1/1/2011 to 31/12/2012. We recorded the incidence of AKI, as defined by the RIFLE and AKIN criteria and documented the demographic data, the preoperative MELD score, as well as APACHE II and SOFA scores upon ICU admission. We also recorded the duration of mechanical ventilation, the length of ICU stay and finally the 30- and 180-day survival.

RESULTS. We studied 71 patients with OLT, with a mean age of 51.78 \pm 10.36 years. Acute kidney injury (AKI) according to the RIFLE classification was detected in 39.4 % of the studied patients (Risk:11.3 %, Injury:15.5 %, Failure:11.3 %). The group of patients with AKI had statistically higher MELD and MELD-Na scores ($p = 0.037$ and $p = 0.039$

respectively) and higher APACHE II score ($p = 0.037$). AKI was also associated with significantly prolonged mechanical ventilation ($p = 0.002$) and length of ICU stay ($p = 0.006$). Both short and long-term survival decreased significantly with and proportionally to the progression of renal impairment by RIFLE stages. However, there was not any difference in patients' survival between stages Injury and Failure ($p = 0.301$) (Table 1). Applying the AKIN criteria, the frequency of AKI rose up to 52.1 % (Stage I:22.5 %, Stage II:7 %, Stage III: 22.55 %). Patients with AKI had significantly higher MELD and MELD-Na scores ($p = 0.027$ and $p = 0.023$ respectively), as well as APACHE II score ($p = 0.038$). Duration of mechanical ventilation and length of ICU stay were statistically higher. Thirty day mortality was significantly different between stages I and II ($p = 0.001$), stage II and III ($p = 0.001$) but not among the patients with no AKI and patients in Stage I ($p = 0.145$) while long-term mortality increased significantly, in each AKIN stage (Table 1).

RIFLE	Non-AKI	Risk	Injury	Failure
n%	60.57	11.3	15.5	11.3
30-day survival	95.5%	75%	63.6%	62.5%
180-day survival	88.6%	65%	36.5%	37.5%
AKIN	Non-AKI	Stage I	Stage II	Stage III
n%	47.9	22.5	7	22.5
30-day survival	100%	93.8%	80%	63.6%
180-day survival	97.1%	75%	60%	31.5%

[Table 1: Outcome variables in renal impairment (RI)]

CONCLUSIONS. AKI classifications according to the RIFLE and AKIN criteria aim to help recognizing and classifying the severity of renal dysfunction, in patients after OLT whereas they are also associated with higher mortality, which rises proportionally to the severity of renal disease. Our data showed a 12.7 % difference in the incidence of AKI between the two classifications as well as in patients stratification in the different stages of the above sets of criteria.

0625

PULSATILE FLOW DURING CARDIO-PULMONARY BYPASS AND POST OPERATIVE ACUTE KIDNEY INJURY

A. Schneider^{1,2}, B. Marino³, M. Bailey⁴, R. Bellomo^{2,4}

¹CHUV, Service de Médecine Intensive Adulte, Lausanne, Switzerland, ²Austin Health, Intensive Care Unit, Heidelberg, Australia, ³Austin Health, Department of Cardiothoracic Surgery, Heidelberg, Australia, ⁴Monash University, Australian and New Zealand Intensive Care Research Centre, Melbourne, Australia

INTRODUCTION. Application of a pulsatile flow during cardio-pulmonary bypass (CPB) might reduce the incidence of acute kidney injury after cardiac surgery (CS-AKI) [1-2].

OBJECTIVE. To determine whether the application of a pulsatile flow during CPB is associated with improved clinical outcomes in patients undergoing cardiac procedures associated with low to medium risk of complications.

METHODS. All consecutive patients who required CPB for a cardiac procedure associated with low to medium risk of post-operative complications at our institution between June 2008 and August 2012 were included in the study. The decision to apply pulsatile flow was left to the judgment of the perfusionist in agreement with the surgeon. Data were collected prospectively and analysed retrospectively. Outcomes of pulsatile flow patients were compared to non-pulsatile flow patients. Primary outcome measure included CS-AKI as defined by the risk-injury-failure-loss-end stage kidney disease (RIFLE) classification, need for renal replacement therapy (RRT) and in-hospital mortality. Multivariate regression analyses including a propensity score for the chance of receiving a pulsatile flow were performed.

RESULTS. Between June 2008 and August 2012, 949 patients received CPB and were included in the study. Pulsatile flow was applied during CPB in 539 patients (pulsatile group) while conventional flow CPB was applied for the remaining 410 (non-pulsatile group). Among patients in the pulsatile group, 134 (24.9 %) developed CS-AKI as compared with 128 (31.2 %) in the non pulsatile group ($p = 0.02$). There was no difference between the two groups in terms of need for RRT (10 (1.9 %) vs 6 (1.5 %), $p = 0.65$ or in-hospital mortality (5 (0.9 %) vs 4 (1.0 %), $p = 0.94$). Patients in the pulsatile flow required positive inotropic drugs less often (113 (21 %) vs 186 (45.4 %, $p < 0.001$) but systemic vasoconstrictors more frequently (210 (39 %) vs 60 (14.6 %), $p < 0.001$).

However, after correction for baseline imbalances and propensity for receiving pulsatile flow, application of pulsatile flow was not associated with a lower risk of developing CS-AKI (OR 0.89; 95 % CI 0.6-1.33, $p = 0.58$), of needing for RRT (OR missing), of dying in hospital (OR 0.37; 95 % CI 0.06-2.35, $p = 0.29$), of needing inotropes (OR 0.9; 95 % CI 0.58-1.38, $p = 0.62$) or of needing vasopressors (OR: 0.79; 95 % CI 0.53-1.18, $p = 0.25$).

CONCLUSION. Application of pulsatile flow during CPB was not associated with improved clinical outcomes as compared with conventional (non-pulsatile flow) CPB management. Further studies are required to confirm of refute these results.

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0626

MICRODIALYSIS - A NEW APPROACH TO MONITORING FUNCTIONS OF THE TRANSPLANTED CADAVERIC KIDNEYS

I. Goncharova¹, M.S. Khubutia¹, S.V. Zhuravel¹, A.A. Romanov¹

¹N.V. Sklifosovsky Research Institute of Emergency Medicine, Moscow Department of Health, Moscow, Russian Federation

Managing renal transplant ischemia reperfusion injury is one of the prominent issues still to be resolved. Recently, a new method of monitoring the IRI in renal allotransplantation became available to surgeons. Microdialysis allows for monitoring of the metabolic processes. It enables one to understand the values of endogenous substances in the renal transplant parenchyma, both frequently and/or, if needed, in real-time mode.

GOAL. To evaluate the data obtained by microdialysis from a cadaveric renal transplant damaged by IRI.

MATERIALS AND METHODS. Upon remodulation of blood flow (reperfusion) in the donor renal transplant, a two-channel microdialysis polyurethane catheter has been implanted in the kidney's cortex (CMA70, CMA Microdialysis, Sweden). The intracellular substrate (dializate) was collected in special 200 μ L vials. The biochemical values have been obtained with the help of CMA 600 Microdialysis (CMA Microdialysis AB, Stockholm, Sweden) analyzer. This research has been conducted over 38 h in the early postoperative period with the biochemical values being read every hour. In the transplant's interstitium space, the following biochemical values were read: glucose, lactate, piruvate, glycerol, and lactate/piruvate ratio. The data obtained has been presented as mean values \pm σ ($p \leq 0,05$ Student)

RESULTS. Having analyzed the results of the renal allotransplant dializate evaluation, reference values have been established for the following biomarkers: glucose, lactate, piruvate, glycerol, and lactate/piruvate ratio. A correlation between the renal transplant dializate values and the function has been established. In 10 patients with the initial function of the renal allotransplant, the values were: lactate $-1,48 \pm 0,26$ mM, piruvate $-129,76 \pm 23,20$ μ mol/L, lactate/piruvate ratio $-11,81 \pm 1,15$; glycerol $-137,81 \pm 32,92$ μ mol/L, and we determined significant difference from those received concerning 10 patients with delayed function of the renal transplant: lactate $-5,83 \pm 1,08$ mM, piruvate $-213,75 \pm 43,84$ μ mol/L, lactate/piruvate ratio $-29,51 \pm 4,64$, glycerol $-342,33 \pm 65,95$ μ mol/L during the entire period of observation.

CONCLUSIONS. Our accumulated experience proved that levels of lactate, glycerol, and the lactate/piruvate ratio, received by means of microdialysis, present valuable prognostic markers allowing for the evaluation of renal functions.

0627

INCIDENCE AND RISK FACTORS FOR EARLY RENAL DYSFUNCTION AFTER LIVER TRANSPLANTATION

P. Wiesen¹, E. Georganta¹, I. Van Cauwenberge¹, C. Gerard², J. Joris³, O. Detry⁴, P. Damas¹

¹CHU of Liege, Department of General Intensive Care, Liege, Belgium, ²CHU of Liege, Department of Biological Hematology and Immuno Hematology, Liege, Belgium, ³CHU of Liege, Department of Anesthesia and Intensive Care Medicine, Liege, Belgium, ⁴CHU of Liege, Department of Abdominal Surgery and Transplantation, Liege, Belgium

INTRODUCTION. Renal dysfunction often occurred after liver transplantation.

OBJECTIVES. The aim of the study was to determine its incidence and its risk factors in a clinical series at the University Hospital of Liege, Belgium.

METHODS. Orthotopic liver transplantations performed from January 2006 until September 2012 were retrospectively reviewed ($n = 187$). Patients, with no renal replacement therapy (RRT) before transplantation were classified in four groups according to their highest creatinine plasma level during the first postoperative week. First group had a creatinine level below 12 mg/l, the second group between 12 and 20 mg/l, the third group between 20 and 35 mg/l, and the fourth above 35 mg/l. In addition, patients who needed RRT during the first week after transplantation were also classified in the fourth group. Preoperative and perioperative parameters were tested as risk factors: age, sex, body mass index (BMI), length of hospital preoperative stay, prior bacterial infection within one month, preoperative ascites, preoperative treatment with β -blocker, converting enzyme inhibitor, or non steroidal antiinflammatory drugs, preoperative creatinine and bilirubine level, postoperative lactate level, need for postoperative vasopressive drugs, surgical revision, mechanical ventilation for more than 24 h, postoperative peaks in bilirubine and transaminase levels, postoperative hemoglobin level, amount of perioperative blood transfusions, type of immunosuppression. Univariate and multivariate analysis were performed using logistic ordinal regression method.

RESULTS. There were 78 patients in group 1 (41.7 %), 46 in group 2 (24.6 %), 38 in group 3 (20.3 %) and 25 in group 4 (13.4 %). Eighteen patients required RRT: 13 (7 %) during the first week after transplantation (group 4), the 5 others after the first week after transplantation (2 in group 1 and 2, and 1 in group 3). There were 7 (3.7 %) early deaths within 28 days after transplantation. Using univariate analysis, the severity of renal dysfunction was correlated with presence of ascites and prior bacterial infection, preoperative bilirubin and creatinine level, need for surgical revision, use of vasopressor, postoperative mechanical ventilation, postoperative bilirubine, transaminase, and hemoglobin levels. The need for transfusion of each type of products also affected renal dysfunction. The ordinal logistic analysis pointed out the BMI (OR = 1.1, $p = 0.004$), preoperative creatinine level (OR = 11.1, $p < 0.0001$), use of vasopressor (OR = 3.31, $p = 0.0002$), maximal postoperative bilirubine level (OR = 1.44, $p = 0.044$) and minimal postoperative hemoglobin level (OR 0.059 $p = 0.0005$).

CONCLUSIONS. More than half of liver transplanted patients experienced some degree of early renal dysfunction after transplantation. Risk factors are preoperative renal dysfunction, and mainly perioperative circulatory instability requiring the use of vasopressor and postoperative anemia.

0628

EFFECTS OF ACUTE PLASMA VOLUME EXPANSION ON RENAL PERFUSION, FILTRATION AND OXYGENATION AFTER CARDIAC SURGERY - CRYSTALLOID VS. COLLOID

J. Skytte Larsson¹, G. Bragadottir¹, B. Redfors¹, V. Krumbholz¹, S.-E. Ricksten¹

¹Sahlgrenska University Hospital, Department of Anaesthesiology and Intensive Care Medicine, Gotheburg, Sweden

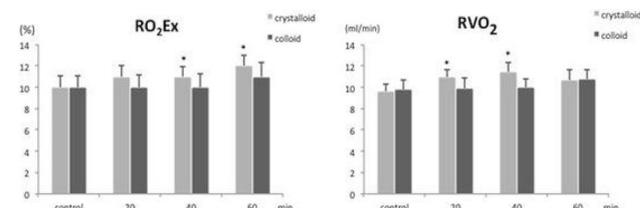
INTRODUCTION. Acute kidney injury may occur in patients undergoing major surgery because of hypovolemia and reduced renal oxygen perfusion. Hypovolemia is commonly treated with artificial solutions to decrease the need for allogenic blood transfusions. A recent experimental study has shown that haemodilution with crystalloids, in contrast to colloids, induce intrarenal hypoxia (1).

OBJECTIVES. The aim of the study was to evaluate the differential effects of a crystalloid and a colloid solution on renal perfusion, filtration and oxygenation, when used as postoperative plasma volume expanders.

METHODS. Twenty-four patients with preoperatively normal renal function, undergoing uncomplicated cardiac surgery, where studied in the ICU early after surgery. Patients were randomized to receive either a balanced crystalloid (Ringers-Acetate, 20 ml/kg, $n = 12$) or a colloid solution (HES 6 %, 130/0.4, 10 ml/kg, $n = 12$) during 20-30 min. Effects on systemic haemodynamics (pulmonary artery catheter) and renal variables were obtained before and 20, 40 and 60 min after

plasma volume expansion. Renal blood flow (RBF) and glomerular filtration rate (GFR) were measured by the renal vein retrograde thermodilution technique and by renal extraction of Cr-EDTA, respectively. Arterial and renal vein blood samples were taken for measurements of arterial (CaO_2) and renal vein (CrVO_2) oxygen contents. Renal oxygen consumption [$\text{RVO}_2 = \text{RBF} \times (\text{CaO}_2 - \text{CrVO}_2)$], renal oxygen delivery [$\text{RDO}_2 = \text{RBF} \times \text{CaO}_2$] and renal oxygen extraction [$\text{RO}_2\text{Ex} = (\text{CaO}_2 - \text{CrVO}_2)/\text{CaO}_2$] were calculated.

RESULTS. The plasma volume expansion was greater in the colloid group, compared to the crystalloid group, as indicated by significantly lower haematocrit and CaO_2 , and higher cardiac filling pressures. Urine flow increased significantly (170 %) only in the crystalloid group. Cardiac index and RBF increased by 15 % respectively 5-10 %, in both groups (ns). In neither one of the groups did plasma volume expansion render a change in RDO_2 . GFR increased to a similar extent with both fluids. In the crystalloid group, there was a significant increase in both RVO_2 and RO_2Ex , which was not seen in the colloid group (see figure).



[Fig 1: Renal oxygen extraction and consumption]

CONCLUSION. Postoperative plasma volume expansion with a crystalloid and a colloid solution both increases GFR. Despite the increase in cardiac index and RBF caused by both fluids, none of them increased RDO_2 , due to the haemodilution. Crystalloids, in contrast to colloids, impair the renal oxygen demand/supply relationship, i.e. renal oxygenation, as demonstrated by an increase in renal oxygen extraction. This clinical study support recent experimental findings that acutely expanded plasma volume acute plasma volume expansion with crystalloid, but not with colloid, impair renal oxygenation.

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0628A

RISK FACTORS FOR ACUTE KIDNEY INJURY IN SEPSIS PATIENTS TREATED WITH COLISTIN

B. Bilgili¹, F. Gül², T. Evran², M. Haliloğlu², I. Cinel², A. Karamaz²

¹Marmara University, Faculty of Medicine, Anesthesiology and Reanimation, Istanbul, Turkey, ²Marmara University, Faculty of Medicine, Istanbul, Turkey

INTRODUCTION. Colistin is widely used in resistant gram-negative bacterial infections. The common side effect of colistin is nephrotoxicity, 14 %-55 % reported. Risk factors for nephrotoxicity are advanced age, nephrotoxic agent usage and chronic renal failure in general population.

OBJECTIVES. The aim is to identify the risk factors for acute kidney injury in sepsis patients treated with colistin.

METHODS. Gram-negative sepsis patients admitted to ICU in two years were analyzed retrospectively. APACHE II, the presence of shock, initial glomerular filtration rate, the duration of colistin administration, simultaneous nephrotoxic agent administration (NSAID, antibiotics) were recorded. Acute renal injury was classified according to RIFLE criteria. Patients with chronic renal failure were excluded.

RESULTS. 64 (32 male, 32 female) gram-negative sepsis patients were evaluated. Acute kidney injury was detected in 56 (87 %) patients. 42 patients out of 56 were administered colistin and the mean duration of administration was 6,43 days. The distribution of acute kidney injury in patients using colistin is given in Table 1. Acute kidney injury was significantly higher in colistin, nephrotoxic agent, shock (+) patients compared to colistin, nephrotoxic agent (-) shock (-) patients ($p=0,049$). In the presence of shock, acute kidney injury was higher in patients using colistin but not nephrotoxic agent according to patients without shock ($p=0,023$). In septic shock patients using colistin, there is no difference in acute kidney injury between patients with nephrotoxic agent and without nephrotoxic agent usage ($p=0,367$). 57 % of the patients using colistin who developed acute kidney injury were in the Failure (F) group according to RIFLE criteria. Acute kidney injury was significantly higher in septic shock patients who were using colistin compared to septic shock patients who were not using colistin ($p=0,0001$).

CONCLUSIONS. The incidence of acute kidney injury classified according to RIFLE criteria is high in sepsis patients. New onset acute kidney injury is correlated with the presence of shock and colistin usage but not with simultaneous nephrotoxic agent usage. The presence of shock is a risk factor for acute kidney injury in sepsis patients treated with colistin.

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Shock resuscitation: 0629-0641

0629

PROCALCITONIN AS A PROGNOSTIC TOOL OF SIRS DEVELOPMENT AFTER CARDIAC SURGERY WITH CARDIOPULMONARY BYPASS

Y. Petrishchev¹, A. Levit¹, I. Leyderman²

¹Sverdlovsk Regional Clinical Hospital #1, ICU, Ekaterinburg, Russian Federation, ²Ural State Medical University, ICU Chair, Ekaterinburg, Russian Federation

INTRODUCTION. Increased serum procalcitonin after cardiac surgery is associated with prolonged LOS in ICU and negative clinical outcome. But the real mechanisms of such

effects are not determined. In our study we tried to find out main relationships of increased serum procalcitonin after open-heart surgery.

METHODS. We included 48 patients who underwent cardiac surgery under cardiopulmonary bypass (CPB): one valve 18 patients, two or three valves - 14, valve surgery and CABG - 13, valve surgery and MAZE procedure -3. Exclusion criteria - SIRS signs before surgery. We investigated the plasma levels of procalcitonin, lactate and interleukin -6 before the operation (stage 1) at the end of the operation (Stage 2) and after 24 h (Stage 3). Hemodynamics was studied by thermomodulation method (Swan-Ganz catheter). Key relationships were assessed by correlation analysis.

RESULTS. The main results of this study are presented in Table 1.

Parameter	Links	Correlation	p
Procalcitonin - stage 2	VO2I-stage 2	0,7	0,038
Procalcitonin - stage 3	D02I-stage 3	0,64	0,048
	Lactate -stage 3	0,7	0,023
	Interleukin-6-stage 2	0,75	0,01
	Length of CPB	0,4	0,005
	Length of CMV	0,44	0,001
	LOS in ICU	0,53	0,001

[Table 1 Results of correlation analysis]

CONCLUSIONS. Increased plasma level of procalcitonin after cardiac surgery with CPB was associated with the duration of CPB, impaired tissue oxygenation, severity of SIRS, which determined the prolonged duration of postoperative intensive care.

REFERENCE(S). 1. Sponholz C et al.: Critical Care 2006; 10: R145. 2. Börge H et al.: The Thoracic and cardiovascular surgeon 2003, 51: 322-326

0630

ATRIAL EJECTION FORCE AND BRAIN NATRIURETIC PEPTIDE AS MARKERS FOR MORTALITY IN SEPSIS

M.B.M. Salim¹, A. Wadde², H. Elaasr², A. Ashour², M. Eldamarawy¹, F. Nasr¹

¹Theodor Bilharz Research Institute, ICU, Giza, Egypt, ²Cairo University, Critical Care Medicine, Cairo, Egypt

INTRODUCTION. In early stages of septic shock, impaired myocardial function plays an important prognostic role. AEF and Plasma BNP levels may be valuable prognostic factors for patients with sepsis.

OBJECTIVES. We sought to evaluate the value of atrial ejection force (AEF) B-type natriuretic peptide (BNP) in predicting the outcome of sepsis, severe sepsis, and septic shock patients.

This was a prospective study involving forty patients with sepsis admitted to the intensive care unit in the Theodor Bilharz research institute (TBR1). This study was approved by the local ethical committee and an informed consent was obtained from every patient or his next of kin if the patient was unable to give consent before being included in the study.

METHODS. 40 patients presented with sepsis, severe sepsis, or septic shock were included in the study. The patients had undergone transthoracic echocardiographic examinations and BNP measurements on the first and third day of admission. The patients were retrospectively divided into survivors and non survivors.

RESULTS. There was a significant statistical difference in BNP level (P = 0.0001) between the two groups. BNP showed statistically significant rise in the non-survival group from day 1 to day 3 (p = 0.002) and a statistically significant decrease from day 1 to day 3 in the survived group (p = 0.001). Regarding the echo findings, there was a significant statistical difference in AEF in the third day between survivors and non survivors (P = 0.0001). The ROC curve showed that BNP in the first day and third day are good tests for prediction of mortality in patients with sepsis.

CONCLUSIONS. Atrial ejection force, unlike BNP level, cannot be used as an independent predictor of mortality in patients with sepsis. BNP level correlates with the severity of sepsis. According to our study, AEF in the third day may be a good predictor for survival of patients presenting with sepsis.

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0631

ARE MAP AND LACTATE EQUALLY IMPORTANT AS TARGETS IN HEMODYNAMIC RESUSCITATION IN SEPTIC PATIENTS?

A. Houwink¹, R.J. Bosman¹, P.H.J. van der Voort¹

¹34251, Amsterdam, Netherlands

INTRODUCTION. The Surviving Sepsis Campaign recommends a mean arterial pressure (MAP) of at least 65 mmHg. MAP and plasma lactate level are both targets for treatment in septic patients in the intensive care unit (ICU). Hyperlactemia and a decreased lactate clearance are associated with an increased mortality.

OBJECTIVES. To study the association between MAP, lactate and mortality in septic ICU patients.

METHODS. A retrospective analysis of patients with confirmed infection was performed. They were extracted from the Patient Data Management System (iMD-Soft; Metavision, Israel) from year 2008 to 2014. Next to demographic variables, validated blood pressures, lactate levels, central venous oxygen saturation (ScvO2), delta-temperature (between toe and core temperature) of the first 24 h of ICU treatment were extracted. Patients were stratified in 4 groups differentiating by MAP (below or above 65 mmHg) and lactate (below or above 2 mmol/L). Analyses were based on first validated measurements after admission and on mean values over 24 h. Analyses were performed with SPSS 18.0.

RESULTS. From 16 out of the 837 extracted patients lactate measurements were missing. 821 patients were eligible for analysis. Sixty-five percent was male, the mean age was 64 (range 19-95 years) and mean APACHE IV predicted hospital mortality was 0.39 (range 0.01-1.0) while the observed hospital mortality was 25.9 %. The Standardized mortality ratio(SMR) was calculated to be 0.69. 378 patients had a first lactate above 2 mmol/l. Hospital mortality was highest (44 %) when lactate was high and MAP low and lowest when lactate was low en MAP high (17 %). High first lactate (p < 0.001) and low first MAP (p < 0.001) were associated with hospital mortality. The SMR for the high lactate and low MAP was 0.81 which was higher than the SMR calculated for all patients (0.69). In a forwardly entered multivariate logistic regression analysis first MAP below 65 was not associated with hospital mortality (OR 0.99; 95 %CI 0.97-1.0, p = 0.11) but lactate was (OR 1.2; 95 %CI 1.1-1.3, p = 0.003). SvO2 and delta T were not related. A regression analysis with 24 h mean MAP, mean lactate, mean SvO2 and mean delta T showed the same results (OR for MAP 0.99; 95 %CI 0.95-1.0, p = 0.46; OR for lactate 1.3; 95 %CI 1.1-1.6, p = 0.001).

CONCLUSIONS. Low MAP and high lactate were associated with ICU, hospital mortality and higher SMR. However, in multivariate analyses lactate was but MAP < 65mmHG was not independently associated with hospital mortality.

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0632

CAROTID DOPPLER FLOW AND ITS DETERMINANTS DURING HEAD-UP-TILT CENTRAL HYPOVOLEMIA AND PASSIVE LEG RAISING IN HEALTHY VOLUNTEERS

A. Sommese¹, J. Bakker², J. van Bommel², A. Lima²

¹Seconda Universita' degli Studi di Napoli, Medicina d'Emergenza, Napoli, Italy, ²Erasmus MC University Medical Center, Department of Intensive Care, Rotterdam, Netherlands

INTRODUCTION. A potential clinical application of carotid Doppler ultrasonography (USG) would be the noninvasive estimation of fluid responsiveness in critically ill patients by assessing carotid blood flow and its determinants (diameter, systolic and diastolic velocity). However, little is known about the interpretation and understanding of carotid blood flow variations during central hypovolemia or fluid therapy. In addition, the identification of which parameters are most influenced by changes in central blood volume remains to be determined. We performed head-up tilt (HUT) test and passive leg raising (PLR) in healthy volunteers (HV) to assess the response of common carotid blood flow determined by Doppler USG to the decrease and increase in cardiac output.

OBJECTIVES. This study aims to refine the understanding of carotid flow parameters during central blood volume alterations in HV.

METHODS. Twenty-nine HV (30 ± 10 years; 13 male) participated in this study. Two different models were performed to induce opposite effects in cardiac output. The first model was performed by applying HUT test. The complete maneuver was performed by 10 min step that consisted of tilting the table from 0° supine position (Baseline 1) to an angle of 70° and back to supine (Baseline 2). The second model was performed by applying PLR. After subjects were positioned in a semirecumbent position of 45° (Baseline 1), PLR was performed resulting in a 0° supine position of the thorax and the legs elevated to 45° for five minutes. The subjects were returned to the semirecumbent position to repeat measurements (Baseline 2). Hemodynamic parameters included stroke volume (SV), heart rate (HR), and mean arterial pressure (MAP) were continuously measured non-invasively with a Finometer® (Finapres Medical System). In each time point, three Doppler measurements were obtained. The subjects were assigned to perform PLR maneuver or HUT test in a random order.

RESULTS. Data are presented as mean ± SD. The hemodynamic parameters induced by both the HUT and the PLR models are shown in tables 1 and 2. Figures 1 and 2 show the temporal changes of mean carotid flow and its components (Vp, Vd, and TAM) during the HUT and the PLR models, respectively. The magnitude of changes of CO and carotid blood flow were similar during the HUT model (23 ± 15 % vs. 24 ± 20 %, P = NS). In contrast, during the PLR model the percentage changes in the carotid blood flow were higher when compared with changes in CO (15 ± 11 % vs. 49 ± 39 %, P < 0.05), figure 3.

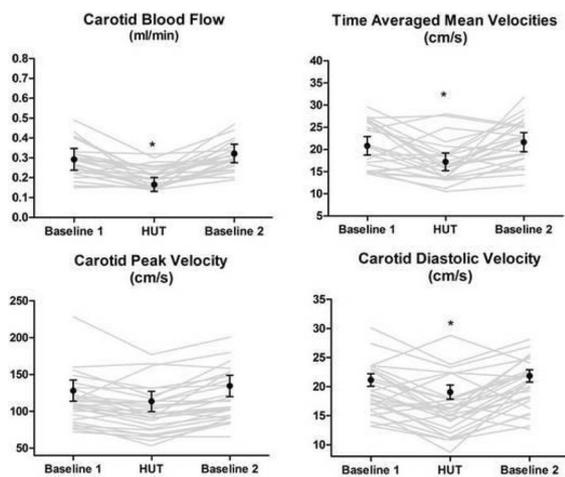
CONCLUSIONS. The dynamic variations in carotid flow and its determinants measured by Doppler USG were highly correlated to changes in central blood volume during HUT and PLR models. The degree of changes in carotid blood flow seems to depend on the method by which the variations in central blood volume are produced. In this regard, carotid blood flow showed to be more sensitive to an increase in cardiac output induced by PLR.

	Baseline 1 HUT	HUT	Baseline 2 HUT
CO (L/min)	6.2 ± 1.6	4.8 ± 1.7 *	6.3 ± 1.6
SV (ml)	94 ± 23	63 ± 22 *	94 ± 25
HR (bpm)	66 ± 10	81 ± 10 *	65 ± 8
MAP (mmHg)	94 ± 16	97 ± 25	94 ± 17

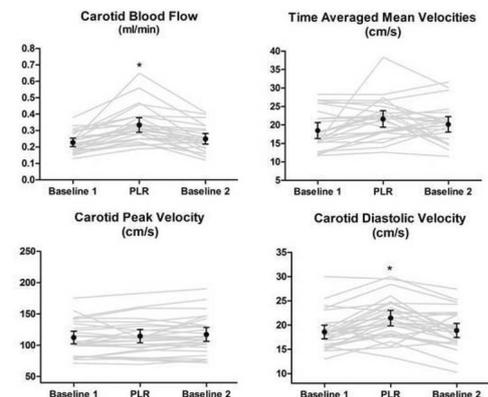
* < P 0.05 vs. Baseline 1 and Baseline 2
[Global hemodynamic parameters during HUT]

	Baseline 1 PLR	PLR	Baseline 2 PLR
CO (L/min)	5.6 ± 1.6	6.2 ± 1.6	5.5 ± 1.5
SV (ml)	89 ± 24	101 ± 25*	91 ± 24
HR (bpm)	63 ± 9	64 ± 10	64 ± 9
MAP (mmHg)	94 ± 10	94 ± 12	85 ± 12

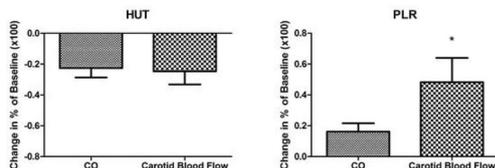
[Global hemodynamic parameters during PLR]
* < P 0.05 vs. Baseline 1 and Baseline 2



[Carotid Doppler parameters during PLR]



[Carotid Doppler parameters during PLR]



[Change in CO and Carotid Flow in HUT and PLR]

REFERENCE. Chest. 2013;143(2):364-70.

0634
INCIDENCE AND IMPACT OF MOTTILING AND ITS DURATION ON OUTCOME IN CRITICALLY ILL PATIENTS

R. Coudroy¹, A. Jamet¹, J.-P. Frat^{1,2}, A. Weinstein¹, D. Chatellier¹, A.W. Thille^{1,2}, R. Robert^{1,3}

¹CHU Poitiers, Medical Intensive Care Unit, Poitiers, France, ²CIC-P 1402, ALIVE Group, Poitiers, France, ³INSERM U1082, Poitiers, France

INTRODUCTION. Mottling seems frequent in intensive care unit (ICU) patients and could be associated with an increased mortality rate in the subset of patients admitted for septic shock. However, the real incidence of mottling in the general ICU population and its impact on outcome is unknown.

OBJECTIVES. To assess the incidence of mottling in ICU and its role on critically ill patients' outcome.

METHODS. Mottling was qualitatively and prospectively reported by trained nurses on all consecutive patients admitted over a 1-year period in a 15-bed medical ICU of a French teaching hospital.

RESULTS. Among 791 patients admitted, 230 (29.0 %) had at least one mottling episode. Most of them (59.5 %) were normotensive without vasopressors when mottling occurred. Incidence of mottling in patients admitted for septic shock was 49.2 % (32/65), as compared to 39.5 % (30/76) for non septic shock, and 25.8 % for other diagnosis. Patients with mottling were older and more severe (as indicated with higher SAPS II and SOFA score at admission) than those without mottling, and required more frequently mechanical ventilation, vasopressors and renal replacement therapy during ICU stay ($p < 0.0001$ for each). In-ICU mortality rate was higher in patients with mottling than in patients without mottling (30.4 % vs. 8.2 %; $p < 0.0001$). After adjustment with multivariate analysis, the three variables independently associated with in-ICU mortality were age, SOFA score at admission, and at least one mottling episode during ICU stay (OR 2.67 [95 % CI, 1.68-4.22]; $p < 0.0001$). One hundred and thirty four patients (59.0 %) had a mottling episode

longer than 6 h. Their in-ICU mortality was higher as compared to those with a shorter mottling episode (39.6 % vs. 18.3 %, $p = 0.001$). In patients with mottling, the three variables independently associated with in-ICU mortality were higher SOFA score and hyperlactatemia prior to mottling, and a mottling episode duration longer than 6 h (OR 2.65 [95 % CI, 1.28-5.48], $p = 0.009$).

CONCLUSIONS. Mottling is frequent among critically ill patients. Occurrence and persistence of mottling more than 6 h are independently associated with in-ICU mortality.

0635
FLUID RESPONSIVENESS IS PREDICTED BY ANALYSIS OF EXTRA SYSTOLES

S.T. Vistisen¹

¹Aarhus University, Research Centre for Emergency Medicine, Aarhus, Denmark

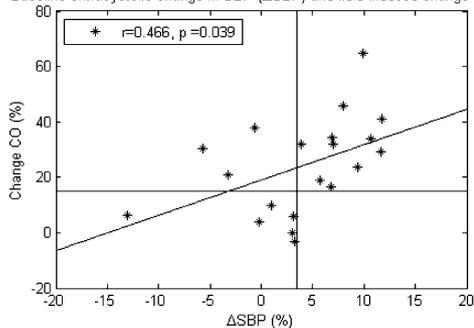
INTRODUCTION. Fluid responsiveness prediction is an unsettled matter for intensive care patients. Preload variables are not reliable and ventilator settings for the vast majority of patients (if at all ventilated) do not accommodate the criteria for otherwise useful dynamic variables [1] (e.g. pulse pressure variation). Yet, the idea of a varying preload utilised in dynamic variable monitoring may be useful: The extra systolic post-ectopic beat is associated with increased preload, and I hypothesised that systolic blood pressure (SBP) at the post-ectopic beat could be analysed in relation to surrounding sinus beats and that the magnitude of the SBP change (Δ SBP) could predict fluid responsiveness.

OBJECTIVES. To study the hypothesis in post-cardiac surgery patients.

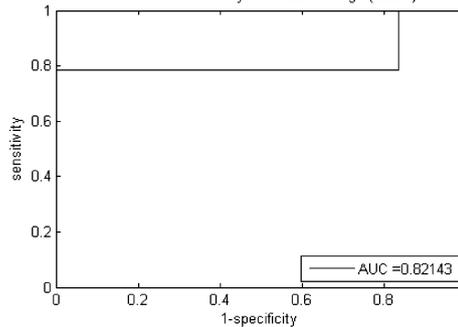
METHODS. Patients scheduled for a 500 ml volume expansion were observed. In the time frame, 0-30 min prior to volume expansion, ECG was analysed for occurrence of isolated extra systoles (at least 10 preceding and following sinus beats). During this period and during volume expansion, other hemodynamic interventions excluded the recording for further analysis. Δ SBP was defined as the change from average SBP at surrounding sinus beats to SBP at the extra systolic post-ectopic beat. A cardiac output increase > 15 % following volume expansion defined fluid responsiveness. Diagnostic performance was analysed with receiver operating characteristic (ROC) analyses.

RESULTS. By April 18th, 20 patients that had one or more eligible extra systoles in the 30 min time frame were included. Among 14 responders and 6 non-responders, Δ SBP classified 17 patients correctly with 100 % specificity and 79 % sensitivity (Optimal Δ SBP threshold: 3.5 %), ROC area: 0.82, (Figure 1).

Baseline extrasystolic change in SBP (Δ SBP) and fluid induced change in CO



ROC curve for extrasystolic SBP change (Δ SBP)



[Figure 1]

CONCLUSIONS. Analysis of SBP at extra systolic post-ectopic beats can predict fluid responsiveness in post-cardiac surgery patients. The method needs to be validated in other patient groups.

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0636
SYSTOLIC AND DIASTOLIC RIGHT VENTRICULAR FUNCTION IN PATIENTS WITH ARDS WITHOUT ACUTE COR PULMONALE IN ICU

G. Tavazzi^{1,2}, M. White², N. Bergsland³, V. De Francesco², S. Canestrini², S. Price²

¹University of Pavia, Foundation Policlinico San Matteo IRCCS, Intensive Care Department 1, Pavia, Italy, ²Royal Brompton and Harefield Hospital NHS Foundation Trust, Adult Intensive Care, London, United Kingdom, ³IRCCS 'S.Maria Nascente', Don Gnocchi Foundation, Milan, Italy

INTRODUCTION. Right ventricular (RV) function has been extensively investigated in the last several years in patients with ARDS and robust correlations between the incidence of acute cor pulmonale (ACP), high pressure, tidal volume ventilation and increased mortality have been found (1). The RV diastolic function has been less studied.

OBJECTIVES. We aimed to describe the systolic and diastolic RV function in patients with ARDS without the features of ACP.

METHODS. An observational analysis of retrospectively collected data in mechanically ventilated patients who underwent bedside echocardiography. We collected RV function data (bidimensional and Doppler) in addition to clinical and ventilator factors. We assessed relationships using Pearson's correlation coefficients.

RESULTS. All the patients (total 98 of whom 53 male and 40 female; mean age 48.6 ± 17.9) were admitted with diagnosis of ARDS (23 on interventional lung assist (iLA); 37 on veno-venous ECMO and 38 on conventional ventilation management; the admission APACHE II was 14.9 ± 6.1).

The mean TAPSE was $1.78 \text{ cm} (\pm 0.61)$; mean pulmonary valve acceleration time (as sign of increased pulmonary vascular resistance) $88.5 \text{ ms} \pm 19.6$; mean tricuspid regurgitation velocity was $3.16 \text{ m/sec} \pm 0.68$; Pulmonary valve pre-systolic a wave (sign of diastolic restrictive pattern) (2) was present in 58 % of the patients (iLA 78 %, VV-ECMO 62 %, 42 % of conventional ventilated patients). The mean TV/Kg was 5.01 ± 2 .

We found a significant correlation between correlations between the presence of a pre-systolic a wave on the pulmonary valve (PV a wave) with pulmonary valve acceleration time (PV acc T) ($r = -0.572$, $p < 0.0001$). Moreover we tested and found correlations between PV a wave and both PEEP ($r = 0.593$, $p < 0.0001$) and $p\text{CO}_2$ ($r = 0.338$, $p < 0.0001$). A strong correlation was found even between the PV acc T and: PEEP ($r = -0.532$, $p < 0.0001$), Peak inspiratory pressure ($r = -0.618$, $p < 0.0001$) and $p\text{CO}_2$ ($r = 0.229$, $p < 0.0001$).

We also found correlations between tricuspid regurgitation duration (TR dur) with TAPSE ($r = 0.344$, $p = 0.017$) and TAPSE length ($r = 0.389$, $p = 0.016$); systolic pulmonary pressure with TAPSE ($r = 0.353$, $p = 0.012$) and $p\text{CO}_2$ ($r = 0.279$, $p = 0.047$); right ventricular filling time and TR dur ($r = 0.408$, $p = 0.014$). No correlations were found between VT/Kg and right ventricular function.

CONCLUSIONS. These results highlight the importance of the detection of RV systolic and diastolic impairment by pressure ventilation in patients with ARDS even in the absence of ACP. More studies are needed focusing on the management of ventilation setting in patients with early signs of RV hemodynamic dysfunction.

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0637

SKELTAL MUSCLE OXYGENATION ALTERATIONS IN DIFFERENT CRITICALLY ILL PATIENTS

L. Claverias¹, D. Arvizu Velazc¹, J. Marín-Corral¹, I. Oliva¹, I. Leache¹, C. Solé¹, V. Blázquez¹, G. Moreno¹, M. Bodi², A. Rodríguez²

¹Hospital Universitari Joan XXIII, Critical Care, Tarragona, Spain, ²Hospital Universitari Joan XXIII/URV/IISP/CIBERES, Critical Care, Tarragona, Spain

INTRODUCTION. Evidence suggests that regional skeletal muscle oxygenation (rSO₂) estimated by near-infrared spectroscopy (NIRS) devices might early detect risk of severe complications with prognostic implications in septic patients. Its usefulness in other critical care populations is yet to be determined.

OBJECTIVE. To determine rSO₂ in postoperative patients of abdominal aortic aneurysm surgery and compare these findings with those observed in septic patients and healthy controls.

METHODS. A prospective, observational, controlled study was performed in a 30-bed medical-surgical ICU. Two groups of critically ill patients were enrolled: patients in the post operative period of abdominal aortic aneurysm surgery (AA) and septic patients (SP). There was a third group of healthy controls. We recorded demographic characteristics, APACHE II score and global hemodynamic variables. A NIRS device (INVOS 5100) probe somatosensor was placed on the medial forearm (brachioradialis muscle) to obtain rSO₂ measurements. All variables were determined at baseline and at 24 h of admission. Chi square (categorical variables) and "t" test (continuous variables) analysis was performed. A "p" value less than 0.05 was considered significant.

RESULTS. We included 115 patients (46 AA and 69 SP), and 41 healthy controls. Mean age of patients was 65.4 ± 13 years, significantly older than the controls (37.8 , $p < 0.01$); 70 % of the patients were male, with a mean APACHE II score at admission of 18 ± 8.5 . rSO₂ value at admission was significantly lower in patients than in controls (63.2 % vs. 67.8 %), even when we considered them separately (AA 63.0 %, $p < 0.01$; SP 61.7 %, $p < 0.01$). There were no differences between rSO₂ value in AA and SP groups, neither at admission (61.7 % vs. 63 %; $p = 0.5$) nor at 24 h (64.7 % vs. 61.5 %, $p = 0.2$). SP group with shock showed an rSO₂ value significantly lower than those without shock, both at admission (59.4 % vs. 67.8 %) and at 24 h (61.4 % vs. 70.6 %). Those differences were not observed in the AA group (basal 64.3 % vs. 60 %; $p = 0.18$; 24 h 63 % vs. 58.9 %; $p = 0.2$). Mortality rate was 34.8 % (39.1 % in SP and 28.3 % in AA). In SP group, rSO₂ was lower in non-survivors at ICU admission (57.0 % vs. 64.9 %; $p < 0.01$) and 24 h (59.7 % vs. 64.9 %, $p < 0.01$) than in survivors. On the other hand, there were no differences between survivors and non-survivors in the AA group (admission 61.7 % vs. 63.5 %; $p = 0.17$ and 24h 60.7 % vs. 61.7 %, $p = 0.72$).

CONCLUSIONS. Both groups of patients presented early tissue oxygenation alterations comparing with healthy controls. The lack of association between rSO₂ and mortality and shock in AA group could express transient and reversible alterations in tissue oxygenation due to the surgical aggression, not related to prognosis.

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0638

FLUID RESPONSIVENESS PREDICTED BY NONINVASIVE BIOREACTANCE-BASED PASSIVE LEG RAISE TEST OF ELDERLY PATIENTS WITH SEPSIS

C. Guolong¹, T. Hongjie², H. Caibao¹

¹Zhejiang Hospital, HangZhou, China, ²The Second Clinical Medical School of Zhejiang Chinese Medical University, HangZhou, China

INTRODUCTION. Passive leg raising (PLR) test could be used to predict fluid responsiveness, whether Bioreactance-based passive leg raising test could predict fluid responsiveness of elderly patients with sepsis has not been known by now.

OBJECTIVES. To investigate whether Bioreactance-based passive leg raising (PLR) test could be used to predict fluid responsiveness of elderly patients with sepsis.

METHODS. This prospective and self-controlled clinical study included thirty one elderly patients with sepsis of intensive care unit (ICU) of our hospital. The hemodynamic parameters including cardiac output (CO), stroke volume (SV) and stroke volume variation (SVV) were continuously recorded by Bioreactance-based device (NICOM) before and after PLR and volume expansion (VE) test. Patients were defined as responders if CO increased $\geq 10\%$ after VE. The role of PLR for predicting fluid responsiveness was evaluated by receiver operating characteristic (ROC) curves.

RESULTS. A total of one hundred PLR and VE tests in thirty one patients were evaluated and all were analyzed. In responders CO were obviously increased after PLR and VE, (5.11 ± 2.10 vs 5.91 ± 2.45), $p < 0.05$); (5.06 ± 2.06 vs 5.77 ± 2.47), $p < 0.05$), the ΔCO after PLR (ΔCOPLR) and ΔCO after VE (ΔCOVE) was highly correlated ($r = 0.813$ (0.712-0.886)), the ΔCOmax after PLR ($\Delta\text{COmaxPLR}$) and ΔCOVE was also highly correlated ($r = 0.819$ (0.716-0.895)), the SVV before VE and ΔCOVE was uncorrelated ($r = -0.218$ (-0.372-0.034)). The area under the ROC curve of ΔCOPLR , $\Delta\text{COmaxPLR}$, SVV predicting fluid responsiveness was 0.880, 0.859 and 0.459 respectively. The $\Delta\text{COPLR} \geq 10\%$ was found to predict fluid responsiveness with a sensitivity of 74 % and specificity of 93 %, the sensitivity and specificity of $\Delta\text{COmaxPLR} \geq 10\%$ was 85 % and 83 % respectively.

CONCLUSIONS. Fluid responsiveness could be accurately predicted by Bioreactance-based passive leg raising (PLR) test of elderly patients with sepsis.

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0639

CENTRAL VENOUS OXYGEN SATURATION CORRELATES WELL WITH MIXED VENOUS OXYGEN SATURATION EXCEPT DURING SELECTIVE CEREBRAL PERFUSION

K. Kobayashi¹, S. Kawashima¹, H. Makino¹, M. Doi¹, S. Sato¹

¹Hamamatsu University School of Medicine, Department of Anesthesiology and Intensive Care, Hamamatsu, Japan

INTRODUCTION. Pulmonary artery catheterization (PAC) is used to monitor circulatory management during cardiovascular surgery. However, prognosis or mortality is reportedly not improved by PAC. Mixed venous oxygen saturation (SvO₂) obtained via PAC is a parameter for oxygen balance estimation; we examined whether central venous oxygen saturation (ScvO₂) obtained via central venous catheterization could replace SvO₂.

METHODS. In 24 patients, who underwent aortic arch replacement, we compared ScvO₂ monitored continuously using specially designed fiber-optic catheters (PreSep Catheters™; Edwards Lifesciences, Irvine, CA, USA) and SvO₂ monitored continuously using PAC (Swan-Ganz CCombo V Catheters™; Edwards Lifesciences). ScvO₂ and SvO₂ were measured before cardiopulmonary (CP) bypass, during CP bypass, during selective cerebral perfusion, and after weaning from CP bypass. Data were compared using linear regression, the Pearson correlation coefficient, and the Bland-Altman method.

RESULTS. ScvO₂ and SvO₂ correlated well before CP bypass ($r = 0.62$; 95 % limits of agreement -8.68 -15.5) and after weaning from CP bypass ($r = 0.64$; -12.5 -24.8). However, the correlation was poor during CP bypass ($r = 0.37$; -6.64 -6.36), and there was no correlation during selective cerebral perfusion ($r = 0.095$; -8.61 -15.5).

DISCUSSION. Except during CP bypass, changes in ScvO₂ mirrored those in SvO₂ before and after CP bypass. Because ScvO₂ can be measured continuously, it is more informative during these periods. Despite its poor reliability during CP bypass, ScvO₂ represents an alternative to SvO₂ for oxygen balance estimation in patients undergoing major vascular surgery.

CONCLUSIONS. During aortic arch replacement surgery, ScvO₂ correlated well with SvO₂ before and after CP bypass, but not during CP bypass or selective cerebral perfusion.

0640

CHANGE IN THE BASIC HEMODYNAMIC PARAMETERS UNDER THE INFLUENCE OF DEXMETOMETIMINE DURING INITIAL NARCOSIS IN NEUROONCOLOGICAL PATIENTS

M. Rumiantceva¹, A.N. Kondratyev¹, R.V. Nazarov¹

¹Russian Polenov Neurosurgical Institute, Saint Petersburg, Russian Federation

INTRODUCTION. Opioid and adrenergic antinociceptive systems are the components of brainstem neuroregulatory systems. The antinociceptive systems are thoroughly studied, have well differentiated receptor system and verified ligands. This influence on the neuro-regulatory systems and, in particular, on opioid and adrenergic systems, is of high theoretic and practical interest for neuroanesthesiology.

For several decades the specialists of the Russian Neurosurgical Institute named after Professor A.L.Polenov have been successfully using the anesthesia care including combined influence on opioid (fentanyl) and adrenergic (clonidine) antinociceptive systems. This anesthesia care creates conditions for neurovegetative stabilization, sufficient for carrying out of brain surgeries.

OBJECTIVE. To evaluate an influence of Dexmedetomidine on the basic hemodynamic parameters when using it for initial narcosis as a part of neurovegetative stabilization.

MATERIALS AND METHODS. The study included 46 patients (34 women, 12 men), average age was 51 ± 13.4 years, with the intracranial space-occupying lesions, who has undergone a surgery at the Federal State Budgetary Establishment Russian Neurosurgical Institute named after Professor A.L.Polenov.

All the patient have undergone intravenous initial narcosis with Fentanyl 3,7 - 5,71 mcg/kg, Dexmedetomidine 1,05 - 2,67 mcg/kg and Propofol 2 mg/kg. Monitoring of the basic hemodynamic parameters (systolic BP, diastolic BP, heart rate and pulse) was carried out using « Nihon Kohden » device. All the surgeries were carried with sedation depth monitoring using « BIS Aspect » device (initial values 98 - 90).

RESULT. All 46 patients (100 %) after the initial narcosis had a decrease in HR (heart rate) and pulse by 7,7 - 66,7 % (with average value $36,4 \pm 13,5$ %) from the initial value. 32

patients (69.6 %) showed increase in systolic BP (blood pressure) by 4 - 45.8 % (average value 20.9 ± 11.5 %) and diastolic BP - by 0 - 69.2 % (average value 18.4 ± 17.6 %) in comparison with the initial values. Others 14 patients (30.4 %) showed a decrease in systolic BP by 4 - 29.7 % (average value 17.8 ± 8 %) and diastolic BP by 5.3 - 33.3 % (average value 16.7 ± 9 %). In all 46 cases the changes were observed in conditions of sufficient sedation depth BIS 15 - 25.

CONCLUSION. Thus, 30.4 % of patients with intracranial space-occupying lesions (14 patients) showed prevailing central sympatholytic effect causing decrease in HR and BP. Other 69.6 % of cases (32 patients) after initial narcosis showed prevailing peripheral vasoconstrictive effect resulting in an increase in systemic vascular resistance and BP with further decrease in the heart rate.

0641

PPV AND SVV RATIO AND MAP RESPONSE TO A FLUID CHALLENGE IN SV RESPONSIVE MECHANICALLY VENTILATED PATIENTS. A PRELIMINARY STUDY TO FIND A FUNCTIONAL HAEMODYNAMIC PARAMETER FOR FLUID RESPONSIVENESS PREDICTION

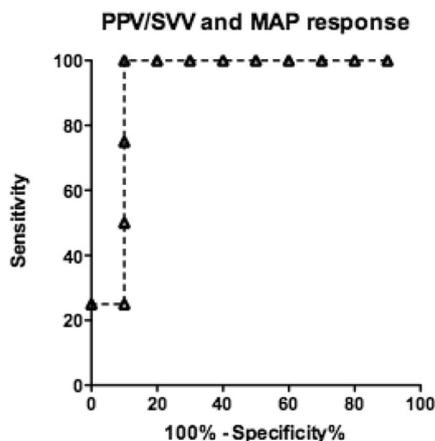
N. Di Tomasso^{1,2}, M. Vanoni¹, J. Mellinhoff¹, R.M. Grounds¹, A. Rhodes¹, M. Cecconi¹
¹St George's Hospital General Intensive Care, London, United Kingdom, ²Università degli Studi di Padova, Dipartimento di Medicina UO Anestesiologia e Terapia Intensiva, Padova, Italy

INTRODUCTION. The purpose of this study was to investigate the dynamic arterial elastance (Eadyn) defined as the ratio between pulse pressure variation (PPV) and stroke volume variation (SVV) during a fluid challenge (FC) using the PulseCO algorithm of the LiDCOTM plus monitor (LiDCO, Cambridge, UK). Eadyn provides a dynamic assessment of the arterial load², important to describe the interaction of the ejected left ventricular stroke volume (LVSV) with the arterial impedance circuit. We tested whether the Eadyn as a dynamic parameter calculated using PPV and SVV can assess the vasomotor tone of a patient and presumably predict the MAP response to a FC.

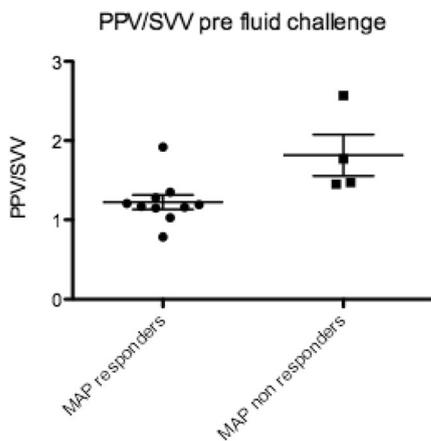
OBJECTIVES. The primary aim of the present study was to test whether the PPV/SVV ratio known as Dynamic Arterial Elastance (Eadyn), calculated with the LiDCO system at the bedside, is a reliable value to predict arterial blood pressure response to a fluid challenge in preload responsive patients.

METHODS. Patients' selection: fully sedated and ventilated critically ill patients in sinus rhythm in which a fluid challenge was indicated for clinical reasons. All data were electronically data logged. A fluid challenge consisted of 250 mls of crystalloid fluid in less than 15 min. A stroke volume (SV) response was defined as an increase of SV of at least 10 %. A MAP response was defined as an increase of at least 10 % in MAP.

RESULTS. A total of 24 FC from 11 patients were analysed. 16 FCs increased the SV ≥ 10 % (9 of them on vasopressors); 4 of them (25 %) increased the MAP ≥ 10 % (MAP responsiveness). The area under the curve for PPV/SVV was 0.92 (p 0.01). (Figure 1). A PPV/SVV of 1.4 (Figure 2) had a 100 % sensitivity and a 90 % specificity in predicting the MAP response in preload responsive patients.



[Fig. 1 The area under the curve for PPV/SVV]



[Fig. 2 PPV/SVV and MAP response]

CONCLUSIONS. The Dynamic arterial elastance calculated using the PulseCO algorithm of the LiDCO monitor predicts the mean arterial pressure increase in mechanically ventilated, preload-dependent patients.

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Patient management & outcome: 0642–0655

0642

LOW SERUM PHOSPHATE LEVELS IN CRITICAL ILLNESS

K. Agarwal¹, R. Kolamunnage-Dona², T. Steele¹, C.H. Toh³, C. Downey⁴, I.D. Welters^{1,5}

¹University of Liverpool, Institute of Ageing and Chronic Disease, Liverpool, United Kingdom, ²University of Liverpool, Institute of Translational Medicine, Liverpool, United Kingdom, ³University of Liverpool, Institute of Infection and Global Health, Liverpool, United Kingdom, ⁴Royal Liverpool and Broadgreen University Hospital, Liverpool, United Kingdom, ⁵Royal Liverpool and Broadgreen University Hospital, Critical Care, Liverpool, United Kingdom

INTRODUCTION. In order to ensure effective functioning of all cellular process, the human body precisely controls all electrolytes. Phosphate is strictly regulated within normal physiological levels. Hypophosphatemia (serum phosphate < 0.8 mmol/l) is observed in around 2 % of hospital in-patients, and it is a common occurrence within the intensive care setting. The relation between hypophosphatemia and outcome as well as time course of hypophosphatemia during critical illness remains unclear to date.

OBJECTIVES. The aims of this study were to

1. Assess effect of hypophosphatemia on patient outcomes such as mortality and length of hospital stay,
2. To investigate the time course of serum phosphate levels during the first four days of critical illness.

METHODS. Demographic data, daily serum electrolyte concentrations, APACHE, length of stay and 28-day mortality were collected on 1038 critical care admissions over a 4 year period. 987 patients met the inclusion criteria and were included in this study. The change in phosphate levels over 4 days was observed and compared between groups of high, normal and low phosphate levels using repeated measures ANOVA (RM-ANOVA). A matched pair analysis was performed to compare severe/moderate hypophosphatemia and normophosphatemia. Statistical analysis was performed with SPSS version 21. P values < 0.05 were considered significant.

RESULTS. 165 patients (16.7 %) were hypophosphatemic on admission, 9 of these patients had severe hypophosphatemia (< 0.32 mmol/l). Hypophosphatemic patients were significantly younger than those with normal phosphate levels (56.2 ± 16.3 vs. 60.1 ± 16.7 years, $p = 0.026$). Serum phosphate levels consistently declined from a mean concentration of 1.29 mmol/l on admission to 0.96 mmol/l on day 4; despite routine phosphate supplementation in hypophosphatemic patients. Alcoholism and hypothyroidism showed significant correlations with hypophosphatemia ($p < 0.001$ and $p = 0.003$ respectively). In a matched-pairs analysis of 82 normo- and 82 moderately-severely hypophosphatemic patients no effect of admission phosphate concentrations on mortality and length of stay was observed.

CONCLUSIONS. Hypophosphatemia has a high prevalence in critically ill patients. The number of patients doubled from 16.7 % on admission to 35.2 % by day 4, which confirms an association with critical illness and decreasing phosphate concentrations. Our results indicate that chronic alcoholism and hypothyroidism may have a major impact on serum phosphate concentrations during critical illness.

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0643

SURVIVAL AND QUALITY OF LIFE 18 MONTHS TO 2 YEARS AFTER DISCHARGE FROM INTENSIVE CARE

T. Katsoulas¹, E. Boutzouka¹, E. Tsigou¹, D. Karabatsou¹, G. Fildisis¹, G. Baltopoulos¹

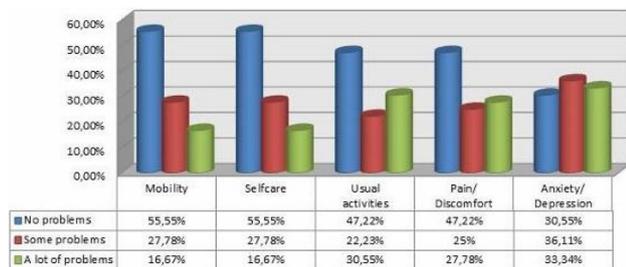
¹University ICU, General Hospital 'Agiou Anargyroi' Kifisia, Athens, Greece

INTRODUCTION. There is increasing evidence in the literature that long term outcomes after intensive care unit (ICU) discharge are poor. Patients (pts) have a high ongoing morbidity, including physical and psychological dysfunction, and a high mortality after ICU discharge. It is also generally accepted that assessment of outcome after ICU stay must include health related quality of life (HRQOL) measurements.

OBJECTIVES. To assess patients' outcomes; mortality and health related quality of life 18 months to 2 years after discharge from the ICU.

METHODS. This was an observational study of the 112 pts who survived and exited the ICU during 2011. Demographic and clinical data were collected from pts' medical records and long term survival and HRQOL were assessed by telephone interviews, that were all performed on a specific date. HRQOL was measured using the EQ-5D questionnaire, which is a generic instrument that has been translated and validated in the local population.

RESULTS. ICU mortality was 18.84 %. At follow up it was not possible to communicate with 26 pts (23.22 %), whereas 50 pts (44.64 %) had died; 42 of them during the first six months after discharge from the ICU (36 pts during the first month). Thirty six pts were finally interviewed, 23 male, age 66.5 ± 2.52 years, APACHE II score 13.53 ± 0.85 , and length of ICU stay 16.81 ± 5.83 days. Frequency of severe problems in mobility, self care, usual activities, pain/discomfort and anxiety/depression, 18 to 24 months after discharge from the ICU, assessed by EQ-5D, is shown in figure 1.



[Figure 1: EQ-5D results]

CONCLUSIONS. ICU mortality was low, but mortality during the first year after discharge and especially during the first post discharge month was high, indicating the necessity of step down units. HRQOL of survivors was satisfactory concerning mobility and self care. A moderate restriction of usual activities was found and almost one-third of patients were suffering from pain and anxiety.

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0644

THE ASSOCIATION OF VITAMIN D STATUS AND POST-DISCHARGE OUTCOMES IN CRITICAL ILLNESS SURVIVORS

H. Kang¹, S.W. Purtle², T. Moromiazato³, F.K. Gibbons⁴, K.B. Christopher¹

¹Brigham and Women's Hospital, Renal Division, Boston, United States, ²University of Colorado, Pulmonary Critical Care, Aurora, United States, ³Hokubu Prefectural Hospital, Department of Medicine, Nago, Japan, ⁴Massachusetts General Hospital, Pulmonary and Critical Care, Boston, United States

INTRODUCTION. Hospital readmissions contribute significantly to the cost of inpatient care and are targeted as a marker for quality of care. Little is known about risk factors associated with hospital readmission in survivors of critical illness.

OBJECTIVES. We hypothesized that pre-hospitalization vitamin D deficiency in patients who survived critical care would be associated with increased risk of 30-day post-discharge hospital readmission.

METHODS. We performed a two center observational study of patients treated in medical and surgical intensive care units in Boston, Massachusetts. All data was obtained from the Research Patient Data Registry at Partners HealthCare. We studied 1,245 patients, age ≥ 18 years, who received medical critical care between 1998 and 2011 and survived hospitalization. All patients had serum 25(OH)D measured before hospitalization. The exposure of interest was 25(OH)D categorized as < 15 ng/mL, 15-29.9 ng/mL, and ≥ 30 ng/mL. The primary outcome was hospital readmission in the 30 days following hospital discharge. Adjusted odds ratios were estimated by multivariable logistic regression models with inclusion of covariate terms thought to plausibly interact with both 25(OH)D levels and readmission status. Adjustment included age, race (white versus non-white), gender and Deyo-Charlson Index.

RESULTS. In the cohort 21 % were readmitted within 30 days. The mean 25(OH)D was 29 ng/mL. The cohort was 38 % male, 78 % white, had 18 % with sepsis and a mean age of 66.9 years. In patients who received critical care and survived hospitalization, pre-hospitalization 25(OH)D status was a robust predictor of hospital readmission and remained so following multivariable adjustment. The odds of 30-day post-discharge hospital readmission in patients with 25(OH)D < 15 ng/mL and 15-29.9 ng/mL were 1.60 (95 %CI, 1.11, 2.31) and 1.55 (95 %CI, 1.13, 2.13) respectively, relative to patients with 25(OH)D ≥ 30 ng/mL. Following adjustment, the odds of 30-day post-discharge hospital readmission in patients with

25(OH)D < 15 ng/mL and 15-29.9 ng/mL were 1.51 (95 %CI, 1.03, 2.20) and 1.54 (95 %CI, 1.12, 2.12) respectively, relative to patients with 25(OH)D ≥ 30 ng/mL.

CONCLUSIONS. Patients with vitamin D deficiency are among a high-risk group of ICU survivors for adverse outcomes. In patients treated with critical care who survive hospitalization, pre-hospitalization vitamin D deficiency is a robust predictor of subsequent unplanned hospital readmission. If our hypothesis is correct, these critical illness survivors with vitamin D deficiency might benefit from a more thorough follow-up schedule or longitudinal care in a multidisciplinary post-ICU clinic.

0645

THE ASSOCIATION BETWEEN NEUTROPHIL-TO-LYMPHOCYTE RATIO AND MORTALITY IN CRITICAL ILLNESS

J. Salciccioli¹, D. Marshall¹, M. Pimentel², M. Santos², T. Pollard³, J. Shalhoub¹

¹Imperial College London, London, United Kingdom, ²University of Oxford, Oxford, United Kingdom, ³University College London, London, United Kingdom

BACKGROUND. The Neutrophil-to-Lymphocyte Ratio (NLR) has been independently associated with outcomes in a variety of patient populations (1, 2). NLR is proposed as a marker of systemic inflammation and has been most extensively investigated in patients with malignancy, in addition to individuals with cardiovascular (3) and respiratory disease (4). The association between NLR and outcomes in critical illness has yet to be elucidated. **OBJECTIVE.** The objective of this study was to assess the relationship between NLR and mortality in a population of critically ill patients in adult intensive care units (ICUs).

METHODS. We performed a retrospective cohort study of unselected adult patients requiring ICU admission from the Multiparameter Intelligent Monitoring in Intensive Care (MIMIC-II) database (5). Using multivariable logistic regression we assessed the independent association of NLR quartiles and 28-day mortality. Secondary outcomes included mortality in the ICU, in-hospital mortality, and mortality at 1 year. An a priori analysis of patients with and without sepsis was performed to compare any differences in the relationship between NLR and outcomes in these sub-groups.

RESULTS. A total of 5056 patients met criteria for inclusion. Mean age of cohort was 63 years, 47 % female, and 28-day mortality was 12 %. The median NLR for the entire cohort was 8.9 (IQR: 4.99-16.21). Following multivariable adjustments, there was a

stepwise increase in mortality with increasing quartiles of NLR (1st quartile: Ref.; 2nd quartile OR: 1.36, 95 % CI: 1.06-1.74; 3rd quartile OR: 1.47, 95 % CI: 1.15-1.89; 4th quartile OR: 1.78, 95 % CI: 1.41-2.25). A similar stepwise relationship was identified in the subgroup of patients who presented without sepsis. However, in patients with sepsis upon admission, NLR was not associated with 28-day mortality. Increasing quartile of NLR was statistically significantly associated with secondary outcomes.

CONCLUSION. The Neutrophil-to-Lymphocyte Ratio is independently associated with outcomes in unselected critically ill patients suggesting that this may be a useful prognostic biomarker in this population. In contrast to previous studies (1), we did not identify a statistically significant relationship between NLR and mortality in patients with sepsis. Further investigation is required to understand the pathophysiology of this relationship and to validate these findings with prospective multi-center data.

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0646

QUALITY OF LIFE AND FUNCTIONAL OUTCOME IN PATIENTS WITH TRAUMATIC BRAIN INJURY AT DISCHARGE OF INTENSIVE CARE UNIT

M.D. Arias-Verdu^{1,2}, R. Gutiérrez-Rodríguez¹, M. Delange-Van Der Kroft³, E. Curiel-Balsera¹, A. Muñoz-López¹, J.F. Fernández-Ortega¹, M.A. Prieto-Palomino¹, R. Rivera-Fernández¹

¹Hospital Regional Universitario Carlos Haya, Intensive Care Unit, Málaga, Spain, ²University of Málaga, Málaga, Spain, ³County Hospital of Axarquía, Intensive Care Unit, Málaga, Spain

INTRODUCTION. our objective was to analyze physical and functional status after being discharged from the ICU, and the quality of life 1 year later.

METHODS. Cohort study with adult patients admitted to the ICU from 2004 to 2008 with severe CET. Demographic, epidemiologic and clinical data were recorded. Validated measure scales used were GCS, GOS, ISS and the quality-of-life questionnaire PAEEC (Project for the Epidemiological Analysis of Critical Patients). Multivariate analysis identified predictor factors of mortality. Results N = 323 patients with a median age of 32 years old, 79.6 % males, who suffered severe CET secondary to traffic (57.6 %) or falling (29.8 %) accidents. Cranial computed tomography (CT) scan most frequent findings were diffuse injury III (30 %) in Marshall classification; ISS first median was 33; APACHE II, 19; length of stay, 6 days (10 days if we take away those who died very soon); days on mechanical ventilator, 8. Total GCS at admission/discharge was 5/10 ($P = 0.001$). GOS 4 to 5 at discharge from the ICU was 14.4 % and 1 year later was 54.1 % ($P = 0.001$). Mortality in the ICU was 33.1 %. Predictors of mortality were the length of stay ($P = 0.0001$), GCS at admission ($P = 0.05$), CT findings type III, IV and V ($P = 0.014$, 0.001 and 0.028, respectively), complications ($P = 0.0001$), tracheotomy ($P = 0.028$), days on ventilator ($P = 0.0001$) and APACHE II ($P = 0.025$). One year after discharge, 159 from 216 patients answered the questionnaire (73.6 %): severe physiologic dysfunction, great dependence in activities of daily living and emotional disturbances were detected when leaving the ICU and marked as 59.3, 88.6 and 70.1 %, while 1 year after they were 18.9, 32.1 and 35.8 %, respectively ($P = 0.0001$).

CONCLUSIONS. The most frequent cause of TBI were traffic accidents, affected young adults and the mortality was over 33 % in the ICU. Factors independently associated with increased mortality were coma level, type of findings in CT, complications, prolonged mechanical ventilation, length of stay, APACHE II, and the need for a tracheotomy. One year later, survivors showed a better GOS and physiologic capacity.

0647

COMPARABLE SURVIVAL OF CRITICALLY ILL PATIENTS ADMITTED TO THE ICU FOLLOWING REDUCED INTENSITY AND MYELOABLATIVE CONDITIONING ALLOGENEIC STEM CELL TRANSPLANTATION

P.L.J. van der Heiden¹, M.S. Arbous¹, W. van Beers², W.M. van den Bergh³, C. Hess⁴, N. Kusadasi⁵, W.A.F. Marjit⁶, M.C. Muller⁷, P.R. Tuinman⁸, M. van Vliet⁹, D.J. van Westerloo¹, N. Blijlevens⁹, HemC Study Group

¹Leiden University Medical Center, Intensive Care, Leiden, Netherlands, ²Academic Medical Center, Hematology, Amsterdam, Netherlands, ³University Medical Center Groningen, Intensive Care, Groningen, Netherlands, ⁴VU University Medical Center, Hematology, Amsterdam, Netherlands, ⁵Erasmus Medical Center, Intensive Care, Rotterdam, Netherlands, ⁶Leiden University Medical Center, Hematology, Leiden, Netherlands, ⁷Academic Medical Center, Intensive Care, Amsterdam, Netherlands, ⁸VU University Medical Center, Intensive Care, Amsterdam, Netherlands, ⁹Radboud University Medical Center, Hematology, Nijmegen, Netherlands

INTRODUCTION. Allogeneic stem cell transplantation (alloSCT) is a potential curative treatment for hematological diseases but is associated with significant morbidity and mortality. Studies on survival following Intensive Care (ICU) admission after alloSCT report low survival rates (6%-48%). A recent study reported improved ICU survival following reduced intensity conditioning (RIC) alloSCT, a less cytotoxic regimen compared to conventional myeloablative conditioning (MAC), 51 % vs. 27 %, OR 2.89¹. However, this study was limited due to a small number of RIC patients (n = 37). We analyzed ICU survival in a large multicenter cohort of patients after RIC and MAC alloSCT.

OBJECTIVES. The primary objective was to determine whether the type of conditioning is a prognostic factor for ICU, 30-day, hospital and 1-year survival of patients after alloSCT. The secondary objective was to evaluate whether other transplantation related factors or clinical parameters on ICU admission predicted ICU, 30-day, hospital and 1-year survival of patients after alloSCT.

METHODS. The prospectively collected data set of the Dutch National Intensive Care Evaluation (NICE) registry was used to analyse the survival and prognostic factors of alloSCT patients admitted to the ICU of six university hospitals during 2003-2011. Only first ICU admissions of individual patients within 2 years after alloSCT were included in the analysis.

RESULTS. A total of 228 patients (123 MAC and 105 RIC) were included. ICU, 30-day, hospital and 1-year survival were 50, 44, 32 and 20 %. No difference in survival was found between RIC and MAC patients. Although RIC patients were older (median 58 vs. 43 yrs, $p < 0.001$), were transferred to the ICU at a later time point following alloSCT (median 168 vs. 48 days, $p < 0.001$) and had higher APACHE II scores (23.4 vs. 20.6, $p = 0.014$), multivariate analysis with backward selection of predictors did not demonstrate a significant difference in survival in RIC and MAC patients (OR for mortality 0.982, 95 % CI 0.58-1.66,

$p = 0.95$). Analysis of all patients showed that the use of a matched unrelated donor (OR 2.1, 95 % CI 1.1-4.2, $p = 0.025$), absence of neutropenia (OR 0.36, 95 % CI 0.18-0.73, $p = 0.004$), APACHE II score (OR 1.07, 95 % CI 1.02-1.12, $p = 0.007$) and serum bilirubin (OR 1.01, 95 % CI 1.01-1.02, $p = < 0.001$) at admission predicted mortality.

CONCLUSIONS. This is the largest study to date comparing the impact of RIC to MAC on ICU survival of alloSCT patients. In contrast to recent literature, we demonstrate comparable ICU, 30-day, hospital and 1-year survival of patients following RIC and MAC alloSCT. Furthermore, the use of a matched unrelated donor, absence of neutropenia, higher APACHE II score and increased serum bilirubin at admission independently predicted mortality of ICU admitted alloSCT patients.

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0648

WITHDRAWAL OF LIFE-SUSTAINING THERAPY IN CLINICAL TRIALS IN CRITICAL CARE: A SYSTEMATIC REVIEW

S. Tétrault¹, M. Shemilt², G. Leblanc¹, A. Boutin², F. Lauzier^{1,2,3}, M. Chassé^{1,4}, R. Zarychanski⁵, D. Fergusson⁴, A.F. Turgeon^{1,2}

¹Université Laval, Division of Critical Care Medicine, Department of Anesthesiology and Critical Care Medicine, Québec, Canada, ²CHU de Québec Research Center, Population Health and Optimal Health Practices Research Unit (Trauma - Emergency - Critical Care Medicine), Québec, Canada, ³Université Laval, Department of Medicine, Québec, Canada, ⁴Ottawa Hospital Research Institute, Clinical Epidemiology Unit, Ottawa, Canada, ⁵University of Manitoba, Department of Internal Medicine, Section of Critical Care Medicine, Winnipeg, Canada

INTRODUCTION. In critical care research, mortality is generally considered the most clinically significant outcome. In adults who die in the intensive care unit, death is frequently preceded by a decision to withdraw or withhold life-sustaining therapies (WLST).

This decision, made by patients or surrogate decision makers, is based on several factors, including the prognostic evaluation by the medical team, the premonitory condition of the patients, and the patients' wishes. In clinical trials, the impact of WLST on the assessment of a critical care intervention in terms of mortality has not been carefully reviewed.

OBJECTIVES. To evaluate the incidence of reporting of WLST in critical care clinical trials and to report its potential impact on study results.

METHODS. We conducted a systematic review of randomized controlled trials in critically ill adult patients published in 20 selected relevant journals from 2008 to 2013 and reporting mortality as the primary outcome. We searched Medline, Embase, and Cochrane Central. The primary outcomes were the proportion of trials reporting WLST and how its potential impact on the trial results was evaluated. Secondary outcomes were the frequency of WLST, reporting of timing and justification for WLST, consideration of WLST in the sample size calculation, interpretation of the potential impact of WLST and assessment of factors that may influence WLST. The risk of bias was assessed using the Cochrane tool.

RESULTS. From 4610 records identified, we included 40 trials. We found 25 % (10/40) of trials to be at low risk of bias, 27.5 % at high risk (11/40), and 47.5 % (19/40) at unclear risk. Mortality in the intervention groups ranged from 11 % to 85 % (mean 32 %) and from 11 % to 72 % (mean 32 %) in the control groups. Among the 40 trials included, 5 (12.5 %) reported WLST. Proportion of WLST among deaths was reported in five trials and ranged from 9 % to 91 %. Timing of WLST (median: 6 days) was reported in only one trial whereas a justification for WLST was reported in three trials ('further therapy not indicated', 'imminent death', 'terminally ill' or 'family consensus'). Two trials reported factors associated with the decision to WLST, namely poor prognosis or functional outcome. WLST was indirectly considered in 27 trials for sample calculation (enrolment after a certain period following admission, inclusion only if expected to survive, excluded if moribund) and directly in one trial (greater sample size to account for possible WLST). WLST was never considered in data interpretation.

CONCLUSIONS. WLST is generally not considered in the design of RCTs, is rarely reported, and its potential impact on trial results or interpretation is uncertain. Considering the variation in the frequency of WLST, we recommend that trials with mortality as the primary outcome measure report WLST for each study group and consider the impact of WLST in data interpretation.

0649

INPATIENT CARE BEFORE INTENSIVE CARE: A RELEVANT PROXY FOR PRE-EXISTING DISEASE IN QUALITY OF LIFE RESEARCH?

L. Orwelius¹, M. Husberg², L. Bernfort², P. Carlsson², M. Fredrikson³, S. Walther⁴, F. Sjöberg¹

¹Linköping University, Departments of Intensive Care, Clinical and Experimental Medicine, Linköping, Sweden, ²Linköping University, Center for Medical Technology Assessment, Department of Medicine and Health Sciences, Linköping, Sweden, ³Linköping University, Clinical and Experimental Medicine, Linköping, Sweden, ⁴Linköping University, Medicine and Health Sciences, Linköping, Sweden

INTRODUCTION. Pre-existing disease is the most important factor in the prediction of health-related quality of life (HRQoL) after intensive care. We hypothesised that the "episodes of inpatient care" in the years (1-3) before admission to the ICU is a stronger predictor of HRQoL and mortality after intensive care than diagnosis of pre-existing disease, and it is also an important burden on hospital resources.

METHODS. Retrospective analysis of recording at two sites. All adults (> 17 years) who had stayed in the ICU for longer than 24 h ($n = 631$). Episodes of inpatient care were assessed from the hospitals' central databases. HRQoL (SF-36) where measured 6, 12, and 24 months after discharge.

RESULTS. A total of 459 patients (73 %) of the patients in ICU had coexisting diseases and among them, 360 (57 %) had at least one episode of inpatient care less than 3 years before the period in ICU, during which the group used significantly more hospital resources than the combined cost of all ICU care during the same time. The addition of episodes of inpatient care (0; 1, or > 1) ($p = 0.003$) to the regression model strongly reduced the effect of the diagnosis of pre-existing disease (0;1 > 1) on HRQoL ($p = 0.085$) and it was also a strong predictor for early mortality after ICU ($p < 0.001$).

CONCLUSIONS. Episodes of inpatient care before and after admission to ICU uses considerable hospital resources, and is a better predictor of HRQoL than diagnoses of pre-existing disease. This finding further strengthens the importance of pre-existing disease in the HRQoL measure after critical care.

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0650

PERIOPERATIVE RISK FACTORS OF PRESSURE ULCERS IN SICU PATIENTS

M.J. Lee¹, S. Na², S.O. Koh², J. Kim²

¹Severance Hospital, Anesthesiology and Pain Medicine, Seoul, Korea, Republic of,

²Severance Hospital, Anesthesiology and Pain Medicine, Intensive Care Unit, Seoul, Korea, Republic of

INTRODUCTION. Pressure ulcers (PU) are localized injuries to the skin and/or underlying tissue, resulting in increased length of hospital stay, morbidity, and adverse outcomes. However, very little attention has been paid to peri-operative risk factors of postoperative pressure ulcers in surgical patients. The purpose of this study is to evaluate and validate preoperative and intra-operative risk factors for postoperative pressure ulcers in intensive care unit (ICU) patients.

METHODS. A retrospective case-control observational design was adapted by using electronic medical record from Jan. 2012 to Dec. 2013 of 126 patients who had undergone surgical procedures and admitted in ICU. Among them, 42 patients caught pressure ulcer, categorized over stage II. Each case paired with two controls has identical values on matching factors such as age, sex and surgical procedures. Univariate and stepwise logistic multivariate analyses were performed. A clinical nomogram to predict postoperative pressure ulcer was constructed and validated internally.

RESULTS. Postoperative pressure ulcers were developed in 4.2 % of ICU patients in this study and two independent preoperative risk factors were identified in them. The significant relationship was found between matched dataset and albumin and lactate level measured preoperatively (OR, 0.20; $P = 0.022$, OR, 1.68; $P = 0.031$, respectively).

variables	PU (n = 43)	no PU (n = 83)	OR (95 % C.I.)	p-value
preop. albumin		3.13 ± 0.83	3.71 ± 0.57 0.20(0.051 ~ 0.793)	0.022
preop. lactate	3.23 ± 2.92	1.26 ± 0.94	1.68(1.048 ~ 2.689)	0.031
intraop. bleeding		4218.60 ± 9033.91	1721.16 ± 2961.07 1.000(1.00 ~ 1.00)	0.518
Braden scale	12.49 ± 2.71	14.44 ± 2.84	0.86(0.618 ~ 1.20)	0.377
postop. ventilator care		38	45	
	0.13(0.01 ~ 1.85)	0.133		

[Multivariate analysis]

Validated set was differentiated well with the area under the curve (AUC) of 0.875 (95 % confidence interval, 0.79-0.97). The predicted and the actual probabilities were calibrated with the clinical nomogram.

CONCLUSIONS. This study successfully developed new predictive model of post-operative pressure ulcer in ICU patients after surgery.

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0651

RELATIONSHIP BETWEEN REBLEEDING AFTER SUBARACHNOID HEMORRHAGE AND MORTALITY IN A CRITICAL CARE UNIT

I. Macias-Guarasa¹, M.D. Arias-Verdu¹, E. Banderas-Bravo¹, E. Curiel-Balsera¹, R. Rivera-Fernandez², E. Castillo-Lorente², M.A. Arreaz-Sanchez², E. Aguilar-Alonso⁴, G. Quesada-Garcia¹

¹Carlos Haya University Hospital, Intensive Care Unit, Malaga, Spain, ²Neurosurgical Hospital Jaen, Intensive Care Unit, Jaen, Spain, ³Carlos Haya University Hospital, Neurosurgical Department, Malaga, Spain, ⁴Infanta Margarita Hospital, Intensive Care Unit, Cabra, Spain

OBJECTIVES. To evaluate rebleeding in patients admitted to ICU for SAH.

METHODS. We study all patients admitted in our critical care unit, after subarachnoid hemorrhage between 2008 and 2013. We analyzed demographic variables, gravity, mortality and treatment. T-Student was applied for continuous variables and χ^2 for qualitative variables. **RESULTS.** $N = 303$. Age 53.99 ± 13.22 . Mean APACHE II score: 14.55 ± 7.61 . Glasgow Coma scale (GCS) on admission 11.91 ± 4 . Fisher I: 5.4 %, 19.1 %, II, 26.1 %; III and 49.5 %; Fisher IV. ICU mortality: 13.2 %, hospital mortality 16.8 %.

Arteriographic findings: aneurysms 80 %, arteriovenous malformation 2 %, without findings 13 %, unexplored 5 %. Treatment: endovascular 61 %, clipping 16 %. Of those patients receiving endovascular treatment, 19 (6.3 %) patients rebled. 89.5 % were Fisher grade IV; of 148 Fisher IV patients 17 (11.5 %) rebled, and of 151 grade I, II and III only 2 (1.3 %) ($p < 0.001$) rebled. 9 patients (45 %) who rebled did so during the first day of admission to ICU and 8 (40 %) after clipping or endovascular treatment. 42.1 % of those who rebled on admission to ICU presented affected pupils.

Mortality among those who rebled was 57.2 %; in compared with the rest, 3.2 % ($p < 0.001$). Patients who died presented no significant differences in age 53.27 ± 12.93 as opposed to 54.14 ± 13.30 years ($p = 0.81$). In addition, this group of patients, 57.2 %, had greater gravity evaluated by APACHE II, 20.72 ± 7.62 as opposed to 13.3 ± 6.99 points ($p < 0.001$) and lower GCS on admission, 7.53 ± 4.58 vs 12.8 ± 3.52 points ($p < 0.001$). Among those who presented affected pupils on admission, died 56 % and only 9 % of those who did not ($p < 0.001$). Multivariable analysis, showed that hospital mortality was linked to pupillary abnormalities on admission, GCS on admission and rebleeding OR: 3.68 (1.54-8.76).

CONCLUSIONS. Rebleeding is an infrequent but grave complication but it was linked to mortality. In a high number of cases it occurs on the first day of admission to ICU and prior to admission.

0652

GENDER-RELATED DIFFERENCES IN THE DELIVERY AND OUTCOME OF CRITICAL ILLNESS - A RETROSPECTIVE OBSERVATIONAL STUDY

P. Zajac¹, C. Schned², T.R. Pieber², H. Dobnig², I. Zollner-Schwetz³, T. Urbanic⁴, M. Rigaud¹, W. Toller¹, D. Wagner², K. Amrein¹

¹Medical University of Graz, Department of Anaesthesiology, Graz, Austria, ²Medical University of Graz, Division of Endocrinology and Metabolism, Graz, Austria, ³Medical University of Graz, Division of Infectious Diseases, Graz, Austria, ⁴Medical University of Graz, Department of Neurology, Graz, Austria, ⁵Medical University of Graz, Department of Surgery, Graz, Austria

INTRODUCTION. Landmark ICU trials typically include 60 to 70 % male in comparison to 30 to 40 % female patients. Critically ill women also seem to have worse outcomes than men [1-2] and are less likely to receive critical care including life supporting treatments [1]. In contrast, in pediatric critical care, gender distribution seems to be equal. Regarding vitamin D status, gender related differences have been reported in large observational studies [3].

OBJECTIVES. We aimed to evaluate a) the gender distribution and b) possible differences in vitamin D levels and other clinical/laboratory parameters between male and female critically ill patients.

METHODS. We used data from our retrospective dataset of 655 mixed surgical/medical adult critically ill patients with available 25(OH)D levels hospitalized at the University Medical Center of Graz between 2008 and 2010.

RESULTS. Overall, 63 % of the patients in our cohort were men. Numerical differences were found between medical (61 %), mixed surgical (62 %) and cardiothoracic surgical patients (70 %, $p = 0.275$ between categories). Women had lower SAPS2 admission scores at ICU admission, but other clinical and laboratory parameters including vitamin D status, length of stay and mortality were not significantly different between male and female patients. Table 1 gives detailed information.

N = 655	Men	Women	p
% of total population	62.9 %	37.1 %	<0.001
Age, years (mean)	61.5 ± 16.5	62.4 ± 16.8	0.518
SAPS2 at ICU admission	30 ± 17	27 ± 13	0.008
25(OH)D, ng/ml	20.4 ± 11.7	18.2 ± 10.4	0.107
parathyroid hormone, pg/ml, median (IQR)	46.7 (45.6)	51.6 (48.3)	0.200
ionized calcium, mmol/l	1.09 ± 0.10	1.11 ± 0.13	0.102
glomerular filtration rate, ml/min	84 ± 56	82 ± 50	0.548
ICU stay, days	10.5 ± 15.1	9.1 ± 11.3	0.171
ICU mortality (%)	14.4 %	13.0 %	0.614

[Table 1]

CONCLUSIONS. Similar to previous studies in adult critical care, significantly more patients treated in the ICU were men and this was consistent across all ICU types in our adult cohort of mixed critically ill patients [1, 4]. Vitamin D levels were comparable and we did not find significant differences in clinical outcome between male and female patients, although statistical power is limited due to relatively small sample size. Future studies should address the reasons for this gender inequality in admission to intensive care.

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0653

A "REAL LIFE" COST EFFECTIVENESS ANALYSIS USING PROCALCITONIN ON PATIENTS UNDERGOING ANTIBIOTIC THERAPY IN ICU

V. Bonato¹, N. Vivaldi¹

¹Assos. Antonio e Biagio e Cesare Arrigo, Anestesia e Rianimazione, Alessandria, Italy

AIM OF THE STUDY. This study has the aim to evaluate the economical benefit coming from the use of Procalcitonin as a marker to guide antibiotic therapy in intensive care unit.

MATERIALS & METHODS. During an observational period of 1 month, 30 patients have been enrolled, for each one the description of the clinical data, PCT value, PCR value, leucocytes, temperature and antibiotic therapy dose have been registered. In the meantime also the cost related to the antibiotic therapy has been registered. We have continued to register the data for each patient every day of stay in the ICU. For each patient the total cost and the number of days of antibiotic therapy has been calculated. The same data has been calculated in relation to the decisional algorithm proposed by Bouadma et al. (Lancet, 2010). Finally the difference between the real life data observed and the data coming from the algorithm has been calculated.

RESULTS. The analysis showed a big deviation in the way to give AB therapy, either the way of starting or stopping antibiotics. The cumulated data shows that 222 days of AB therapy have been given where 128 should have been given whether the PRORATA algorithm would have been closely followed. This might have been led to a potential savings of 94 days (43 %) of therapy. The total amount of costs of AB therapy registered is 19901,607 Euro. In case of PRORATA algorithm it would have been of 15456,607 Euro. The resulted potential savings is about 4445,216 Euro (22 %).

CONCLUSIONS. The use of Procalcitonin in the process of AB Stewardship may result effective to reduce AB days and costs of AB therapy.

0654

STUDY OF PREDICTIVE FACTORS FOR MORTALITY IN PATIENTS UNDERGOING DOUBLE PROSTHETIC VALVE REPLACEMENT AND CORONARY BYPASS SURGERY

I. Macías-Guarasa¹, R. Gutierrez-Rodriguez¹, F.J. de Miguel-Aparicio², R. Rivera-Fernandez¹, M.D. Arias-Verdu¹, G. Quesada-García¹

¹Carlos Haya University Hospital, Intensive Care Unit, Málaga, Spain, ²Carlos Haya University Hospital, Málaga, Spain

OBJECTIVE. To identify the risk factors associated with mortality in patients undergoing cardiac surgery.

MATERIALS AND METHODS. A retrospective, observational study of patients admitted between 2009-2012 after cardiac surgery. Exclusion factors: none. We analyzed demographic factors, scores (APACHE II, Euroscore, Charlson index), hemodynamic conditions prior to surgery, preoperative criteria for transfusion (haemostatic problems, loss greater than 1 liter, hemodynamic instability, anuria, pre-transfusion mean hemoglobin < 7, platelets < 70000, prothrombin time < 40 %), surgery times, type of surgery, ICU and hospital mortality. Statistics used: mean, median, typical deviation. Analysis of qualitative variables related to mortality by Chi square, quantitative variables analyzed according to the Student T test. Multivariable analysis by logistical regression.

RESULTS. A total of 243 patients were studied. Mean age 67.5 ± 12 years, Charlson Index 4.5 ± 2, APACHE II 15.3 ± 6.5. In the single variable analysis the following factors were linked significantly ($P < 0.05$) to mortality: advanced age > 65 years, stays longer (than a week), previous renal failure, previous treatment with antiplatelets or anticoagulants, previous surgery, prior gravity (Euroscore > 7, APACHE II > 14), pulmonary complications, excessive bleeding postoperatively (defined as more than 100 cc per hour of drainage), need for vasoactive drugs, prolonged mechanical ventilation, infections and multiple transfusions. In the multivariable analysis significant ($P < 0.05$) and independent links were found to mortality: male gender, OR 1.047 (CI 95 % 0.5-2.044), advanced age OR 7.33 (CI 95 % 2.53-21.22), multiple transfusion (> 4 blood concentrates, > 900 cc of plasma, > 2 pools de platelets) during the entire admission OR 2.396 (CI at 95 % 1.25-4.5), prolonged surgery times (> 225 min) OR 1.08 (CI at 95 % 0.566-2.059), type of surgery (double prosthetic valve) OR 1.609 (CI at 95 % 0.48-5.37), postoperative pneumonia OR 7.618 (CI at 95 % 3.12-18.55), and very high rates of positive fluid balance OR 4.807 (CI at 95 % 2.44 -9.44).

CONCLUSIONS. This study suggests that multiple transfusions, previous renal failure, worse scores (Euroscore and APACHE II) may be predictors of postoperative mortality especially in elderly patients. Further studies would be useful to redefine the exclusion criteria for patients admitted for this type of major surgery.

0655

THE DISCUSSION OF OUR QUESTIONNAIRE SURVEY TO NURSES AND DOCTORS ABOUT MULTIDISCIPLINARY COOPERATION

H. Imahase¹, K. Matsumoto², M. Beppu³, Y. Sakaguchi², Y. Sakamoto¹

¹Saga University Hospital, Emergency Medicine, Saga, Japan, ²Saga University Hospital, Intensive Care Medicine, Saga, Japan, ³Saga University Hospital, Nursing Department, Saga, Japan

INTRODUCTION. In medical treatment and care, it is increasingly important to share the policy of treatment and care and understand each opinion of each occupation. If there is a mismatch, it increases the frustration of the staff, which leads them to burn-out(1).

OBJECTIVES. In Japan, multidisciplinary cooperation becomes popular in ICUs of some hospitals; the academic and community hospitals in the urban area like Tokyo and Osaka. We examined the current situation of the ICU in our university hospital which is in the rural area.

METHODS. We did the questionnaire survey to 10 doctors and 90 nurses in June 2013. The points of questionnaire are below:

Their character: occupation, sex, and experience

Do you have the multidisciplinary discussion about the policy of the patient treatment and care?

Who explains the condition of the patient and gets his or her consent?

Is there the care or treatment you can't understand or be satisfied with?

When you can't understand or be satisfied with, do you take any action?

Finally, can you understand or be satisfied with?

RESULTS. We had the answers from nurses(72/90) and doctors(9/10).

The care or treatment you can't understand or be satisfied with is present; the nurses(31/72) and doctors(6/9) answered yes and nurses(30/72) said 'can't answer'.

In the cases they felt understandable or unsatisfied with, 50 % of nurses and 100 % doctors actually took some action as opening talk or having the conference. However, 59 % of nurses taking action couldn't understand or be satisfied with finally.

One cause of this condition is that there were many cases only doctors performed decisions and explained to patients. Also some nurses complained that many doctors wouldn't listen to the opinion of the nurses.

DISCUSSION. Multidisciplinary cooperation is permeated in some places like in Europe and the United States, but in Japan (especially in rural areas), doctors have decided almost everything.

We should progress multidisciplinary cooperation. However, in rural areas where a few doctors and nurses have to practice so many patients, we demand the different style of multidisciplinary cooperation based on Japanese ethnicity and the each staff's individuality. Going forward, we will conduct a survey regularly to consider and construct our own multidisciplinary cooperation.

CONCLUSIONS. We did the questionnaire survey about multidisciplinary cooperation in our hospital.

It turned out not to be a good situation then and we found the problems. We are now seeking a better multidisciplinary cooperation thinking global and acting local.

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Traumatic brain injury: 0656–0669

0656

RESTING ENERGY EXPENDITURE AND TRANSCRANIAL DOPPLER FOR THE EARLY RECOGNITION OF BRAIN DEAD PATIENTS

E. Kiourtzieva¹, E. Koco¹, M. Oikonomou¹, E. Soilemezi¹, C. Pazvanti¹, D. Matamis¹

¹Papageorgiou General Hospital, ICU, Thessaloniki, Greece

INTRODUCTION. Heavy sedation is usually administered in patients with intracranial pathology to decrease intracranial pressure (ICP). When the outcome of these patients evolves to brain death by clinical criteria, the sedation administered impedes the early performance of brain death clinical tests. Serial measurements of Transcranial Doppler (TCD) may help through the evolution of the blood flow velocities pattern for the early diagnosis of brain Death (BD). It has been shown that Resting Energy expenditure (REE)

measured by indirect calorimetry is decreased in brain dead patients and Basal Metabolic Rate (BMR) decreases below 100 %, independently of the sedation administered.

OBJECTIVES. Serial measurements of TCD and REE were performed simultaneously in patients with intracranial pathology to evaluate these two techniques for the early recognition of brain death.

METHODS. All patients with intracranial pathology for a period of one year were included in the study. All of them were treated medically and if needed surgically according to their primary disease and the CT scan and ICP findings. All of them were followed daily with simultaneous TCD and REE measurements until the final outcome (dead or alive). TCD and REE measurements between BD and non BD patients were compared. BD was diagnosed by clinical criteria (absence of brain stem reflexes) twice by three clinicians simultaneously, with a time difference between the two tests of at least 8 h. Statistics were performed with the SPSS calculation package.

RESULTS. Thirty nine patients (20 M and 19F), 17 suffering from head trauma and 22 from intracerebral hemorrhage were included in the study. Among the 39 patients, 13 developed brain death by clinical and TCD criteria (reversed flow or absence of flow in the Middle Cerebral Artery bilaterally). No difference in age was found between BD and non-BD patients (57 ± 20 vs 59 ± 10 years). On the contrary a highly statistical difference was found in REE and BMR between the two groups (694 kcal/day vs 1966 kcal/day and 46 % vs 131 % respectively). BD patients were hypothermic compared to non BD patients (35.9 vs 37.9). Multiple regression analysis revealed that REE and BMR were independently associated with BD. Interestingly three patients with sub-tentorial lesions were found BD by clinical criteria but not BD by TCD criteria. These patients had extremely high BMR (168 % ± 26). However, when these patients developed BD by TCD criteria BMR decreased to 46 %.

CONCLUSIONS. Indirect calorimetry and TCD may be of value in patients with intracranial pathology for the early diagnosis of BD or to exclude false diagnosis, by clinical criteria, of brain death in patients with sub-tentorial lesions.

0657
CONTINUOUS MONITORING OF CEREBRAL BLOOD FLOW (CBF) AND CEREBRAL TEMPERATURE IN NEUROCRITICAL CARE UNIT

M.C. Casadio¹, M.G. Abate², A. Vargiolu², F. Sala², A. Patrino², C. Cadore², M. Rota², G. Citerio²

¹Università degli Studi di Milano Bicocca, Milano, Italy, ²Ospedale San Gerardo, Monza, Italy

INTRODUCTION. The balance between heat generation and heat removal by cerebral blood flow defines brain temperature in humans and other large animals. In physiological conditions brain metabolism is among the main determinants of CBF and brain temperature (BrT) affects the metabolism itself.

OBJECTIVES. To correlate BrT and core temperature (cT) in neurocritical ill patients and to evaluate any variation of CBF at different levels of temperature.

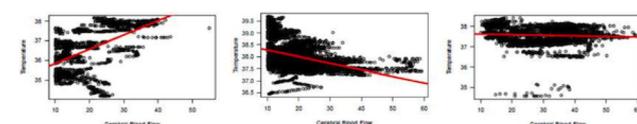
METHODS. 15 patients (9 M, mean age 54.2 SD 10.5; 1 brain injured and 14 with sub-arachnoid hemorrhage -SAH) were included in the study. Core temperature was continuously monitored with a bladder catheter. Patients were sedated, mechanically ventilated. BrT and CBF were continuously monitored minute-by-minute with an intracerebral probe (Hemedex[®]). Patients were monitored from 3 to 6 days. Intracranial pressure was maintained < 20 mmHg. Cerebral perfusion pressure was tailored according to the state of cerebral pressure vasoreactivity.

RESULTS. Mean core temperature was 37.1° (SD = 0.3°). The intraclass correlation coefficient was 0.54, therefore 54 % of core temperature variability was due to the "patient effect". BrT and CBF values for any patient are summarized in figure 1. BrT ranged from 34.1 to 39.7 °C while cT ranged from 34.5 to 38.8 °C. In any patient BrT was superior to cT. Given the longitudinal nature of the data, a linear mixed regression model was fitted to assess the relationship between CBF and BrT in order to take into account the correlation among repeated measures on the same subject. The CBF effect on cerebral temperature was 0.006397°, thus meaning that any CBF increase of 1 ml/100 g/min the brain temperature increase of 0.006397 °C. This effect did not reach statistical relevance (P-value = 0.3646). Moreover we documented 3 different trends (Figure 2. Respectively A, B, C) of correlation between CBF and brain temperature, with some patients having CBF increase with BrT increase, others having CBF increase with BrT decrease and others showed no relation between BrT and CBF.

	Mean	DF	t-Value
brt1	37.750	310	846.221
brt2	37.627	310	4562.749
brt3	37.888	310	2216.717
brt4	37.498	310	2012.102
brt5	37.465	310	3935.391
brt6	37.749	310	2831.452
brt7	37.343	310	1161.767
brt8	35.443	310	1065.570
brt9	37.593	310	2559.416
brt10	36.455	310	1261.622
brt11	37.206	310	1495.156
brt12	37.116	310	1494.742
brt13	37.204	310	1269.038
brt14	36.329	310	437.601
brt15	37.435	310	1610.340

	Mean	Std. Dev.	Std. Error	Count	Minimum	Maximum
CBF1	23.520	6.732	.362	311	10.782	40.904
CBF2	34.868	2.555	.145	311	28.474	43.836
CBF3	31.207	10.233	.580	311	10.903	54.500
CBF4	28.127	7.272	.412	311	10.093	49.552
CBF5	20.521	4.689	.266	311	10.487	31.138
CBF6	28.351	10.607	.601	311	11.581	52.575
CBF7	18.055	4.848	.275	311	10.009	32.268
CBF8	16.770	5.423	.308	311	10.016	35.700
CBF9	23.780	7.587	.430	311	11.158	54.611
CBF10	32.956	4.207	.239	311	22.240	43.239
CBF11	41.311	6.363	.361	311	24.327	52.896
CBF12	23.126	8.642	.490	311	10.058	50.723
CBF13	19.021	2.568	.146	311	12.215	25.442
CBF14	24.374	6.858	.389	311	10.008	41.313
CBF15	34.034	8.719	.494	311	18.402	52.834

[Figure 1]



[Figure 2]

CONCLUSIONS. As expected the "overall cerebral temperature was higher than the core temperature. The effect of CBF on brain temperature was variable among patients.

Multimodal monitoring could be useful to characterize CBF and brain metabolism in single patients.

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0658
THE EFFECTS OF PROPOFOL AND THIOPIENTAL CONTINUOUS INFUSION ON SERUM POTASSIUM DISTURBANCES IN NEUROSURGICAL PATIENTS

E. Kim¹, H.P. Park¹, T.K. Kim¹

¹Seoul National University College of Medicine, Department of Anesthesia and Pain Medicine, Seoul, Korea, Republic of

INTRODUCTION. The potassium disturbance associated with thiopental continuous infusion is well known. However, the effect of propofol continuous infusion on serum potassium levels has not been investigated extensively.

OBJECTIVES. The aim of this retrospective study was to determine the effect of thiopental and propofol continuous infusion on serum potassium levels when used for ICP control.

METHODS. We reviewed the medical records of 60 consecutive patients who received coma therapy or deep sedation for intracranial pressure control using either thiopental or propofol between January 2010 and January 2012.

RESULTS. The overall incidence of hypokalaemia (K < 3.5 mmol/l) was comparable between thiopental and propofol groups (89.2 vs. 82.6 %). But, the incidence of moderate to severe hypokalaemia (K < 3.0 mmol/l) was significantly higher in thiopental group (51.4 vs. 13.0 %, p = 0.003). The lowest potassium level (2.9 vs. 3.2 mmol/l, p = 0.020) was lower in thiopental group. The patients in the thiopental group required greater potassium replacement than the propofol group patients (0.08 vs. 0.02 mmol/kg/h, p < 0.001). On multivariate analysis, thiopental (odds ratio, 95 % CI, 7.31[1.78-27.81]; p = 0.005) was associated with moderate to severe hypokalaemia during continuous infusion. The incidence of rebound hyperkalaemia (K > 5.0 mmol/l, 32.4 vs. 4.3 %, p = 0.010) and the peak potassium concentration (4.8 vs. 4.2 mmol/l, p = 0.037) after the cessation of therapy were higher in thiopental group. On multivariate analysis, thiopental (8.82[1.00-77.81]; p = 0.049) and duration of continuous infusion (1.02[1.00-1.04]; p = 0.016) were associated with rebound hyperkalaemia once therapy was discontinued.

CONCLUSIONS. Propofol was less frequently associated with moderate to severe hypokalaemia after induction and rebound hyperkalaemia following the cessation of continuous infusion than thiopental.

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0659
EVALUATION OF SEVERE HEAD INJURY MANAGEMENT WITH HEMOSTASIS MONITORING BY ROTEM IN THE TRAUMA ICU OF DIJON UNIVERSITARY HOSPITAL: PRELIMINARY STUDY

S. Mirek^{1,2,3}, J. Darphin^{2,3}, N. Opprecht^{1,2,3}, A. Nadiji^{1,2}, E. Demaistre⁴, S. Aho⁵, C. Girard^{1,2,3}

¹Dijon University Hospital, Neurotrauma Critical Care Unit, Dijon, France, ²Dijon University Hospital, Department of Anesthesiology and Critical Care, Dijon, France, ³Burgundy University, Dijon, France, ⁴Dijon University Hospital, Hematology Laboratory, Dijon, France, ⁵Dijon University Hospital, Epidemiology Department, Dijon, France

INTRODUCTION. Severe head trauma remains a priority in terms of public health with a high mortality and significant sequelae. Added hemostasis disorders may worsen the prognosis. They must be corrected quickly.

OBJECTIVES. The objective of our study is to assess of professional practices in the management of severe TBI patients at the University Hospital of Dijon and to observe the prognosis worsening factors, including hemostasis disorders.

METHODS. An observational retrospective study was carried out from January 2011 to December 2013 on all patients who were hospitalized for head injuries in the ward of trauma resuscitation of the University Hospital of Dijon.

Epidemiological variables (age, gender), lesions (GCS), hemodynamic (MBP, pulse), time to management, use of noradrenaline, biological variables (pH, Lactate) and the coagulation tests (PT, aPTT, fibrinogen) were analyzed by univariate test and then introduced into a multivariate Cox model. The threshold p < 0.05 was accepted as significant. The primary endpoint was survival.

RESULTS. 206 patients with head injury were included from January 2011 to December 2013. A ratio of 77 % of men is found, with a mean age of 43 yo. Mean GCS is 8, with 96 patients with GCS < 8 (48 %).

A significant difference in survival was found for age (p = 0.020), GCS (p < 0.001), noradrenaline (p < 0.001), pulse (p = 0.090), PT (p < 0.001), the aPTT (p < 0.001) and fibrinogen (p = 0.033).

Multivariate analysis found the following results (table 1).

	HR	p-value
Age	1.02 (1-1.03)	0.002
GCS	0.84 (0.77-0.92)	<0.001
Norepinephrine	1.07 (1.02-1.13)	0.008
Pulse	1 (0.99-1.02)	0.56
PT	0.96 (0.94-0.99)	0.006
aPTT	1.09 (0.75-1.59)	0.64
Fibrinogen	1.32 (0.99-1.78)	0.059

[Table 1]

CONCLUSIONS. Population of this study is representative of TBI patients, with almost half of severe head injury (GCS < 8). This work confirms the classical factors of worsening, such as age, initial GCS, the administration of noradrenaline. In addition, the hemostasis profile is particularly interesting, in particular PT and fibrinogen. We are working on the establishment of a thromboelastographic monitoring by Rotem in the trauma ICU to get in the shortest time a coagulation profile of our TBI patients. The objective is to optimize care and improve survival. This 2nd phase of the work is in progress.

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0660

ULTRASOUND OF THE OPTIC NERVE SHEATH DIAMETER IN THE DIAGNOSIS OF INTRACRANIAL HYPERTENSION IN AN INTENSIVE CARE UNIT

A. Taché Sala¹, P. Pujol Valverde¹, C. Lorenzo Cárdenas¹, J. Gonzalez Londoño¹, M.A. Arruego Minguillón¹, J.M. Sirvent Calvera¹, M. Terceño Izaga², Y. Silva Blas², J. Serena Leal²

¹Hospital Universitari Dr Josep Trueta, Intensive Care Unit, Girona, Spain, ²Hospital Universitari Dr Josep Trueta, Neurology and Neurosonology Department, Girona, Spain

INTRODUCTION: The measurement of the diameter of the optic nerve sheath (ONSD) using ultrasound has emerged as a tool to detect increases of the intracranial pressure (ICP). Previous studies confirm the correlation between this technique and the values of ICP obtained invasively. Values greater than 5.7 mm in ONSD are associated with ICP > 20 mmHg.

OBJECTIVES. The aim of our study was to validate the usefulness of ONSD for detection of intracranial hypertension, and to study the correlation between the values of ONSD and ICP values.

METHODS. Prospective observational study of a cohort of patients admitted to an Intensive Care Unit (ICU) with 18 beds. Inclusion criteria were patients over 18 years old admitted to our ICU with suspected or confirmed intracranial hypertension from any cause, with a Glasgow Coma Scale score (GCS) ≤ 8 and invasive ICP monitoring. Patients who had any disease of the optic nerve or had ocular bilateral lesions which prevented the performance of the technique were excluded. We proceeded to measure the values of ONSD bilaterally (or unilateral in case of only one optic nerve being available) using a Philips Ultrasound Envisor[®] linear 7.5 MHz probe. The first measurement of each patient was taken on admission to our ICU and the other measurements were made in 24 h and when the ICP's increased over 20 mmHg. The technique is performed with the patient properly sedated, in supine position and with the head in a straight position. Whenever possible, the value of PIC was blinded from the examiner. The collections of hemodynamic variables were simultaneously obtained with the exploration. ONSD measurement was made at a depth of 3 mm from the retina and the distance between the outer edges of the nerve sheath were measured. Three measurements of ONSD were made bilaterally with the aim of improving the results, recording in our study the average between the measures. Neither the performance nor the final results of the examination were evaluated to modify the usual treatment of the patient.

RESULTS. 23 patients were included, with a total of 45 scans, each one with 3 ONSD determinations in each eye (total of 270 explorations). 68 % of the patients (15) were men with a mean age of 38.9 (± 22.0) of age. The causes of intracranial hypertension were head trauma (81.8 %), meningoencephalitis (4.5 %), Posterior Reversible Encephalopathy (9 %) and vasospasm after subarachnoid hemorrhage (4.5 %). The ONSD was statistically significantly higher in patients with ICP > 20 mmHg compared with those ≤ 20 mmHg PIC [5.0 (4.8 -5.1, CI 95 %) vs 6.3 (6.1-6.5, CI 95 %); p < 0.001]. There was a statistically significant correlation between values and PIC ONSD (Pearson P < 0.0001).

CONCLUSIONS. In our study ONSD values were significantly higher in patients with intracranial hypertension (ICP > 20 mmHg) compared to patients with ICP values < 20 mmHg. These results are consistent with recently published results found in literature.

0661

APNEA TESTS DURING BRAIN DEATH ASSESSMENT: IMPACT ON OXYGENATION

M. Giani¹, C. Pagan de Paganis¹, R. Leo¹, A. Confalonieri², F. Valenza³, G. Citerio²

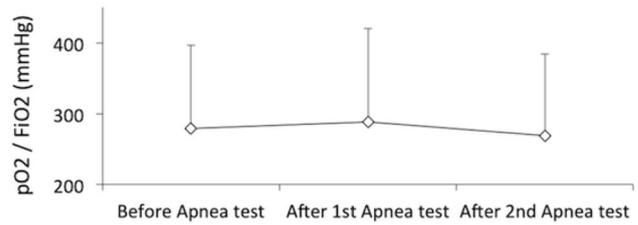
¹Università degli Studi di Milano Bicocca, Dipartimento di Scienze della Salute, Monza, Italy, ²Ospedale San Gerardo, Neurointensive Care Unit, Department of Anaesthesia and Critical Care, Monza, Italy, ³Ospedale Maggiore Policlinico, Dipartimento di Anestesia, Rianimazione e Terapia del Dolore, Milano, Italy

INTRODUCTION. The use of protective ventilation after brain death has increased the number of lungs available for transplantation. Nevertheless, the apnea test is usually performed disconnecting the patient from the ventilatory support, inducing lung derecruitment and thus worsening oxygenation.

METHODS. The aim of this study was to assess the impact of the apnea test, usually performed without PEEP, on patient oxygenation indices. The prevalence of protective ventilation strategy used during brain death evaluation was also evaluated. Digital charts of patients who underwent brain death assessment in the period 2010-2013, prospectively collected, were retrospectively reviewed.

RESULTS. A total of 123 consecutive patients (58 females, aged 63 ± 17 yrs) who underwent brain death assessment in the period 2010-2013 were included. Brain death was secondary to spontaneous intracranial bleeding (68 pts), cerebral edema (25 pts), trauma (17 pts) or ischemic stroke (13 pts). 246 apnea test were compared with baseline data.

Most of the patients were ventilated with a protective strategy, with moderate PEEP (6.5 ± 2) and low TV (< 8 ml/Kg in > 85 % of patients). During the apnea test all patient met the legal pCO₂ and pH required level (> 60 mmHg and < 7.4). Oxygenation before and after the apnea tests did not differ significantly, the P/F ratio was respectively 279 ± 117, 289 ± 132 and 269 ± 115 (p = 0.23, one-way RM ANOVA).



[Fig. 1 Oxygenation before and after the apnea tests]

CONCLUSIONS. In this population of patients who underwent brain death assessment, managed with protective ventilation and moderate PEEP, the apnea test had no impact on patient oxygenation indices.

0662

INITIAL INTRACRANIAL PRESSURE AND WORST GLASGOW COMA SCORE AS INDEPENDENT PREDICTORS OF (I) NEED FOR AND (II) TIME TO ESCALATION OF TREATMENT FOR REFRACTORY INTRACRANIAL HYPERTENSION IN TRAUMATIC BRAIN INJURY

V. Sathianathan¹, J. Longmore¹, J. Lloyd¹, N. Butterfield², S. Ashworth¹

¹St Mary's Hospital, Adult Intensive Care Unit, London, United Kingdom, ²St Mary's Hospital, Department of Radiology, London, United Kingdom

INTRODUCTION. Cerebral oedema following traumatic brain injury (TBI) results in elevated intracranial pressure (ICP) and disruption of normal intracranial pressure-volume relationships. Prediction of patients likely to require aggressive ICP control would potentially allow earlier intervention, better resource allocation and improve patient outcomes.

OBJECTIVES. To investigate the correlation between initial documented ICP and worst pre-intubation GCS with the need for, and time to, 2nd and 3rd tier management of refractory ICP in patients with TBI.

METHODS. A retrospective cohort study of 43 patients admitted to a Major Trauma Unit ICU from September 2013 - April 2014. All patients were managed following the same departmental protocol, developed from the Brain Trauma Foundation guidelines (1), which adopted a tiered strategy to managing refractory elevated ICP (see table 1). Baseline patient demographics were recorded from the medical notes along with initial ICP, worst pre-intubation GCS, need and timing of 2nd and 3rd tier interventions and the ICP thresholds at which they were instituted. Spearman's Rank correlation coefficient (r_s) was used to determine the strength of correlation between each factor and the need for, and time to, escalation of treatment for refractory ICP. Null hypotheses were rejected if p < 0.05 with critical r_s values determined from Spearman's Rank significance tables.

RESULTS. 19/43 (44 %) of patients required escalation to 2nd tier treatment and 7 (16 %) of those went on to 3rd tier treatment. Median threshold to 2nd tier treatment was 29 mmHg (IQR 6.5) and 38 mmHg for 3rd tier (IQR 10). Median time to 2nd tier treatment was 12 h following ICU admission (IQR 25.5) and 60 h for 3rd tier (IQR 96). Worst pre-intubation GCS showed no statistically significant correlation with need for higher tier ICP treatment (r_s = -0.09), time to 2nd tier (-0.16) or time to 3rd tier (0.47). Initial ICP showed a statistically significant correlation with need for higher tier ICP treatment (r_s = 0.33) and a negative correlation with time to 2nd (-0.39) and 3rd tier (-0.43) treatment but these did not reach statistical significance (p > 0.05).

Tier of Treatment	Intervention
Tier 1	Head of bed > 30 deg; Aim pO ₂ > 13, pCO ₂ 4.5 -5.0 (kPa); Sedation & analgesia; CPP > 60 mmHg; Normothermia; Normoglycaemia
Tier 2	Aggressive hyperventilation (pCO ₂ 4.0-4.5); Neuromuscular blockade; Osmolar therapy (hypertonic saline/mannitol); Induced hypothermia
Tier 3	Tier 3 Barbiturate coma; Focal surgical evacuation/ decompressive craniectomy

[Table 1 - Tiered management in TBI]

CONCLUSIONS. Initial ICP is better than worst pre-intubation GCS in predicting those TBI patients who will require escalating treatment for refractory ICP. Higher initial ICP may also indicate a quicker need for escalation of therapy and therefore may be useful in predicting the course of these patients.

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0663

INFLUENCE OF MODERATE BRAIN HYPOXIA ON LONG TERM OUTCOME

A.-M. Domínguez-Berrot¹, M. González-Vaquero¹, M.E. Vallejo-Pascual², P. Jiménez-García¹

¹Complejo Asistencial Universitario de León, Intensive Care Unit, León, Spain,

²Universidad de León, Economía y Estadística, León, Spain

INTRODUCTION. Not only intracranial hypertension but brain hypoxia too, have prognostic implications in neurocritical patients (NCP). Detection of potentially harmful episodes using multimodal monitoring could be helpful for therapeutic and prognostic aims. Information available so far suggests to avoid brain hypoxia.

OBJECTIVES. To evaluate the influence of time under moderate brain hypoxia on functional outcome of NCP, according to GOS at 6 months (GOS-6). To evaluate the prognostic value of combined variables (VAR):PbO₂-ICP.

METHODS. Retrospective study. NCP admitted to our ICU (2011-2013), who underwent ICP and PbO₂ monitoring, were included. Several data were registered including: PbO₂; ICP;CPP (hourly); PaO₂; mortality; APACHE score;GCS; GOS-6. NCP were divided into 3 groups according to their GOS: Group 0 (GOS: 1, death, 8 NCP); Group 1 (GOS 2-3: severe damage/disability; 6 NCP); and Group 2 (GOS 4-5: moderate/low/no disability; 14 NCP). For each NCP, 20 explicative VAR of GOS were analyzed. They were defined based on the following items: time (hours, h) with high ICP (> 20) and h with normal ICP (< 20) combined

with different levels of brain hypoxia (critical: < 5; severe: < 10; moderate: < 15). Differences between group 0 and groups 1 and 2 (no death) were considered. Then, differences between groups 1 and 2 were analyzed. None of the VAR were normally distributed within groups, so the differences between groups were analyzed with U of Mann-Whitney. Then, two logistic regressions were run, in which predictors were statistically significant VAR in terms of differences between groups. A new comparison between groups 2 and 3 was made, focusing on the time each patient needed to reach a PbO_2 of 10 or 15. A plot of the Kaplan-Meier estimate was displayed, and the log-rank test was calculated.

RESULTS. In all, 28 NCP were enrolled, 21 male and 7 female. Main results are shown in tables 1 and 2.

VAR	GROUP 0			GROUPS 1-2			U	LOGISTIC REGRESSION Model: 2 VAR
	N	Mean	Median	N	Mean	Median		
Time (h) with High-ICP	8	60.25	50.5	20	19.2	9.5	0.021	1.055 (1.005-1.108)
Time (h) with $PbO_2 < 5$	8	5.75	2	20	1.65	0	0.039	1.253 (1.023-1.535)

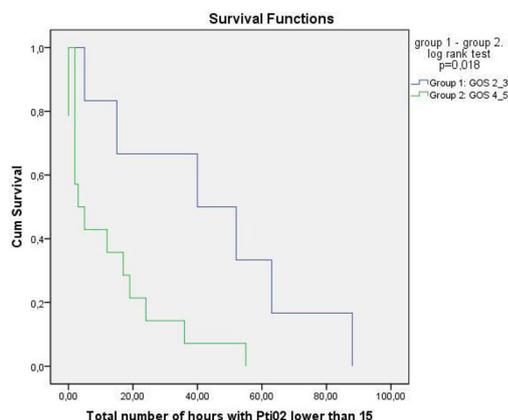
[Table 1. Time under high ICP and low PbO_2]

When analyzing the VAR "time (h) with normal ICP and $PbO_2 < 10$ " (T10) as an independent VAR, the hazard for unfavorable outcome is 29 % every hour, although this result is non statistically significant due to sample size and variability (dispersal) in group 1 for this VAR. When analyzing the VAR "time (h) with normal ICP and $PbO_2 < 15$ " (T15), the hazard for unfavorable outcome is 6.6 % every hour (statistically significant).

VAR	GROUP 1			GROUP 2			U	LOGISTIC REGRESSION 1 VAR BY MODEL odds ratio (CI:95 %)
	N	Mean	Median	N	Mean	Median		
T15	6	40	38	14	9.42	2	0.006	1.066 (1.005-1.131)
T10	6	18.66	8.5	14	0.85	0	0.012	1.291 (N.S.)
Time (h) with $PbO_2 < 15$	6	43.83	46	14	12.64	4	0.015	1.06 (1.005-1.117)
Time (h) with $PbO_2 < 10$	6	19	8.5	14	2.5	1	0.049	N.S.

[Table 2. Outcome normal IPC + dif levels PbO_2]

When comparing time spent to reach a PbO_2 value of 15 (Kaplan-Meier estimator), the slope on Group 2 is steeper than in group 1: NCP with better functional outcome achieve earlier the target PbO_2 (fig 1)



[Figure 1]

CONCLUSIONS. Even with normal ICP, the extent and length of brain hypoxia are determinant for survival; NCP with critical values of PbO_2 show higher mortality. The extent of brain hypoxia affects functional outcome. Seemingly, from our data, even with moderate hypoxia, a good outcome according to GOS-6 is possible. Probably, time needed to reach an adequate level of PbO_2 can influence outcome as well.

0664

OESOPHAGEAL DOPPLER GUIDED FLUID MANAGEMENT AND CLINICAL OUTCOME IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY

C. Gore¹, S. Nahas¹, M. Templeton¹, M. Stot¹

¹Imperial College Healthcare NHS Trust, Adult Critical Care Unit, London, United Kingdom

INTRODUCTION. Expected mortality in severe traumatic brain injury (TBI) ranges from 18 % to 100 % (3). There is evidence of improved outcome after severe head injury (4) by timely treatment in specialised units (5) and a therapy based on brain volume regulation (1). Appropriate fluid management is crucial (2) and there are only a few studies to date which assessed targeted fluid management and neurological outcome in this patient population. None of these studies employed oesophageal Doppler guided fluid management (ODM).

OBJECTIVES. This study was a service evaluation of fluid management in patients admitted with severe TBI in a tertiary trauma centre (Imperial College Healthcare NHS Trust, UK). We

aimed to correlate clinical outcome with admission physiology scores, 24 and 96 h fluid balance, and establish if ODM guided fluid management influenced these correlations.

METHODS. A retrospective analysis of patients admitted with severe TBI was performed using data collected for the UK intensive care national audit and research centre database and data retrieved from the electronic patient records. Adult patients with severe TBI were divided in two groups, according to the fluid management received: with or without ODM. Multiple logistic regression analysis was used to adjust for potential confounders to survival outcomes. Survival to intensive care unit discharge served as the primary endpoint.

RESULTS. 130 patients treated for TBI between 2011 and 2012 were included in this analysis. The mean age was 42.62. 22.3 % patients were female, mean Glasgow Coma Score at time of accident 8.3, mean motor score 3.9, mean Marshall score 3.85. Survival to intensive care discharge was attained in 80.84 %. While the group with classic fluid balance management had a mortality of 15.49 %, the ODM group had a mortality of 24.48 %. Mean 24 h fluid balance: 2274.38 ml, SD 2467.2. Mean 96 h fluid balance: 6086.3 ml, SD: 5422, values not correlated with unit mortality or hospital length of stay. The only physiological score predictive of mortality was APACHE in the two patient groups (mean APACHE was 18, SAPS 34, ICNARC 19). There was a non statistically significant trend ($p < 0.157$) towards worse mortality in the ODM group, after adjusting for the APACHE score. There was a statistically significant difference in 96 h fluid balance favouring ODM group, after adjusting for SAPS score, even if this was not correlated with the unit outcome ($p < 0.05$).

CONCLUSIONS. ODM was associated with higher positive fluid balance, but did not affect intensive care unit outcome.

There is need for a prospective randomised trial to investigate how a protocol driven, ODM fluid management affects patients with severe TBI.

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0665

IMPACT OF A NORMOTHERMIA PROTOCOL-BASED STRATEGY ON VENTILATOR-ASSOCIATED PNEUMONIA IN SEVERE BRAIN-INJURED PATIENTS

Y. Launey^{1,2}, A. Lecouin³, N. Nessel³, F. Feuillet⁴, Y. Mallédant¹, P. Seguin¹

¹CHU de Rennes, Anesthesiology, Emergencies, SAMU and Critical Care, Rennes, France, ²Inserm UMR-991, Rennes, France, ³CHU de Rennes, Rennes, France, ⁴Inserm EA-4275, Biostatistics, Pharmacoepidemiology & Human Sciences Research, Nantes, France

INTRODUCTION. Fever is frequently observed in severe brain-injured patients and is associated to prolonged ICU length of stay, and increased mortality (1). The fever control (FC) is one of the major therapeutics in these population. However, the febrile response is an adaptative physiological response and its suppression could be deleterious and promote infection. Severe brain-injured patients are particularly exposed to ventilator-associated pneumonia (VAP) (2). Several studies have assessed the FC in several pathologies but suggested harmful effects of such a strategy. Notably, the use of therapeutic hypothermia is known to favor VAP development (3). Normothermia is another way to control fever in head-injured patients but data are sparse. Thus, we designed a study to evaluate the impact of a FC protocol on VAP occurrence.

OBJECTIVES. To determine the impact of a FC based-protocol on VAP occurrence in severe brain-injured patients.

METHODS. We retrospectively enrolled 189 severe brain-injured patients. From 1st January to 31st December 2008, patients served as historical control and from 1st January 2009 until 31st December 2009, a fever control protocol was applied when core body temperature was ≥ 38.3 °C (including successively a cooling tunnel, an infusion of 500 mL of cooled (4 °C) saline serum and finally oral administration of acetaminophen). The primary endpoint was the density of incidence of VAP between the 2 groups. Secondary endpoints were the length of mechanical ventilation, the mortality rate. The multivariate statistical analysis was based on a competing risks regression model.

RESULTS. When the protocol was prescribed and started, the delay before its effective application was less than 24 h and its median duration was 4 days (range 2 to 6 days). The density of VAP incidence was significantly higher in the FC group (26.1 vs 12.5 per 1000 ventilation-days). The mean delay for VAP occurrence was similar in the two groups (7.5 ± 3.6 days). The mean length of MV was significantly increased in the FC group (14.5 ± 10.7 days vs 9.6 ± 7.3 , $p < 0.001$). The mortality rate was similar between the 2 groups (34.0 % versus 23.5 %, $p = 0.109$). In the multivariate analysis (Table 3), the competing risk model was built once HR were adjusted with tobacco use, pentothal use, age, and SAPS2. Therapeutic normothermia was the only significant independent risk factor of VAP occurrence (HR = 2.73, CI 95 % [1.38; 5.38], $p = 0.004$).

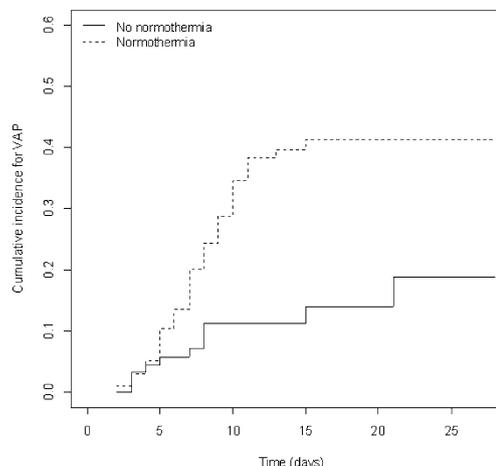


Figure 1: Cumulative incidence curves of VAP according to the use or not of control fever protocol.

[CIF curve for VAP]

CONCLUSIONS. Fever is deleterious in brain-injured patients and its control belongs to the routine management of brain injured patients. However the FC-associated potential adverse effect counterbalanced its potential beneficial effects which still remains to be demonstrated. The FC use must make us aware of its potentiating role in the infectious diseases development, especially VAP.
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0666

THE ASSOCIATION OF DYSNATREMIA WITH POOR OUTCOME IN PATIENTS WITH TRAUMATIC BRAIN INJURY

A. Hasani¹, R. Mahrous¹, M.A. Elsayed¹, K. Adel¹, A. Mettawi¹, N. Emara¹, K. Anwar¹, A. Mukhtar¹

¹Cairo University, Anesthesia, Surgical ICU and Pain Management, Cairo, Egypt

INTRODUCTION. Dysnatremias, disorders of sodium (Na) level in serum, are common in critically ill patients and are associated with poor prognosis. (1) Although many studies were conducted on the incidence, risk factors, and outcome of dysnatremia in critically ill patients (1,2), no studies to the best of our knowledge reported the incidence and outcome of dysnatremia in patients with severe head injury.

OBJECTIVES. We aim to study the incidence, risk factors, and outcome of dysnatremias in critically ill patients with moderate to severe traumatic brain injury (TBI).

METHODS. The study was conducted in the surgical intensive care unit (ICU) at Cairo University teaching hospital. All patients with moderate to severe TBI admitted to the ICU were included in the study. Daily serum Na concentration was documented. Dysnatremia was classified as hypernatremia (serum sodium level > 145 mEq/L), and hyponatremia (serum sodium level < 135 mEq/L). The study Patients were divided into two groups; Dysnatremic group and normal serum Na group. Both groups were compared as regards risk factors and outcome.

RESULTS. From November 2013 to March 2014, Forty nine patients were included. The incidence of dysnatremia was 32 (65.3 %) patients. Hyponatremia and hypernatremia were developed in 6 (12.2 %) and 26 (53.1 %) patients respectively. The two groups were comparable regarding demographic and severity scores (Table 1). The admission GCS in dysnatremia group was significantly lower compared to the other group. (6.3 ± 2.4 Vs 9.1 ± 2.9 , P value = 0.001). Patients with dysnatremia had higher incidence of unbalanced cumulative fluid balance than the other group (90.6 %, Vs 69.7 % P = 0.05). The mortality rate in dysnatremia group was significantly higher than the group with normal serum Na level (78.1 % Vs 41.2 %, P value = 0.01). Table 1: Demographic data, risk factors, and outcome of the two groups. Data are presented as mean \pm standard deviation, number (frequency)

	Dysnatremic patients (n = 32)	Non dysnatremic patients (n = 17)	P value
Age (years)	36 \pm 14	39 \pm 17	0.6
Male gender	29(90.6 %)	16(94.1 %)	0.6
APACHE II	18 \pm 4.7	17 \pm 4	0.7
Injury severity score	25 \pm 10	23 \pm 8.8	0.4
Surgical intervention	25(78 %)	13(76 %)	0.8
GCS on admission	6.3 \pm 2.4	9.1 \pm 2.9	0.001
Mean GCS during ICU stay	5.3 \pm 2	9.2 \pm 4.1	0.002
Balanced fluid intake	3(9.4 %)	5(31.3 %)	0.05
Mortality	25(78.1 %)	7(41.2 %)	0.01

[Demographic data, risk factors, and outcome of the]

CONCLUSIONS. Dysnatremia is a common complication in patients with TBI. The association of dysnatremia with poor outcome warrant further investigation.

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ROLE OF FACTOR XIII AND VON CLAU FIBRINOGEN IN CEREBRAL HEMORRHAGE. A PROSPECTIVE OBSERVATIONAL STUDY WITH NEUROSURGICAL PATIENTS

E. Val Jordán¹, M.D. Vicente Gordo¹, P. Mora Rangil¹, B. Virgós Señor¹, J. Casado Pellejero², N. Fernández Monsterrin³

¹Hospital Univ. Miguel Servet, Critical Care, Zaragoza, Spain, ²Hospital Univ. Miguel Servet, Neurosurgery, Zaragoza, Spain, ³Hospital Univ. Miguel Servet, Hematology, Zaragoza, Spain

INTRODUCTION. Unexpected intracranial hemorrhage after a brain surgery is one of the most serious complications. Von Claus Fibrinogen (VCF) and Factor XIII (FXIII) are both essential for hemostasis, especially in patients undergoing surgery.

OBJECTIVES. Our main objective is to investigate the association between VCF and FXIII disorders and postoperative hemorrhage after brain surgery. We also propose to connect that hemorrhage with the standard coagulation test and some of clinical features of the surgery.

METHODS. We propose a prospective observational study for 4 months. We include all adults operated on brain tumor, admitted in our ICU. We analyze some bleeding risk factors and some surgical features in postoperative period. We take two blood samples to determine standard coagulation (partial thromboplastin time (PTT), prothrombin activity (PA), platelet count and fibrinogen), FXIII and VCF; one of them immediately after surgery (sample-1), and the other one 24 h later (sample-2). These data were connected with the main variable, studied in the brain CT scan at 24 h. As main variable we consider the hemorrhage in or out of surgical area with mass effect, in the CT control.

RESULTS. The population was composed by 18 patients. Mean age 47 ± 15 years; 4 females and 14 males. Tumor volume calculated in preoperative MR was 41.4 ± 57.5 ml. Over 50 % of brain tumors were malignant. Subtotal resection (> 90 %) was possible with

13 patients (72 %). Mean surgical time was 7.7 ± 3.8 h with 32.7 ± 13.3 min of hemostasis. In CT control we could find 9 patients (50 %) with hemorrhage in surgical area and 2 (11 %) out of surgical area, and 3 of them (17 %) with mass effect.

FXIII levels were not significant between postoperative samples and with hemorrhage. However, Fibrinogen and VCF levels between samples were significantly associated (p 0,0001 and 0033 respectively). Patients with brain hemorrhage in both samples had higher VCF levels than patients without hemorrhage (p 0,0197 en sample-1 and p 0,0001 in sample-2)

Connected with standard coagulation test, there was no significantly association between platelets count, PTT and PA in both samples and with brain hemorrhage.

There was no association with surgical and hemostasia time and tumor volume with FXIII and VCF levels. Malignant and hemorrhage weren't significantly associated.

CONCLUSIONS. Increased levels of VCF could be associated with higher probability of serious hemorrhagic events after intracranial surgery.

Despite not being significantly associated with hemorrhage, the tendency of FXIII deficiency is to be connected. A higher population may be required to demonstrate it.

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CAN THE CEREBRAL REGIONAL OXYGEN SATURATION BE A PERFUSION PARAMETER IN SHOCK ?OBSERVATIONAL PILOT STUDY

A. Al Tayar¹, A. Abouelela^{1,2}, K. Mohiuddeen³

¹King Fahd Military Medical Complex, ICU, Dhahran, Saudi Arabia, ²Alexandria University, Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt, ³King Fahd Military Medical Complex, Anesthesia & ICU Department, Dhahran, Saudi Arabia

INTRODUCTION. Shock is defined as a state of tissue hypo perfusion and the tissue reperfusion is the main goal of management of shock. Increase in central venous saturation (CVSO2) and decrease in blood lactate level are useful in assessment of adequacy of tissue perfusion. Near infra-red spectroscopy(NIS) is a non invasive way to observe real time changes in regional cerebral saturation and has been used in patients with different brain diseases. There is a small body of literature suggesting that cerebral regional saturation monitoring (CrSO2) added a value in assessment and management of intensive care(ICU)patients.

OBJECTIVES. The aim of this study is to determine if cerebral regional oxygen saturation can be used as an indicator of tissue perfusion in ICU patients with shock, and to determine the prognostic value of CrSO2 in survival prediction.

METHODS. This is a prospective observational single center pilot study entailed 20 patients who were diagnosed as mixed septic and cardiogenic shock admitted to adult ICU at King Fahd Military Medical Complex, Dhahran, Saudi Arabia. The CrSO2 was monitored with NIS using Somatec, INVOS Oximeter 5100C with bilateral frontal electrode, mean value of the 2 readings was taken as well blood lactate level, CVSO2, mean arterial blood pressure (MAP), cardiac index (CI) at baseline time, 8 h(hr.), 24 h., 48 h. and 72 h. All patients with history of cerebrovascular diseases and those who presented with neurological deficits were excluded from the study.

RESULTS. Significant negative correlation was noticed between CrSO2 and lactic acid at 8 h, 24 h, 48 h and 72 h from admission($r = -0.625^*,-0.711^*,-0.745^* \& -0.722^*$) and ($p = 0.003, < 0.001, < 0.001 \& < 0.001$) respectively. Significant positive correlation was noticed between CrSO2 and CvSO2 at 8 h, 24 h, 48 h and 72 h from admission ($r = 0.572^*, 0.674^*, 0.527^* \& 0.757^*$) and ($p = 0.008, 0.001, 0.017 \& < 0.001$) respectively. Also significant positive correlation was found between CrSO2 and Mean Arterial Pressure (MAP) at 24 h, 48 h and 72 h from admission ($r = 0.523^*, 0.513^* \& 0.626^*$) and ($p = 0.018, 0.021 \& 0.003$) respectively. Significant difference was also detected between the value of CrSO2 in the survivors (12 patients) and the non survivors (8 patients) after 72 h from admission as it was $52.58 \pm 7.33 \%$ & $44.75 \pm 9.44 \%$ ($p = 0.049^*$) while it was not significantly different in the first 3 days.

CONCLUSIONS. CrSO2 might be helpful as one of the perfusion parameters in shocked patients, also it could have a prognostic value in mortality prediction. However, further studies with larger sample size are still needed to validate this results.

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COMPARISON OF MANNITOL VERSUS HYPERTONIC SOLUTIONS IN THE TREATMENT OF ACUTE CEREBRAL EDEMA

M. Rosales¹, L. Laxamana²

¹St. Luke's Medical Center, Institute for Neurosciences, Québec, Philippines, ²St. Luke's Medical Center, Institute for Neurosciences, Global City, Philippines

INTRODUCTION. Cerebral edema with or without increase in intracranial pressure (ICP) has been commonly reported in patients with acute brain injuries (ABI). It is a challenging problem in the clinical setting and is a major cause of morbidity and mortality in patients with acute brain injury.

OBJECTIVES. The aim of this study is to evaluate the effects of hypertonic solutions (Hypertonic saline versus Hypertonic sodium lactate) with mannitol compared to mannitol alone in the treatment of acute brain injuries presenting with cerebral edema and increased intracranial pressure (ICP).

METHODS. This is a descriptive retrospective study involving selection of 57 patients diagnosed with acute brain injuries who were given mannitol alone (28), mannitol with hypertonic sodium lactate (18), and mannitol + hypertonic saline (11) for cerebral edema and increased intracranial pressure who were admitted in a neurocritical care setting in a tertiary hospital from a 2 year period.

RESULTS. In the Mannitol Group, the GCS of patients improved consistently from baseline to discharge with p value = 0.018 (> 0.05 alpha), power at 95 % = 0.547. The GCS increase seen in the mannitol group was statistically significant. In the mannitol plus hypertonic saline, patients' GCS escalated from baseline to sixth hour, then noted a trending down from the sixth hour to the third day. At around the fifth day, this has seen to increase again until discharge. In effect, there was a fluctuating trend that was observed in the mannitol + hypertonic saline group from baseline to discharge phase ($p = 0.839$ power at 95 % = 0.154). In the mannitol + hypertonic sodium lactate group, the GCS score has been

shown to be consistently improving from baseline until the first day, further increasing to the third day until discharge.

CONCLUSIONS. Remarkably, the results we obtained from the mannitol + hypertonic sodium lactate group with regards to the improvement of GCS was a consistent escalation from baseline to discharge, in comparison to the other groups. Unfortunately this was not exhibited statistically, probably due to low power of samples observed across time (power at 95 % = 0.261). It is still reasonable, however to do larger prospective trials to validate these data.

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SERUM TYPE III PRO-COLLAGEN PEPTIDE AS A MARKER OF VENTILATOR ASSOCIATED LUNG INJURY IN PATIENTS WITH SEVERE RESPIRATORY FAILURE RECEIVING ECMO

L. Camporota¹, V. Mongelli¹, M.A. Calderazzo¹, E.V. Caricola¹, G. Glover¹, C. Meadows¹, E. Nicoletti¹, M. Malafronte¹, R. Beale¹, M. Shankar-Hari¹, N. Barrett¹

¹Division of Asthma, Allergy and Lung Biology, King's College London, Department of Adult Critical Care, Guy's and St Thomas' NHS Foundation Trust, King's Health Partners, London, United Kingdom

INTRODUCTION. Type III pro-collagen peptide (PCP-III) is an early marker of collagen synthesis in response to biological or mechanical stimuli, leading to lung tissue repair or fibrogenesis. Little is known of the factors associated with high levels of PCP-III in patients with severe respiratory failure (SRF) requiring veno-venous extracorporeal membrane oxygenation (ECMO).

OBJECTIVES. To assess the factors associated with serum PCP-III levels in patients with SRF requiring ECMO.

METHODS. A retrospective observational study of patients with SRF admitted to our ECMO centre from August 2012 to December 2013. Serum N-terminal pro-collagen type III (PCP-III) was measured within 24 h of ECMO commencement. Lung volumes and lung recruitability on lung CT at CPAP 5 cmH₂O and 45 cmH₂O recruitment CT) were calculated using OsiriX software.

RESULTS. We recruited 56 subjects, median (IQR) age 45 years (35 to 57), 53.6 % female. 84 % had a pulmonary cause of ARDS. 21.4 % were current smokers. Median (IQR) Lung Injury Score was 3.5 (3 to 3.5). Median (IQR) PaO₂/FiO₂ pre-ECMO was 67 mmHg (54.3 to 85.2). The mean (SD) duration of mechanical ventilation prior to ECMO was 4.5 days (3.4). Median (range) of plateau pressure and PEEP were respectively 34 cmH₂O (31 to 36) and 14 cmH₂O (15 to 15). 62.5 % had received neuro-muscular blockers. The median (IQR) admission SOFA score was 15 (12 to 17). ICU survival was 76.8 %. The mean (SD) serum PCP-III was 21.2 (13.9) µg/L. Higher PCP-III levels were found in patients with > 3 quadrant involvement on the chest radiograph 26.3 µg/L (3.4) vs 16.9 µg/L (2.7); (p = 0.049) and in patients with smaller volume increments in non-collapsed lung on the 45 cmH₂O recruitment chest CT, 25.9 µg/L (16.4) vs 17.7 µg/L (11.8); (P = 0.09). Higher PCP-III correlated with higher ventilator driving pressure (DP); r = 0.35, (p = 0.03); with values of 18.5 µg/L (10.7) in patients with DP < 20 cmH₂O (median value) vs 29 µg/L (18.4) in patients receiving a DP > 20 cmH₂O; (p = 0.035). PEEP levels were inversely associated with PCP-III. Using a cut-off PEEP of 14 cmH₂O (median population value), the median (IQR) PCP-III was 22.6 µg/L (17 to 34) vs 16 µg/L (11.6 to 24.2), respectively for the lower and higher PEEP group; [p = 0.06 (trend)]. There was no correlation between plateau pressure and PCP-III levels. Mean (SD) of plateau pressure was similar in patients with PCP-III levels above and below the median of 20 µg/L [33 cmH₂O (3.4) vs 35 cmH₂O (4.9); (p = 0.2)]. No association was found between PCP-III and severity of organ dysfunction or aetiology of disease.

CONCLUSIONS. Serum PCP-III levels are associated with more injurious ventilator settings pre-ECMO (higher driving pressure, lower PEEP) in patients with lower lung recruitability. The lack of association of PCP-III with disease severity may indicate that PCP-III is a marker of ventilator associated lung injury rather than severity of the underlying disease.

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PROGNOSTIC VALUE OF FLUID BALANCE IN PATIENT RECEIVING EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO)

H.P. Shum¹, W.P. Lo¹, L.L. Chang¹, H.M. So¹, K.C. Chan¹, W.W. Yan¹

¹Pamela Youde Nethersole Eastern Hospital, Department of Intensive Care, Hong Kong, Hong Kong, China

INTRODUCTION. Poor venous outflow from extra-corporeal membrane oxygenation (ECMO) cannula is a common trigger for fluid administration. However, positive fluid balance has been associated with an increased risk of mortality in critically ill patients.

OBJECTIVES. This retrospective study assesses the relationship between fluid balance and outcomes among patients who received ECMO.

METHODS. Patients who received ECMO for 3 days or more between Jan 2009 to Jan 2014 were reviewed. Demographics, severity of organ failure and fluid balances during ECMO treatment were recorded. Univariate and logistic regression analysis were performed to identify factors associated with hospital mortality.

RESULTS. Seventy-six patients received ECMO during the study period and 64 of them fulfilled the inclusion criteria. Seventeen (26.6 %) patients died in intensive care unit (ICU) and the hospital mortality rate was 28.1 % (18 patients). In univariate analysis, the Sequential Organ Failure Assessment (SOFA) score on initiation of ECMO (p = 0.015), ECMO type (p = 0.050), average fluid balance in the first three days of ECMO (p = 0.001) and requirement of renal replacement therapy (p = 0.019) correlated with hospital mortality. In logistic regression, only average fluid balance in the first three days of ECMO was independently associated with hospital mortality (p = 0.012, OR 1.73 per 1L gain, CI = 1.13-2.68, C-index = 0.771, Hosmer-Lemeshow test p = 0.063).

CONCLUSIONS. Positive fluid gain during first three days of ECMO was independently associated with hospital mortality. Meticulous exclusion of correctable causes of poor

venous outflow from ECMO cannula (e.g. cannula mal-positioning, elevated intra-abdominal pressure, agitated patient, etc.) should be done before fluid administration for poor venous outflow.

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MECHANICAL VENTILATION PRACTICES IN PATIENTS WITH ARDS RECEIVING ECMO: AN INTERNATIONAL SURVEY

L. Camporota¹, E. Nicoletti¹, M. Malafronte¹, M. de Neef¹, V. Mongelli¹, M.A. Calderazzo¹, E.V. Caricola¹, G. Glover¹, C. Meadows¹, R. Beale¹, M. Shankar-Hari¹, N. Barrett¹

¹Division of Asthma, Allergy and Lung Biology, King's College London, Department of Adult Critical Care, Guy's and St Thomas' NHS Foundation Trust, King's Health Partners, London, United Kingdom

INTRODUCTION. The use of veno-venous extracorporeal membrane oxygenation (ECMO) is increasing. However, no consensus exists on optimal mechanical ventilation (MV) during ECMO.

OBJECTIVES. To describe ventilatory practice in patients with ARDS on ECMO.

METHODS. A cross-sectional, multicenter, international electronic survey (Smart SurveyTM) of 173 adult respiratory ECMO centres. The survey included 19 questions in 3 domains: demographics; MV practices on ECMO; and adjunctive respiratory therapy. The survey was internally and externally validated. Statistical analysis was undertaken using Students t-test or ANOVA (Kruskal-Wallis).

RESULTS. 133 centres responded (76.9 %). 80.6 % of centres were staffed by intensivists. 44.2 % treated fewer than 10 ECMO patients per annum. 44.2 % had provided ECMO for less than 5 years. No association was found between years of ECMO experience and either the number of ECMO patients treated in 2012, or the clinicians' training background. Pressure control was the most commonly used MV mode (64.4 %), 11.6 % used volume control. There was a large heterogeneity in the initial MV settings. Although the median PEEP was 10cmH₂O, 22.6 % used PEEP < 10cmH₂O and 15.5 % used 15-20cmH₂O. In the majority of centres (62.8 %) PEEP was set based on centre preferences and not titrated. The median tidal volume (TV) was 4 ml/kg (SD ± 2.2). 7 % aimed TV > 7 ml/kg. Regarding recruitment manoeuvres (RM), 34.1 % centres never used RM, while 13.2 % used RM daily. When asked which MV strategy best described their practice, 45.7 % of centres used a "lung rest" strategy (low PEEP, low Pplat) and 44.2 % an "open lung" strategy (moderate/high PEEP); PEEP levels were higher in centres that used "open lung" (10-14 cmH₂O) (P = 0.002) and lower in "lung rest" (8-10 cmH₂O) (P = 0.005). No association was found between the ventilation strategy and the Pplat target (median 25cmH₂O, P = 0.2). Only 24.8 % use chest CT to guide MV. Adjunctive treatments (e.g. NO or HFOV) were never or occasionally used. Only 10 % centres extubate patients on ECMO, and this is more likely in more experienced centres (P = 0.05). Whilst 71.3 % do perform tracheostomy on ECMO, there is variability in the timing (most frequent on days 6-10). Only 27.1 % of ECMO centres have a protocol for MV on ECMO.

CONCLUSIONS. We found large heterogeneity in ventilatory practices during ECMO. The clinicians' training background and the centres' experience had no influence on the approach to ventilation.

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OUTCOMES OF PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE TREATED WITH EXTRACORPOREAL LUNG SUPPORT

S.A. Braune¹, M. Fiolka¹, G. Soeffker¹, A. Nierhaus¹, D. Wichmann¹, S. Kluge¹

¹University Medical Center Hamburg-Eppendorf, Department of Intensive Care Medicine, Hamburg, Germany

INTRODUCTION. Patients with chronic obstructive pulmonary disease (COPD) and acute on chronic respiratory failure are at increased risk of clinical deterioration once on invasive mechanical ventilation (IMV), of prolonged IMV and of death. Extracorporeal lung assist (ECLA) in this specific patient group may serve as rescue treatment or as means to ameliorate side effects of IMV or even to avoid IMV. However, the application of an ECLA carries a substantial risk of complications.

OBJECTIVES. To evaluate the clinical course and outcomes of COPD patients treated with ECLA for acute on chronic respiratory failure.

METHODS. Retrospective, observational single-centre study on 38 COPD patients treated with ECLA with or without IMV in a tertiary level department of intensive care medicine from 2009 until 2013. Patients included were either treated with a pumpless arterio-venous ECLA (avECLA) for extracorporeal CO₂ removal (ECCO2R) or with a pumpdriven veno-venous ECLA (vvECLA), either with low blood flow (< 2 L/min) for ECCO2R (vvECLA-CO2R) or with high blood flow (> 2 L/min) for extracorporeal membrane oxygenation (vvECMO).

RESULTS. The median age (IQR) was 61.5 years (55-69) and all COPD-patients had GOLD-stage 3-4. Sixteen patients (42 %) were treated with avECLA and 22 patients (58 %) with vvECLA. Of these, 11 patients (29 %) were on low-flow vvECLA-CO2R and 11 (29 %) on high-flow vvECMO. Median tidal and minute volumes on IMV were significantly reduced within 24 h of commencement of ECLA (337 vs. 276 ml and 9.5 vs. 4.7 L/min, p < 0.01). The median times on ECLA and on IMV were 6.5 days (5-11) and 15.5 days (8-27), respectively. Six patients (16 %) were successfully treated with ECLA to avoid intubation and IMV. Overall 28-day mortality was 33.3 %, and in the subgroups of patients on vvECLA-CO2R, avECLA-CO2R, and vvECMO 28-day mortality rates were 18.1, 31.2, and 63.6 %, respectively. In 15 patients (36 %) on renal replacement therapy (RRT) for acute renal failure 28-day mortality was 60 % vs. 22 % in those patients without RRT (p < 0.05). Bleeding complications were observed in 20 patients (47.6 %), of which 5 (11.9 %) were cannula related and 9 (21.4 %) episodes were considered major bleedings. In 2 patients (4.8 %) circuit clotting required urgent membrane exchange. In 2 patients (4.8 %) on avECLA-CO2R cannula related limb ischemia occurred, necessitating vascular surgery in one case. No death related directly to complications was observed.

CONCLUSIONS. Treatment of COPD patients with ECLA helped to reduce the invasiveness of mechanical ventilation. However, 28-day mortality in this patient group still remained high, especially in sicker patients with more invasive extracorporeal treatment. Moreover, complication rates were clinically relevant. More prospective studies on patients with COPD on ECLA are needed to further evaluate the effectiveness and safety of an extracorporeal treatment strategy in this special patient group with acute on chronic lung injury.

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EFFECTS OF DIFFERENT ECMO GAS FLOWS ON THE BREATHING PATTERN OF SEVERE ARDS PATIENTS DURING PRESSURE SUPPORT AND NAVA

T. Mauri^{1,2}, G. Suriano^{1,2}, G. Grasselli², A. Giuffrida², M. Battistini^{1,2}, A. Bronco^{1,2}, M. Pozzi^{1,2}, N. Patroniti^{1,2}, G. Bellani^{1,2}, A. Pesenti^{1,2}

¹University of Milan Bicocca, Department of Health Sciences, Monza, Italy, ²San Gerardo Hospital, Department of Emergency Medicine, Monza, Italy

INTRODUCTION. Assisted mechanical ventilation (MV) might improve respiratory muscles function and gas exchange, decrease sedation needs and weaning time in severe acute respiratory distress syndrome (ARDS) patients undergoing extracorporeal membrane oxygenation (ECMO). During assisted MV, tidal volumes (Vt) should remain in the protective range. However, in ECMO patients, they might depend from physician's setting of the ventilator as well as from the amount of CO₂ removed by ECMO (1,2).

OBJECTIVES. Aim of this study was to evaluate, in severe ARDS patients, tidal volumes and other respiratory parameters at different levels of extracorporeal CO₂ removal by ECMO during both pressure support ventilation (PSV) and neurally-adjusted ventilatory assist (NAVA).

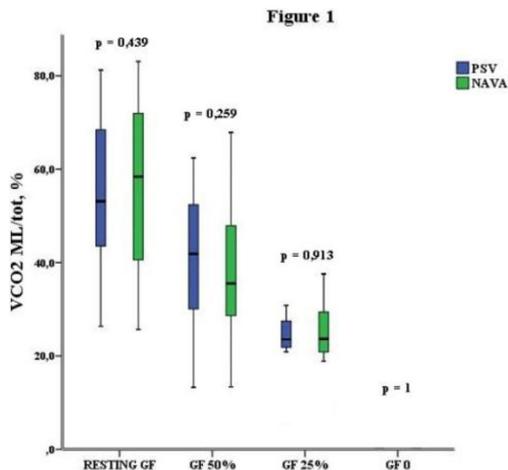
METHODS. We performed a prospective interventional randomized cross-over study on severe ARDS patients undergoing ECMO and assisted MV. ECMO sweep gas flow (GF) was decreased from resting conditions (i.e., p0.1 < 2 cmH₂O and RR ≤ 20 bpm) to 50 %-25 %-0 % during PSV and NAVA (20 min step, random order). Support and NAVA gain were chosen to obtain, at the highest GF, similar Vt (i.e., ≈ 6 mL/kg) and peak airway pressure (i.e., < 25 cmH₂O). Continuous recording of airway pressure, flow, esophageal pressure and electrical activity of the diaphragm were recorded during all study phases and analyzed off-line by dedicated software. Variables were compared by two-way repeated measures ANOVA with GF and ventilator mode as co-variables. Data are presented as median [IQR].

RESULTS. Eight severe ARDS patients (5 male) were recruited: they were on ECMO since 20 days [14-49], age was 51 [40-54] year-old, PEEP was 14 [10-16] cmH₂O and Crs 33 [26-45] mL/cmH₂O. During PSV and NAVA, decreasing GF led to a similar decrease in the amount of CO₂ removed by ECMO (Figure 1) and increase of respiratory rate, p0.1 and electrical activity of the diaphragm (p < 0.001 for different GF; p = n.s. for ventilation modes and interaction). Tidal volume (Figure 2), peak airway pressure, minute ventilation and transpulmonary pressure increased at lower GF, albeit their increase was more pronounced during NAVA than during PSV (p < 0.05 for different GF and ventilation modes; p = n.s. for interaction). In fact, when GF was zeroed during NAVA, Vt was > 6 mL/kg in 90 % of patients and > 8 mL/kg in 50 %.

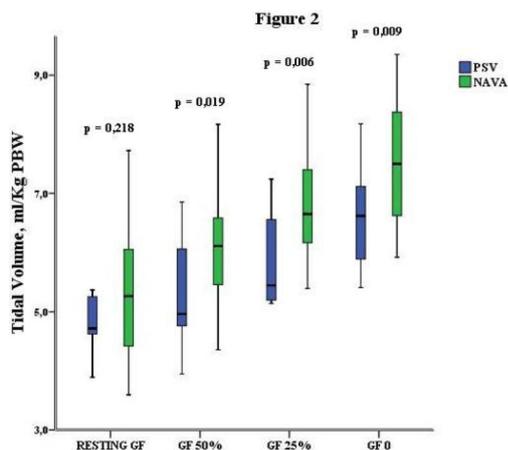
CONCLUSIONS. In severe ARDS patients undergoing assisted MV and ECMO, decreasing CO₂ removal by ECMO significantly increases ventilation pressure and volume. Particular attention should be paid to NAVA settings when changing ECMO gas flow.

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GRANT ACKNOWLEDGMENT. MIUR



[Figure 1]



[Figure 2]

0676
INTENSIVIST DELIVERED QUATERNARY SEVERE RESPIRATORY FAILURE RETRIEVAL SERVICE WITH MOBILE EXTRACORPOREAL MEMBRANE OXYGENATION (ECMO) CAPABILITIES

P.B. Sherren¹, S.J. Shepherd¹, G. Glover¹, C. Meadows¹, C. Langrish¹, N. Ioannou¹, K. Daly², N. Gooby¹, A. Agnew¹, N.A. Barrett¹

¹Guy's and St. Thomas' NHS Foundation Trust, Critical Care Medicine, London, United Kingdom

INTRODUCTION. Transfer to an extra-corporeal membrane oxygenation (ECMO)-capable respiratory failure centre is associated with improvement in disability-free survival in adult patients with severe respiratory failure (SRF) [1]. However, the secondary inter-hospital transfer of severely hypoxic/hypercapnic patients poses significant challenges, and mobile ECMO during retrieval is frequently indicated. Although the use of mobile ECMO is well established, the ideal make-up of the retrieval team remains to be demonstrated. Trials to date predominantly utilise a surgeon and large retrieval team.

OBJECTIVES. We describe the logistics and outcomes for an intensivist (non-surgeon) delivered SRF retrieval service with mobile ECMO capabilities.

METHODS. Retrospective observational study of all patients retrieved to St Thomas' hospital between 02/2013 and 01/2014.

RESULTS. Of the 60 patients analysed, 57 % were female and the mean ± SD age was 44.1 ± 13.6 years. The median (IQR) Murray score and mean ± SD PaO₂/FiO₂ ratio were 3.2 (3-3.5) and 10.2 ± 4.1 kPa respectively. At referral, 16.7 % were receiving protective lung ventilation according to ARDSnet criteria, 47 were receiving neuromuscular blockers, eight were ventilated in the prone position, two were on high frequency oscillatory ventilation and three were on inhaled nitric oxide.

Forty eight patients (80 %) required venovenous ECMO initiation at the referring centre. All patients that required ECMO were successfully cannulated. Cannulation techniques were bifemoral (85.4 %) and femoral-jugular (10.4 %) and dual-lumen jugular Avalon cannulation (4.2 %). There were no cannulation or ECMO related complications. Mean ± SD pump blood flow and sweep gas flow during transport were 4.5 ± 0.7 and 4.4 ± 1.7 Lmin⁻¹ respectively. One patient with multi-organ failure died prior to transfer.

There were no serious adverse events during retrieval. The mean ± SD lowest SpO₂ and SBP were 91 ± 6 % and 105 ± 19 mmHg respectively. Following retrieval, there was a significant improvement in PaO₂/FiO₂ ratio, ventilator FiO₂, Pplat, pH and PaCO₂ (table 1).

	At referral	Immediately following retrieval	P-value
PaO ₂ /FiO ₂ ratio mean ± SD, kPa	10.2 ± 4.1	26.2 ± 15.5	<0.0001*
Ventilator FiO ₂ median (IQR)	1.0 (0.9-1)	0.4 (0.3-0.7)	<0.0001*
Pplat mean ± SD, cmH ₂ O	32.8 ± 5.8	23.0 ± 5.5	<0.0001*
pH mean ± SD	7.15 ± 0.16	7.32 ± 0.09	<0.0001*
PaCO ₂ mean ± SD, kPa	10.6 ± 4.4	6.4 ± 1.7	<0.0001*

[Ventilatory data pre & immediately post-retrieval]

Survival to critical care discharge was 77 % for patients initiated on ECMO and 75 % for those retrieved conventionally.

CONCLUSIONS. Despite very high illness severity, patients who fail mechanical ventilation can be safely transferred to a specialist respiratory failure centre. An intensivist delivered mobile ECMO service delivers safe patient retrieval and a high survival rate.

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COST ANALYSIS OF THE USE OF EXTRACORPOREAL CARBON DIOXIDE REMOVAL TO AVOID INTUBATION IN PATIENTS FAILING NON-INVASIVE VENTILATION

S.A. Braune¹, H. Burchard², M. Engel³, A. Nierhaus¹, H. Ebel⁴, S. Rosseau⁵, S. Kluge¹

¹University Medical Center Hamburg-Eppendorf, Department of Intensive Care Medicine, Hamburg, Germany, ²University Goettingen, Bovenden, Germany, ³Klinikum Bogenhausen, Department of Cardiology and Intensive Care, Munich, Germany, ⁴Catholic Hospital 'St. Johann Nepomuk', Department of Internal Medicine II, Erfurt, Germany, ⁵Charité-Universitätsmedizin Berlin, Department of Internal Medicine, Infectious Diseases and Respiratory Medicine, Berlin, Germany

INTRODUCTION. Extracorporeal carbon dioxide removal (ECCO₂R) is increasingly applied in patients with refractory hypercapnia on invasive mechanical ventilation (IMV), but little is known about the economic impact of this new technology. A new indication for ECCO₂R is its pre-emptive application to avoid IMV altogether.

OBJECTIVES. To evaluate the financial implications of this new treatment strategy.

METHODS. Retrospective ancillary cost analysis using data from a recently published multicentre case-control-study (1) on the use of ECCO₂R to avoid IMV in patients with acute on chronic ventilatory failure of different aetiology showing a reduction in hospital length of stay. Cost calculations and comparison between the two treatment groups and subgroups were based on direct costs of the ECCO₂R and on average daily treatment costs for ICU and normal wards.

RESULTS. In the patient group treated with ECCO₂R IMV could be avoided in 90 % of cases and hospital length of stay (LOS) was shorter than in the matched control group treated with IMV (median 23 vs. 42 days). The overall average hospital treatment costs did not differ between the two groups (41.134 vs. 39.366 €, p = 0.8). A subgroup analysis of each 12 cases and 12 matched controls with chronic obstructive pulmonary disease (COPD) revealed significantly lower hospital treatment costs for the ECCO₂R group (19.610 vs. 46.552, p < 0.05).

CONCLUSIONS. Avoiding mechanical ventilation by the use of ECCO₂R and thereby reducing hospital LOS was associated with similar treatment costs for a mixed group of patient with acute on chronic ventilatory failure. In the subgroup of COPD patients treatment costs were even lower, implying that in selected patient groups a strategy of ECCO₂R to avoid intubation may not only hold clinical advantages, but also some beneficial economic impact. Further prospective economic analyses in larger patient groups are warranted to confirm these preliminary results.

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0678

MOBILIZATION OF PATIENTS ON VENO-VENOUS EXTRACORPOREAL MEMBRANE OXYGENATION SUPPORT, WITH AN 'ECMO-HELMET'

R. Pruijsten¹, R. van Thiel¹, M. Saeijs², M. Verbiest², D. Dos Reis Miranda¹

¹Erasmus Medical Center, Department of Intensive Care Medicine, Rotterdam, Netherlands, ²Erasmus Medical Center, Department of Physiotherapy, Rotterdam, Netherlands

INTRODUCTION. Extracorporeal Membrane Oxygenation (ECMO) is increasingly used in patients with acute severe respiratory failure, when conventional treatment fails. Venovenous ECMO-support can bridge patients to recovery or -in case of end-stage lung disease- to lung transplantation. Deconditioning and neuromuscular weakness of the immobilized patient have a negative impact on morbidity and mortality. Although ECMO-patients are often considered to be too unstable for active physical therapy, early reconditioning has shown to improve outcome^{1,2}. To secure tubing and cannulas during mobilization, a device made of thermoplastic splinting material (a 'Snorkel') can be used for stabilization¹. Another type of stabilization device, an 'ECMO-Helmet', may have beneficial effects: by fixating the cannulas closer to the body, it may lead to less dislocations during mobilization. **OBJECTIVES.** Our aim was to assess if mobilization of patients with an 'ECMO-Helmet' is feasible and safe.

METHODS. The veno-venous ECMO-systems were cannulated with a bicaval dual-lumen catheter via the right jugular vein. With support of a physiotherapist, reconditioning was optimized for each patient, ranging from exercising in bed to walking outside the room. For stabilizing the cannula, we used an 'ECMO-helmet' (consisting of gypsum and hook-and-loop fasteners; see Figure). We defined the patient 'mobilized' when we at least succeeded to let him/her sit in bed in upright position, with both legs hanging outside of the bed.

RESULTS. Between November 2012 and February 2014, 6 patients were mobilized with an ECMO-helmet (median age 52 years; 4 males). Reasons of respiratory failure were: idiopathic pulmonary fibrosis (2x); idiopathic pleuroparenchymal fibroelastosis; end-stage cystic fibrosis; interstitial pulmonary disease after Influenza-A pneumonia and a complicated lung transplantation (pneumectomy). Of these 6 patients, 4 were able to stand and walk a short distance (up to 100 meters) and 2 patients could sit in upright position with both legs hanging outside of the bed. There were no complications of mobilization. The ECMO-cannulas did not need to be held by hand and did not dislocate in any patient during mobilization (measured by marks on cannulas and skin). Eventually, 4 patients could be bridged to lung transplantation and 2 patients died on the ECMO.



[An 'ECMO-Helmet']

CONCLUSIONS. Mobilization of patients on veno-venous ECMO-support with an 'ECMO-Helmet' is feasible and safe.

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0679

VENO-VENOUS ECMO THERAPY FOR LIFE-THREATENING POST-PNEUMONECTOMY PULMONARY EDEMA. PRELIMINARY RESULTS

N.P.H. Adam¹, L. Kiani¹, H. Clavier¹, J.L. Le Guillou¹, L. Triet¹, R. Caliendo², P. Girard², M. Debauchez³, D. Debrosse⁴, C. Lamer¹

¹Institut Mutualiste Montsouris, General Intensive Care Unit, Paris, France, ²Institut Mutualiste Montsouris, Pneumology, Paris, France, ³Institut Mutualiste Montsouris, Cardiac Surgery, Paris, France, ⁴Institut Mutualiste Montsouris, Thoracic Surgery, Paris, France

INTRODUCTION. Post-pneumectomy pulmonary edema (PPPE) is a rare but severe complication after thoracic surgery(1). Although poorly understood, its pathophysiology seems to involve both vascular and alveolar injuries and shares common mechanisms with ARDS(2). Its mortality can reach 100 % especially after right pneumectomy(3). Venovenous extra corporeal membrane oxygenation (vvECMO) might be a rescue treatment of life-threatening hypoxemia due to PPPE.

OBJECTIVES. Evaluation of efficiency and safety of vvECMO to treat PPPE.

METHODS. Retrospective study in a general ICU. We reviewed all patients who underwent pneumectomy and had PPPE within the past 4 years.

RESULTS. During the period, 110 patients had a pneumectomy: 64 (58 %) on the left side and 46 (42 %) on the right side. In the right pneumectomy group, 10 patients (21 %) had

complications and were admitted in ICU within the first 7 days after surgery. three patients (6 %) developed a PPPE with refractory hypoxemia leading to early vvECMO treatment (table 1). In all cases, pneumectomy was undertaken for primitive lung adenocarcinoma and was associated with total mediastinal lymphadenectomy. Pulmonary edema occurred within the first 48 h after surgery and cardiogenic edema or lung infection were ruled out. We used a double lumen and single cannula (AVALON®) implanted in the right internal jugular vein, under TEE control, by an intensivist and a cardiac surgeon. During vvECMO (MAQUET®) therapy, protective ventilation was achieved using pressure support and ECMO parameters were assessed in order to keep SaO₂ > 90 % and pH > 7.35. ECMO was successfully removed after 7, 8 and 17 days respectively. Adverse events occurred in two patients: one had hemorrhage at implantation site after cannula removal but didn't need surgery, and one had an infected deep venous thrombosis of the right internal jugular vein. All patients were alive at ICU, hospital discharge and one year after surgery.

	Patient 1	Patient 2	Patient 3
Age (y)	69	51	56
Sex M/F	F	M	F
FEV1 (% predicted value)	79	65	84
Right lung perfusion (% of total perfusion)	54	16	-
Time from acute respiratory failure to ECMO (h)	20	16	9
PaO ₂ /FiO ₂ ratio prior to ECMO	67	104	73
ECMO duration (d)	7	8	17
ICU length of stay (d)	45	32	40
Hospital length of stay (d)	62	36	52

[Patients characteristics]

CONCLUSION. ECMO can be a live-saving procedure for life-threatening hypoxemia due to idiopathic PPPE. Because randomized controlled trials seem unrealistic, an international registry should be implemented.

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DOUBLE LUMEN CANNULA EXPERIENCE IN V-V ECMO

E. Zogheib^{1,2}, M. Guilbart¹, A. Hchikat¹, C. Caplin¹, J. Marc¹, D. Taing¹, T. Caus², H. Dupont^{1,2}

¹CHU Amiens, Surgical Intensive Care, Amiens, France, ²INSERM U 1088, UPJV University, Amiens, France, ³CHU Amiens, Cardiac Surgery, Amiens, France

INTRODUCTION. Extra corporeal membrane oxygenation (ECMO) is used in the refractory acute respiratory distress syndrome (ARDS). Usually, the veno-venous ECMO (v-v ECMO) requires a venous site of drainage of the blood and another site of reinjection of the "arterial" blood. With the aim of saving venous vascular axes, the evolution of a double lumen cannula (AVALON®) provides support through a single cannula in the jugular position in the neck, avoiding femoral cannulation.

OBJECTIVES. Describe the use and competence of AVALON cannula.

METHODS. All the patients treated with v-v ECMO from January 2011 to March 2014 were included in this observational study. The indications, the duration of ECMO, cannula insertion, complications and hemodynamic skills of cannulas were described.

RESULTS. 21 v-v ECMO using an Avalon® cannula was implanted. Cannulas were inserted in the right jugular vein using trans thoracic echocardiography (TTE). The insertion of the guide in the inferior vena cava failed in spite of the use of a transesophageal echocardiography (TEE) (4.7 % of failure), requiring the use of a femoral cannula. 18 patients presented a refractory ARDS with pneumonia (90 %) among which 4 H1N1 flu, and 1 Wegener disease. One patient presented a massive hemoptysis requiring ECMO to allow pneumectomy, and 1 patient a postoperative bronchial fistula of a lobectomy to allow the surgical reinterventions. All the implantations were realized on bed. 65 % of cannulas were inserted by intensivists, 10 % by cardiac surgeons, and 25 % by a mixed team. 19 patients were retrieved towards the reference ECMO center, among whom 9 required the use of medical care ambulance (93 km [7-360]). 50 % of the patients were explanted and alive 6 months later. The mean insertion time (from the puncture to the starting up of the pump) was 25 min [15-45]. The cannula size mainly used was 27F diameters (70 %), the 23F size (20 %) and the 31F (10 %). The change of 23 F cannula by a 27F cannula was necessary because of the blood flow limitation. The maximum blood flow was 3.7L/mn with 23F, 5.1L/mn with 27F and 5.3 l/mn with 31F. The repositioning of the cannula was necessary in 35 % of the cases (cannula was in the right atrium). A pericardial tamponade occurred 20 min after ECMO starting and required a sternotomy for haemostasis on a wound of a coronary vein with favorable evolution. No thrombosis of cannulas was observed, inspite stopping of anticoagulation during ECMO. Infection of cannula to enterococcus was described in one case, requiring an antibiotic treatment with good evolution. Mean duration of ECMO was of 26 days [2-60]. Cannulas were removed without any surgical procedure. No bleeding complications were described.

CONCLUSIONS. In our study, the use of a Avalon® cannula by an expert team is possible, despite usual complications. The use of a large diameter cannula must be used in severe hypoxemia or hypercapnia.

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NEUROLOGICAL EVENTS OCCURRING DURING VENO-VENOUS ECMO: AN OBSERVATIONAL STUDY

C.-E. Luyt¹, G. Hekimian¹, N. Bréchet¹, G. Tachon¹, A. Nieszkowska¹, J.-L. Trouillet¹, J. Chastre¹, A. Combes¹

¹Groupe Hospitalier Pitié-Salpêtrière, Paris, France

INTRODUCTION. Incidence and impact of neurologic events in patients on veno-venous ECMO (vv-ECMO) are not known.

OBJECTIVES. To describe epidemiology, risk factors and impact of neurologic complications occurring in vv-ECMO patients.

METHODS. Mono centre observational study. Between 2006 and 2012, patients having developed a neurological event while on vv-ECMO were compared to vv-ECMO patients without neurological events.

RESULTS. A total of 133 adults were treated (87 males [65 %]; mean age, 44 ± 14 years; mean SAPS II score on admission, 69 ± 15). In 23 patients, a neurological event could not be ruled out because of early death or pre-existing neurologic disease. Twenty-one (16 %) developed a neurological event that lead to cerebral imaging (20 CT-scan and 1 MRI) : mydriasis (7/21), coma (5/21), hemiplegia (2/21), seizures (2/21), brain death (2/21) or prolonged delirium (2/21). Diagnoses included cerebral haemorrhage in 10 (7.5 %) and ischemic infarction in 3 (2 %), occurring after a median (IQR) time of 3 (1-11) and 21 (10-26) days after ECMO onset, respectively. The 2 brain-dead patients (1 after cardiac arrest and one after trauma, both occurring before ECMO) had malignant cerebral oedema. Six patients with clinical neurological event had normal CT scan. Neurological events on ECMO were associated with renal failure on admission; whereas age, comorbidities, hemostasis disorder on admission or during ICU stay were not associated with neurological events on ECMO. Seven (70 %) and 1 (33 %) patients with cerebral haemorrhage and cerebral ischemic stroke died, respectively, whereas 40 % of patients without neurological event died ($p = 0.06$ for comparison with cerebral haemorrhage; $p = NS$ for comparison with ischemic stroke). Five patients had cerebral imaging without neurological events. No abnormalities were detected in these patients.

CONCLUSIONS. Neurological events are frequent (10 %) in patients requiring vv-ECMO. Cerebral haemorrhage is the most frequent, occurs early and is associated with increased mortality. Ischemic stroke occurs later and doesn't seem associated with worse outcome. Except renal failure on admission, no risk factor seems to be associated with neurological events.

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THE USE OF EXTRACORPOREAL MEMBRANE OXYGENATION ON SEVERE RESPIRATORY INSUFFICIENCY SECONDARY TO COMMUNITY-ACQUIRED PNEUMONIA

M. Basto¹, M. Achando¹, M. Leite¹, D. Franco², D. Caeiro¹, P. Fernandes¹, M. Gonçalves¹, P. Castelões¹

¹Centro Hospitalar de Vila Nova de Gaia/Espinho, EPE, Intensive Care Unit, Vila Nova de Gaia, Portugal, ²Unidade Local de Saúde de Castelo Branco, EPE, Internal Medicine, Castelo Branco, Portugal

INTRODUCTION. Pneumonias that present with refractory, severe respiratory insufficiency have a high mortality rate. During the last few years the utilization of extracorporeal membrane oxygenation (ECMO) has increased in these situations.

OBJECTIVES. To evaluate the results of our Intensive Care Unit (ICU) initial experience with ECMO utilization in pneumonias presenting with severe refractory respiratory insufficiency.

METHODS. Observational, retrospective study of the experience with ECMO in pneumonia cases during the time period comprised between November 2013 and February 2014.

RESULTS. Veno-venous modality ECMO was implanted in 6 patients with community-acquired pneumonia with a mean age of 46.33 years old (28-58), 4 of which were males (66.7 %). They scored mean APACHE II, SAPS II and SOFA of 31, 45.83 and 6.33, respectively. Three of the pneumonias had viral etiology (H1N1), one was caused by Legionella and in the two remaining no agent was isolated. The period between admission and the start of ECMO had a mean duration of 4.6 days (less than 24 h in two cases). In spite of the adopted ventilatory strategy for all patients (FIO₂ 1.0, mean PEEP of 12 and I:E inversion), they showed a bad response with a mean pre-ECMO PaO₂/FIO₂ of 62.3 mmHg (40-86) and mean PACO₂ of 57 mmHg (33-74). The patients underwent ECMO for a mean of 12 days (8-15), with a mean invasive ventilation time of 23 days. Of note, 2 patients needed reintubation and 2 were subjected to tracheostomy. The mean ICU stay was 27 days, with a survival rate of 100 % at the first month post-discharge. Three patients developed minor complications related to cannulation, (2 hematomas and one local thrombosis).

CONCLUSIONS. ECMO seems to have a positive impact on outcome in patients with severe respiratory failure, and more randomized trials are needed to support the existing evidence regarding its benefit on survival.

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Neuro-intensive care: 0684–0697

0684

PHOSPHORYLATED NEUROFILAMENT H (pNF-H) AS A DIAGNOSTIC MARKER IN ACUTE BRAIN INSULTS

M.O. Elghonemi¹, H. Saber², W. Radwan¹

¹Cairo University, Critical Care, Cairo, Egypt, ²Beni Seuf University, Critical Care, Cairo, Egypt

INTRODUCTION. Acute brain insults can occur due to trauma or due to ischemic and hemorrhagic strokes. One of the main drawbacks in the management of patients with acute brain insults is the absence of a widely available and rapid diagnostic test. that can diagnose and evaluate prognosis of such case.

OBJECTIVES. objective of our study was to assess whether Phosphorylated Neurofilament H (pNF-H) might provide useful diagnostic information in the early evaluation of such patients and weather levels of the neurofilament correlated with different clinical variables.

METHODS. A total of 90 patients presenting to the critical care department of Cairo University were prospectively studied. Patients were stratified according to the presenting pathology into 3 main groups: Traumatic Brain Injury, Ischemic stroke and Cerebral Hemorrhage. Blood samples for phosphorylated neurofilament H were assayed on admission and after 7 days. Neurofilament levels were correlated to Glasgow coma scale, CT findings and NIHSS on admission and after 7 days. Rankin score at 3 months was used to detect the degree of disability.

RESULTS. pNF-H levels showed a negative correlation with GCS on admission and after 7 days in traumatic brain injury ($r = 0.66, 0.78$), ischemic stroke ($0.3, 0.5$) and cerebral hemorrhage ($r = -0.56, 0.65$); hence higher pNF-H levels were associated with lower GCS on

admission and after 7 days. In traumatic brain injury patients, there was a negative correlation between pNF-H levels and Marshal CT scores on admission and after 7 days ($r = 0.56, 0.4$) hence higher pNF-H levels correlated with worse CT findings. In ischemic CVS, there was a negative correlation between neurofilament levels and ASPECTS CT scores ($r = 0.64, 0.89$). In both ischemic CVS and cerebral hemorrhage, NIHSS showed positive correlations with pNF-H levels. Patients who died or had the greatest (Rankin 6 and 5) after 3 months had the highest levels of pNF-H on admission and after 7 days. The cut off level of Neurofilament to detect death and disability was 35 pg/ml on admission (sensitivity 82 %, specificity 78 %) and was 11 pg/ml after 7 days (sensitivity 87 %, specificity 92 %)

CONCLUSIONS. Phosphorylated Neurofilament H can be used as a diagnostic and prognostic marker in patients with acute brain insults as seen by the presence of significant correlations between the marker levels and different clinical and radiological tools.

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0685

MORTALITY AFTER REFRACTORY STATUS EPILEPTICUS IN FINLAND

A.-M. Kantanen¹, M. Reinikainen², R. Kälviäinen³, I. Parviainen⁴, E. Ruokonen⁵

¹Kuopio University Hospital, University of Eastern Finland, Neurocenter, Department of Neurology, Kuopio, Finland, ²North-Karelia Central Hospital, Intensive Care Unit, Joensuu, Finland, ³Kuopio University Hospital, University of Eastern Finland, Neurocenter, Epilepsy Center, Kuopio, Finland, ⁴Kuopio University Hospital, Intensive Care Unit, Kuopio, Finland, ⁵Kuopio University Hospital, University of Eastern Finland, Intensive Care Unit, Kuopio, Finland

INTRODUCTION. Status epilepticus (SE) is an important neurological emergency associated with significant mortality and morbidity. The annual incidence of SE is considered to be 20/100 000. Mortality rates of SE are influenced by the underlying etiology, duration of SE and the patients age. Overall 30-day mortality of SE is estimated to be 20 %. Status epilepticus is considered refractory (RSE) if the first and second line treatments with antiepileptic drugs fail and the patient needs to be treated with general anesthesia in the intensive care unit (ICU). Approximately 12 - 43 % of SE becomes refractory. Data on outcome of RSE are scarce (1,2,3).

OBJECTIVES. The aim of the study was to identify the incidence and 12-month mortality of RSE in Finland.

METHODS. We analysed retrospectively the Finnish Intensive Care Consortium Database in order to identify RSE patients treated in ICU in Finland during a three-years-period (2010-2012). Data were available from three of Finland's five university hospitals and from 10 of the 15 central hospitals. The total referral population of these hospitals is 3.9 million. We included consecutive adult (16 years or older) RSE patients. Patients with hypoxic ischaemic brain damage and post-hypoxic myoclonus were excluded.

RESULTS. We identified 284 patients with ICU-treated RSE. This corresponds to annual incidence of RSE of 2.4/100 000. The median age was 58 years (range 17 - 84 years), the length of ICU stay was 5.0 days (interquartile range 3.6-8.3 days). SAPS II Score 47.3 ± 13.7. The overall hospital mortality is 9.2 %, 95 % CI 5.7 %-12.7 %, being lowest (2 %) in the age group under 44 years and highest (20 %) in the age group over 75 years. The 12-month mortality was 24.8 %, 95 % confidence interval (CI) 19.5 - 30.2 %, being lowest (8 %) in the age group under 44 years and highest (56 %) in the age group over 75 years.

CONCLUSIONS. The current incidence of RSE in Finland seems to be lower than reported in previous studies, but mortality still remains relatively unchanged. Over 20 % of the RSE patients die within a year.

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0686

EARLY COMPLEMENT ACTIVATION IN ICU-ACQUIRED WEAKNESS: A PILOT STUDY

E. Witteveen¹, F. de Beer¹, L. Wieske¹, W.K. Lagrand¹, C. Verhamme¹, M.J. Schultz¹, T.N. van Schaik¹, J. Horn¹

¹Academic Medical Center, Amsterdam, Netherlands

INTRODUCTION. The complement system is an important entity of the innate immune system. Complement activation triggers an early massive inflammatory reaction and is associated with the development of multiple organ dysfunction.¹

ICU-acquired weakness (ICU-AW) is caused by dysfunction and damage of muscles and nerves. This is considered as part of multiple organ failure. Therefore, we hypothesized that ICU-AW is associated with increased complement activation.

OBJECTIVES. To investigate the correlation between early complement activation and ICU-AW.

METHODS. In this prospective observational cohort study, newly admitted ICU patients with SIRs with or without suspicion of infection, were included. Exclusion criteria included antibiotic treatment for > 48 h before admission, inability to get informed consent < 24 h after admission, expected duration of mechanical ventilation < 48 h or inability to assess muscle strength. Further exclusion criteria were pre-existing poor functional status or any central nervous system disorder, spinal cord injury or neuromuscular disorder as reasons for admission.

Plasma was sampled daily from 0 to 7 days after admission. The complement activation products C3b/c, C4b/c and C5a were measured by ELISA technique. Muscle strength was assessed using the Medical Research Council (MRC) score in 6 muscle groups bilaterally. ICU-AW was defined as an average MRC score < 4.

RESULTS. We included 27 patients, of which 13 patients developed ICU-AW. A total of 167 plasma samples were analyzed. Complement activation was seen in all patients. Peak and mean levels (mean level of all samples of an individual patient) of C3b/c, C4b/c and C5a were not different between patients with and patients without ICU-AW. There was also no difference in the pattern of C3b/c, C4b/c or C5a levels.

Figure 1. Peak and mean levels of complement activation products in first 7 days after admission.

Values are presented as median and interquartile range.

	ICU-AW n:13	No ICU-AW n:14	p-value
C3b/c peak levels	107 (82-201)	90 (73-196)	0.550
C3b/c mean levels	63 (57-94)	62 (50-95)	0.720
C4b/c peak levels	23 (17-33)	24 (19-38)	0.369
C4b/c mean levels	15 (12-20)	16 (13-24)	0.616
C5a peak levels	19 (12-36)	17 (12-19)	0.583
C5a mean levels	13 (10-19)	12 (8-16)	0.65

[Figure_1]

CONCLUSIONS. We did not find a correlation between plasma complement activation product levels and ICU-AW. By including severely ill patients, all showing high complement activation, a correlation with ICU-AW might not be detectable.

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0687

TEMPORAL PROFILE OF JUGULAR AND SYSTEMIC S100B, AND LACTATE IN PATIENTS UNDER CERVICAL REGIONAL ANESTHESIA FOR CAROTID ENDARTERECTOMY

T. Molnar¹, E. Völgyi¹, S. Marton¹, J. Lantos², Z. Vamos¹, P. Szabo¹

¹University of Pecs, Dept. of Anesthesiology and Intensive Care, Pecs, Hungary, ²University of Pecs, Department of Surgical Research and Techniques, Pecs, Hungary

INTRODUCTION. The jugular venous-to-arterial lactate difference [lactate (jv-a)] and longitudinal change of jugular venous lactate [$\Delta(jv)$ lactate] are indicators of brain tissue metabolism and perfusion. The calcium binding protein S100B has a concentration-dependent vasodilator effect on cerebral arteries (1).

OBJECTIVES. The aim of this study was to examine the associations between whole blood lactate (jv-a), $\Delta(jv)$ lactate and serum S100B in patients under cervical regional anesthesia for carotid endarterectomy.

METHODS. A total of 48 patients with different sedation protocols (25 with intravenous propofol [TCI], 23 with per os benzodiazepine [BDZ]) were recruited into this prospective study. All patients received cervical block prior to carotid endarterectomy. Arterial (a) and jugular bulb (jv) blood was serially taken for lactate and S100B measurement before regional anesthesia (baseline, T0), before release of clamp (T1) of carotid artery, after release (T2) of clamp, at post-op. 2 h (T3) and 24 h (T4). Statistics: Mann-Whitney U test, Spearman correlation and Chi square test were performed by using SPSS 11.5.

RESULTS. S100B was already measurable in the systemic circulation prior to surgery in those patients (n = 10) whose lactate_{jvug} was significantly lower at T0 (p < 0.05). There was a significant negative correlation between the change of lactate_{jvug} (Δ lactate_{jvug} T₂-T₀) representing the extent of anaerobic metabolism and S100B_{jvug} at T2 indicating the reperfusion (p < 0.05). Neither the clamp time (22 ± 7 min), nor the severity of stenosis (84 ± 6 %) showed any association to S100B. In the TCI group, serum S100B in the systemic circulation was significantly higher at T4 compared to the BDZ group (p < 0.05), although neither the incidence of previous TIA/stroke nor intraoperative hemodynamic data showed significant difference in the two sedation group.

CONCLUSIONS. The early presence of S100B in the systemic circulation even prior to surgery indicates small-vessel disease or blood brain barrier dysfunction beside carotid artery stenosis in the affected patients. The inverse correlation between the reperfusion indicator S100B_{jvug} and Δ lactate_{jvug} T₂-T₀ indicates the potential vasoregulator effect of S100B, thus its vasodilator capacity may prevent from cerebral hyperperfusion. Further study should be addressed to clarify the link between propofol sedation and change of serum S100B.

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THE UTILIZATION OF ELECTROENCEPHALOGRAPHY (EEG) IN THE INTENSIVE CARE UNIT: ARE WE FOLLOWING THE GUIDELINES?

J.G. Boyd¹

¹Kingston General Hospital, Critical Care Medicine, Kingston, Canada

INTRODUCTION. EEG (both routine and continuous) are being used more frequently in the intensive care unit to provide prognostic information and to assess for subclinical seizures. The European Society of Intensive Care Medicine has recently published recommendations and suggestions for the use of EEG monitoring in the intensive care unit (Claassen et al., 2013). However, the implementation and adherence to these guidelines is not known.

OBJECTIVES. The present study was designed to assess the whether these guidelines and suggestions were being followed in our intensive care unit.

METHODS. This study was a prospective single centre study performed in a 33-bed tertiary level medical surgical intensive care unit at a large academic teaching hospital in Ontario, Canada. At our centre, EEG monitoring (routine and continuous) is available 7 days a week, but during daytime hours only. A member of the research team screened patients in the intensive care unit on a weekly basis. Clinical data was obtained by bedside chart review. Each patient was assessed to determine whether they met the ESICM recommendations or suggestions for EEG monitoring. If these criteria were met, the results of the EEG were recorded. Our University Research Ethics Board approved all procedures.

RESULTS. Over a seven week period, a total of 116 patients were screened 194 times. The mean age was 62 years, and the majority (60 %) were male. Fifty-four percent were mechanically ventilated. Of the 194 screenings that were performed, 12 patients met the

criteria EEG monitoring as per the ESICM recommendations. The ESICM has also listed several suggestions for EEG monitoring, and 36 patients would have met one of the recommended indications. The most common recommended indication for EEG monitoring was for patients without primary brain injury, but with unexplained impairment of mental status or unexplained neurological deficits (n = 29). Of the 41 patients that had an indication for EEG monitoring (ESICM recommendation, suggestion, or both), 19 patients underwent EEG monitoring, including 2 with continuous EEG monitoring. The most common finding was generalized slowing of the background rhythm.

CONCLUSIONS. EEG monitoring may be an underutilized monitoring modality in our general medical surgical intensive care unit. It is unclear whether increased EEG monitoring will impact patient outcomes.

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0689

ANOXIC COMA. THE BASELINE CLINICAL VARIABLES AND VEEG STUDY. CAN THE VEEG HELP US IN MEDICAL MANAGEMENT AND PROGNOSIS?

F. Arméstar-Rodríguez¹, J.L. Becerra-Cuñat², Y. León-Chan¹, E. Benveniste¹, E. Mesalles¹, M. Jiménez³, J. Roca³, E. Mor¹, J.A. Moreno¹

¹Hospital Universitario Germans Trias i Pujol, Intensive Care, Barcelona, Spain, ²Hospital Universitario Germans Trias i Pujol, Neurology, Barcelona, Spain, ³Hospital Universitario Germans Trias i Pujol, Epidemiology, Barcelona, Spain

INTRODUCTION. Predictors of unfavorable outcome in patients with anoxic coma after cardiopulmonary arrest (CPA) are very important for making decisions about limitation of therapeutic efforts.

OBJECTIVES. The aim of the current study was to analyze the clinical variables and the value of the video electroencephalogram (VEEG) early in the prognosis of patients with anoxic coma after recovered CPA.

METHODS. Retrospective study of patients with recovered CPA admitted consecutively to an intensive care unit. The variables within the first 48 h were: age, sex, Glasgow Coma Scale (GSC), pupillary light reflex; other variables related to CPA (cause, duration, witnessed or not witnessed), myoclonic status and EEG patterns.

RESULTS. Fifty patients were studied. The variables associated with mortality were the absence of pupillary light reflex (Hazard Ratio: 0.277, 95 % Confidence Interval: 0.103-0.741, p = 0.01), a low GSC (HR: 0.701, 95 % CI: 0.542-0.908, p = 0.007) and myoclonic state (HR 0.38, 95 % CI: 0.176-0.854, p = 0.01) at entry in ICU. In 22 patients the VEEG was performed. The EEG patterns did not reach statistical significance (p = ns), although the HR was 2.6 (95 % CI: 0.342-19.629).

CONCLUSIONS. The absence of pupillary light reflex, a low GSC and myoclonic state are prognostic factors in patients recovered after a CPA. The EEG patterns showed a nonsignificant trend of association with the prognosis of such patients.

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0690

CHANGES IN THE LAST 11 YEARS OF THE INCIDENCE AND MECHANISM OF CRANEOENCEPHALIC INJURY ADMITTED TO AN INTENSIVE CARE UNIT IN SPAIN

C. Lorenzo Cárdenas¹, P. Pujol Valverde¹, A. Taché Sala¹, J. Gonzalez Londoño¹, M. Morales Pedrosa², C. Murcia Gubianas³, A. Castanera Duro¹, M.A. Arruego Minguillón¹, J.M. Sirvent Calvera¹

¹Hospital Dr Josep Trueta, Intensive Care Unit, Girona, Spain

INTRODUCTION AND OBJECTIVES. In recent years there has been a decrease of cases of Traumatic Brain Injury (TBI) admitted to our ICU. We proceeded to analyze and describe the characteristics that caused TBI patients to be admitted in our ICU during the period between 2003 and 2013.

METHODS. We analyzed retrospectively the TBI database of the ICU of our hospital, a 3rd level hospital between the years 2003 to 2013. The most relevant traffic laws regarding road safety (Law 17/2005 and 15/2007) were enforced in Spain during the period of 2006 and 2007. We split the data that was obtained during this period into two parts; the first one included the period from 2003 to 2007 and it was compared with the second part (that included since 2008 to 2013). We proceeded to describe the demographic, clinical and injury mechanisms between populations during both periods. **RESULTS.** Since the beginning of 2003 until the end of 2013, a total of 602 patients with TBI were admitted in our ICU. 76.6 % (431) were male, with an average GCS of 8.2 (± 3.6) and a mean age of 42.3 (± 20.2) years. During the first period (2003-2007): A total of 380 TBI cases (63.12 %) were admitted. 198 (52.1 %) were secondary to traffic accidents and 56 (15.3 %) to accidental falls. 196 (51.6 %) were severe TBI (initial GCS ≤ 8). 18.8 % (71) died. 290 (76.3 %) were men, with mean age of 40.3 (± 19.7). During the second period (2008-2013): After traffic laws described above were enforced, 222 TBI were admitted (36.8 %), 77 were secondary to traffic accidents (37.2 %), remaining this as the leading cause of TBI admitted to our ICU. The second most common injury mechanism was the accidental fall (27.05 %). 67.9 % (150) were severe TBI (initial GCS ≤ 8). Overall mortality during this period was 13.2 % (38). 165 (77 %) were men, with mean age of 45.75 (± 20.4).

CONCLUSIONS. The number of TBI admitted to our ICU secondary to traffic accidents has declined over the past 6 years, probably related to the introduction in 2006 and 2007 of a more severe traffic law regarding road safety. However, TBI remains the leading cause of admission to our ICU, although less frequent compared to the second cause (accidental drops). Despite the decrease in the total number of patients with TBI, we experienced an increase in the number of patients with severe trauma, but no statistically significant difference in mortality (p = 0.7).

0691

THE INCIDENCE OF NEUROLOGICAL EVENTS DURING PREGNANCY REQUIRING NEUROINTENSIVE CARE IN THE EAST OF ENGLAND: OUR EXPERIENCE

C. Robba¹, M.S. Sekhon¹, J. Outtrim¹, A. Bertuccio², B. Matta¹

¹Addenbrookes Hospital, NCCU, Cambridge, United Kingdom, ²Alessandria Hospital, Neurosurgery, Alessandria, Italy

INTRODUCTION. Neurocritical care diseases such as cerebrovascular events, eclampsia, preeclampsia, neuropathy, myopathy and intracranial hemorrhage can complicate pregnancy. Due to the complexities of neurocritical care illness with concomitant pregnancy, little is known regarding the incidence, presentations, diagnosis, optimal management strategies and outcomes in these patients.

OBJECTIVE. We describe a consecutive case series of pregnant patients whom presented to our neurocritical care unit and discuss the presentations, diagnoses as well as management of neurocritical care diseases in pregnancy.

METHODS. We described 38 women neurocritically ill pregnant patients aged 17 to 39 years admitted to our unit at Addenbrookes Hospital, Cambridge, from 2009 to 2014. Nine were excluded because the admission diagnosis was not primarily neurological in origin. Of the 29 patients included, we recorded baseline demographics, symptoms of presentation, state of pregnancy, management, treatment and outcomes (GOS and mortality at discharge).

RESULTS. Loss of consciousness, seizure and headache were the most common presenting symptoms. More than half of cases occurred in the third trimester of pregnancy or peripartum. Of the 29 patients admitted, 17(58.6%) patients had vascular intracranial events (stroke, hemorrhage, aneurysmal disease). Of these, 14 (48.3%) patients had an intracranial hemorrhage (5 non traumatic subarachnoid hemorrhage, 9 intracranial hemorrhage), and 3 (10.3%) were associated with cerebral venous sinus thrombosis. Four patients were admitted secondary to trauma (13.8%), and only 3 (10.3%) patients were admitted for eclampsia. Other causes (meningitis, brain tumors, respiratory failure,) were less common. 3 of the 29 (10.3%) patients included died. Of the 26 patients who survived (89.7%), 24 were neurologically improved at the discharge, and 2 had no neurological deficits.

DISCUSSION. Neurological disorders during pregnancy result from a wide range of etiologies, and the management can be challenging. The management (surgical, medical or supportive) should be evaluated according to the state of pregnancy, general conditions and risk factors for the patient and for the child and after a multidisciplinary assessment that should involve neurologists, neurosurgeons, obstetrics and intensivists.

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0692

CEREBRAL OXIMETRY ASSESSED BY NEAR-INFRARED SPECTROMETRY DURING PREECLAMPSIA: AN OBSERVATIONAL STUDY. A PRELIMINARY STUDY OF THE IMPACT OF MAGNESIUM SULFATE ADMINISTRATION

P. Guerci¹, F. Vial², N.-E. Baka², H. Bouaziz³, M.-R. Lossier¹

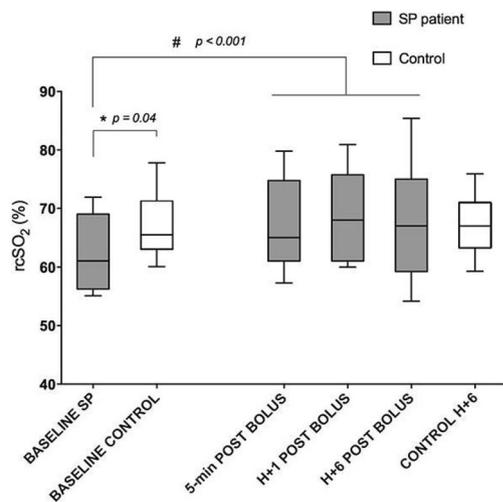
¹CHU de Nancy, Anesthesiology and Critical Care Medicine, Vandoeuvre-Les-Nancy, France, ²Maternité Regionale Universitaire de Nancy, Anesthesiology and Obstetric Critical Care Unit, Nancy, France, ³CHU de Nancy, Anesthesiology and Critical Care Medicine, Nancy, France

INTRODUCTION. Preeclampsia is a multisystem disorder that may result in substantial maternal complications, and neonatal morbidity and mortality.¹ Neurologic symptoms are often associated with severe forms of preeclampsia (SP) and may ultimately progress to eclampsia. It is well established that these signs are related to posterior reversible encephalopathy syndrome (PRES-like),² and more rarely to reversible cerebral vasoconstriction syndrome. We hypothesized that vasogenic edema leading to neurologic signs may alter cerebral microcirculation with subsequent decreased cerebral oxygenation.

OBJECTIVES. To determine the regional cerebral oxygen saturation of hemoglobin (rcSO₂) in SP parturients exhibiting neurologic symptoms compared to healthy pregnant women (control) and to describe the effects of MgSO₄ infusion on rcSO₂, cerebral and systemic hemodynamic variables.

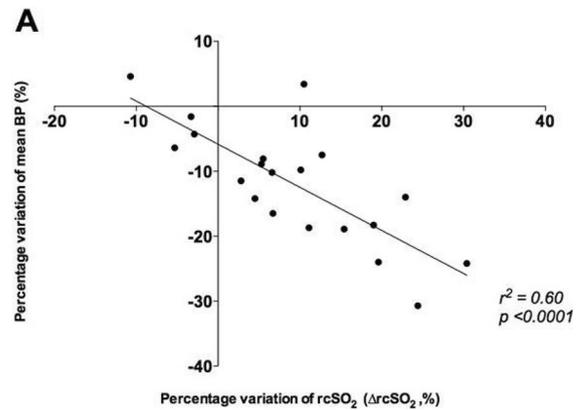
METHODS. Prospective observational study at an obstetric critical care unit in a university-affiliated hospital. In 20 SP parturients presenting with neurologic signs before any administration of MgSO₄, we measured rcSO₂ using near-infrared spectroscopy (NIRS), blood flow velocities of the middle cerebral artery (MCA) and cardiac output at baseline, 5 min, 1 h (H + 1) and 6 h (H + 6) after the MgSO₄ bolus (4 g), followed by continuous MgSO₄ infusion (1 g/h). These measurements were also obtained in 20 control parturients at baseline and H + 6.

RESULTS. Baseline rcSO₂ was significantly lower in the SP group: 61% [56-69] versus 66% [63-71] (*p* = 0.037). At inclusion, blood pressure was significantly higher in the SP group compared with the control group, while cardiac output and transcranial Doppler readings were similar. Five minutes after the MgSO₄ bolus infusion, a median increase of 8.6% [3.2-18.1] in rcSO₂ was observed (*p* = 0.007), reaching values of the control group that were maintained up to H + 6 (figure 1).



[Figure 1]

Blood pressure and systolic velocities of the MCA significantly decreased (*p* < 0.01) after the MgSO₄ bolus, whereas cardiac output did not change. The percentage increase in rcSO₂ was negatively correlated to the mean blood pressure (*r*² = 0.60, *p* < 0.0001) (figure 2).



[Figure 2]

CONCLUSIONS. Cerebral oxygenation impairment can be detected by NIRS monitoring in SP parturients. These results suggested the presence of disorders in cerebral microcirculation and/or changes in cerebral oxygenation. MgSO₄ infusion in SP patients restored rcSO₂ to control levels with no systemic side effects. Further studies are needed to confirm the usefulness of NIRS monitoring in SP patients and to assess the effects of other anti-hypertensive therapies on rcSO₂.

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0693

DUPLIX ULTRASOUND SCREENING FOR LOWER EXTREMITY DEEP VENOUS THROMBOSIS IN CRITICALLY ILL NEUROSURGICAL PATIENTS

A. Mukhtar¹, M. Elsayed¹, H. Azzizi¹, R. Mahrous¹, A. Gado¹, A. Hassanin¹, T. Ali¹, N. Salama¹, N. Yasser¹, G. Sayed¹

¹Cairo University Faculty of Medicine, Anesthesia Department, Cairo, Egypt

INTRODUCTION. Lower extremity deep venous thrombosis (LEDVT) is common in critically ill patients, its risk is increased in neurosurgical & traumatic brain injury (TBI) patients independent of pharmacologic thromboembolism prophylaxis (PTP).¹ Many cases of LEDVT are asymptomatic, only detected by duplex ultrasound screening (DUS)², yet the American college of chest physicians guidelines recommend against routine DUS for LEDVT in critically ill patients.³ In neurosurgical critically ill patients, DUS was found beneficial in detecting LEDVT⁴, still with no recommendations for its routine use.

OBJECTIVE. To detect the possible value of routine DUS in early detection of LEDVT in critically ill neurosurgical patients.

METHODS. Patients with severe head injury &/or acute cerebral hemorrhage, with Glasgow coma scale(GCS) ≤ 8 & who spent > 48 h in the ICU with delayed PTP without documented LEDVT signs were included. Weekly DUS was performed for 5 months at two sites; the common femoral vein including sapheno-femoral junction & the popliteal vein. Demographic data, severity scoring data, timing of PTP, dehydrating measures, mechanical ventilation, GCS, spinal cord injury, sepsis, vasopressors & surgical procedures were also recorded.

RESULTS. Thirty three cases were examined; TBI were 17(54.8%) cases while acute cerebral hemorrhage cases were 14(45.2%). DUS reported 11(33%) LEDVT cases. TBI cases had lower incidence of LEDVT than acute cerebral hemorrhage cases (3(17.6%) versus 8(57.1%) cases respectively, *P* = 0.028). Nine cases (82%) of LEDVT were diagnosed in the first week of admission. Delayed PTP patients had higher incidence of LEDVT than those with early prophylaxis (5(62%) versus 4(19%) cases respectively, *P* = 0.024).

CONCLUSION. Routine DUS improved early detection of LEDVT in critically ill neurosurgical patients with delayed pharmacologic thromboembolism prophylaxis especially in the first week of ICU admission.

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0694

SCALE FOR EVALUATION OF BRAIN-STEM LESIONS IN PATIENTS WITH EXTRA MEDULLARY FOSSA-POSTERIOR TUMORS

V. Podlepich¹, E. Sokolova¹, E. Aleksandrova¹, A. Goriachev¹, A. Chumayev¹, A. Polupan¹, K. Lapteva¹, I. Matskovsky¹

¹Burdenko Research Neurosurgery Institute, Russian Academy of Medical Sciences, Moscow, Russian Federation, ²Pirogov Russian National Research Medical University, Moscow, Russian Federation

INTRODUCTION. The delay with protection of upper airways and beginning of mechanical ventilation leads to aspiration pneumonia and secondary brain ischemia. The better prognostic scales can help to prevent complications.

OBJECTIVE. Scoring and diversification of brain-stem lesions in patients with extra medullar fossa-posterior tumors in peri-operative period.

METHODS. We invented the scale of brain-stem function on the base of evaluation 11 cranial nerves and level of consciousness. Each function is scored from 0 to 3 (4 levels: 0, 1, 2, 3). Higher score-worse function. After clinical scoring of the signs of examination we used two protocols of evaluation of results. The first is the total number; the second gives the numbers for six positions: conciseness, midbrain, pons, medulla, motor pathway, sensor pathway.

RESULTS. 43 patients operated extra medullar fossa-posterior tumors were included in the study. All were examined before and next day after operation. 39 patients had score 19 or less before and after operation and good recovery but 8 needed tube feeding because of neurogenic swallowing disorders. Maximal augmentation of score in this group was 19. 3 patients were in severe condition had total scores: 20, 33, 43. All were tracheostomised and mechanically ventilated for 3, 7, 14 days. The score make possible to discriminate the level of lesion. All these patients had biggest score bulbar lesion: 8, 9, 11 in the group. All the other patients never exceed score 5 of medulla level.

CONCLUSIONS. In the group of operated extra medullar fossa-posterior tumors patients with the total score ≥ 20 and bulbar lesion score ≥ 8 the need for airway protection and/or mechanical ventilation observed. The future studies to be continued. We are planning augmentation of the group to 200 patients and evaluate correlation of the scores with the other scales and neuro-visualization and electrophysiology data.

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0695

MANAGEMENT OF STATUS EPILEPTICUS IN A TUNISIAN INTENSIVE CARE UNIT

H. Ben Ghezala¹, K. Moez², K. Ben Taher³

¹Faculty of Medicine of Tunis, Intensive Care Unit, Zaghouan, Tunisia, ²Ministry of Public Health, Zaghouan, Tunisia, ³Ministry of Public Health, Intensive Care Medicine, Zaghouan, Tunisia

INTRODUCTION. The incidence of status epilepticus in intensive care units (ICU) is variable (10-60 per 100.000 person years). There are different clinical and etiological forms. Its Management had been updated in several recommendations. The last French expert recommendations were published in 2009. In a new intensive care unit in Zaghouan in Tunisia, we do not have precise data about patients managed in our unit for status epilepticus. That is why we decided to perform an epidemiologic study about this emergency.

OBJECTIVE. The main objective of our study was to describe the epidemiology, the etiology, the clinical features and the outcome of patients admitted in our ICU in Zaghouan for status epilepticus.

METHODS. Single-center retrospective study that included all patients admitted in intensive care unit for status epilepticus. We collected data from the opening of the unit in January 2011 to the 30th of November 2013.

RESULTS. 26 patients were enrolled in the study. The average age was 31 ± 11 years with extremes of 15 and 65 years. There was a male predominance ($n = 19, 73\%$). All patients came to the emergency department by non-medical transportation. It is in most cases a status epilepticus complicating known epilepsy ($n = 17, 68\%$). An inaugural status epilepticus was diagnosed in the other patients ($n = 9, 34\%$): hypoglycemia ($n = 2$), head trauma ($n = 5$), stroke ($n = 3$) and meningoencephalitis ($n = 1$). Generalized tonic-clonic seizures (GTCS) was the main clinical form observed in our patients ($n = 24, 92\%$). We did not need electroencephalogram.

All our patients received an active treatment of neuroprotection against brain aggression factors. 17 patients (65%) required intubation and mechanical ventilation. The main anti-epileptic drug used were diazepam ($n = 18, 69\%$) and phenobarbital ($n = 25, 96\%$). Six patients died (23%). The average length of ICU stay was 5 ± 2 days.

CONCLUSION. Status epilepticus still a medical emergency associated with a high morbidity and mortality. The characteristics of patients enrolled in our study are similar to published series. Our results suggest that the outcome of status epilepticus still poor despite all the progress made in its management. Multidisciplinary care and improving treatment approaches are required to improve its outcome.

0696

PREVALENCE OF THIAMINE DEFICIENCY IN ICU PATIENTS

J. van Rosmalen¹, D. Ramnarain¹, A. van Olfen¹

¹St. Elisabeth Hospital, Intensive Care, Tilburg, Netherlands

INTRODUCTION. Critically ill patients often develop cognitive impairment and delirium during treatment in the ICU stay. Thiamine deficiency is one recognized factor attributing to serious illness. In literature reported prevalence varies from 8% to 37%.¹ Even as high as 98% in certain groups.² We investigated the prevalence of thiamine deficiency (vitamin B1) in our neuro-intensive care at admission.

METHODS. Prospective, single center observational study.

Setting A mixed level-3 intensive care unit with 32 beds of a large teaching hospital in the Netherlands with a focus on neurosurgery and trauma.

Population 82 Adult critically ill patients, admitted between June and December 2013.

Inclusion criteria Age over sixteen years, ICU patients with indication for mechanical ventilation (both invasive and non-invasive) and/or inotropic/vasopressive drugs.

Exclusion criteria Alcohol abuse (men > 21 , women > 15 standard drinks per week), poor prognosis, hospitalization for intoxication, admission after elective surgery, thiamine supplementation in the three weeks preceding admission.

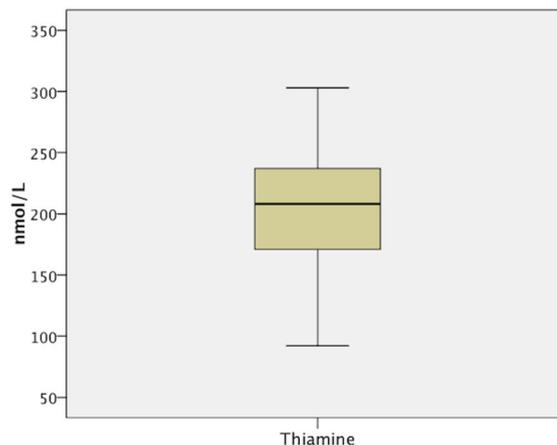
Measurements Total Thiamine was measured with HPLC within hours after admission at ICU. Also Carbohydrate Deficient Transferrin (CDT) was measured as a proxy for alcohol-use. Information about alcohol use and other known risk factors for thiamine deficiency was collected: use of diuretics, anti-diabetics, fentanyl, GI-surgery, heart failure, lactate-level, CRP-level, cachexia or dialysis.

RESULTS. The prevalence of thiamine deficiency in this cohort of Dutch critically ill patients was 2.4% (2/82) at admission. Mean thiamine level was 202 ± 47 nmol/L (fig. 1).

63% was male, mean age was 64 ± 16 years, Apache IV was 71 ± 30 . 83% was mechanically ventilated, 39% had inotropes and 31% had both. There was no association between known risk factors and TD or thiamine level. Neither alcohol-use, nor CDT was correlated to thiamine level. In patients who develop delirium, thiamine is higher than in non-delirious patients (214 ± 37 vs. 198 ± 49 nmol/L, ns).

CONCLUSIONS. The prevalence of TD was lower than reported in literature. We found no correlation between thiamine deficiency and cognitive impairment and delirium.

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[Thiamine level in ICU patients at admission]

0697

IMPACT OF OBESITY ON PATIENTS ADMITTED TO THE NEUROSCIENCES INTENSIVE CARE UNIT

J. Chalela¹, M. Hill², C. Martin³, S. James²

¹Medical University of South Carolina, Neuroscience, Charleston, United States, ²Medical University of South Carolina, Neuroscience Intensive Care Unit, Charleston, United States, ³Medical University of South Carolina, Dietary, Charleston, United States

INTRODUCTION. There is conflicting evidence regarding the impact of obesity in patients admitted to the ICU. While some studies suggest it adversely impacts outcome others suggest it is protective. Data is lacking on the impact of obesity in patients admitted to the Neurosciences ICU (NSICU). We sought to determine the impact of obesity among this patient population.

OBJECTIVES. Clinical data that looks at the affect of obesity on outcomes in the NSICU. We looked at multiple variables including length of stay, need for procedures (tracheostomy, PEG, Central Line), Deep Vein Thrombosis, and ventilator days.

METHODS. A prospective observational study performed at an academic NSICU. Using a standardized data collection form we obtained the following variables: basic demographics, past medical history, admission diagnosis, body mass index (BMI), in-hospital complications, length of stay, need for ICU procedures (tracheostomy and percutaneous gastrostomy tubes), length of stay, and mortality. We then correlated the presence of obesity (BMI > 30) with each variable mentioned above. A sample size of 105 patients was estimated based on an expected 12% incidence of complications among non-exposed (non-obese) patients (confidence level, 0.95, power 80%). Fischers exact test was used to compare categorical variables and t-test used to compare continuous variables.

CONCLUSIONS. Obesity appears to be a common factor among patients admitted to the NSICU. Obesity is associated with diabetes, hyperlipidemia and younger age but our study does not suggest that obesity affects ICU outcome.

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Antimicrobial use and PKIPD: 0698-0711

0698

THE PLASMA AND SUBCUTANEOUS TISSUE PHARMACOKINETICS OF CEFAZOLIN IN POST-TRAUMA CRITICALLY ILL PATIENTS

J.A. Roberts^{1,2}, A.A. Udy³, S.C. Wallis¹, M.S. Roberts⁴, P.S. Kruger⁴, C.M.J. Kirkpatrick⁵, D.L. Paterson⁶, J. Lipman^{1,2}

¹The University of Queensland, Burns, Trauma, and Critical Care Research Centre, Brisbane, Australia, ²Royal Brisbane and Women's Hospital, Intensive Care Medicine, Brisbane, Australia, ³The Alfred Hospital, Department of Intensive Care and Hyperbaric

Medicine, Melbourne, Australia, ⁴The University of Queensland, Therapeutics Research Unit, Brisbane, Australia, ⁵Monash University, Faculty of Pharmacy and Pharmaceutical Sciences, Melbourne, Australia, ⁶The University of Queensland, UQCCR, Brisbane, Australia

INTRODUCTION. Patients admitted to the intensive care unit (ICU) post-trauma can develop profound pathophysiological changes that may alter antibiotic pharmacokinetics. Inadequate target site penetration of antibiotics may account for the high rates of therapeutic failure and mortality in patients with severe infections and has been described in patients with sepsis and septic shock previously.

OBJECTIVES. The present study aimed to describe the plasma and tissue pharmacokinetics of ceftazidime administered to critically ill patients post-trauma for prophylaxis of soft tissue infection.

METHODS. This study was an open-labeled pharmacokinetic study at a tertiary referral ICU. All patients received a standard ceftazidime dose of 1 g IV 8-hourly. Serial plasma concentrations of ceftazidime were collected at pre-specified time intervals. Serial ISF concentrations were determined via a subcutaneously inserted microdialysis catheter. All pharmacokinetic samples were measured using a validated liquid chromatography tandem mass spectrometry assay was used to measure the total and unbound concentrations. Pharmacokinetic parameter estimates were determined using non-compartmental methods. Data are reported as mean (SD).

RESULTS. Thirty critically ill patients were included in the study. The characteristics of the included patients were as follows, age 37.0 (14.1) years, Weight 86.8 (22.7) kg, APACHE II score 16.2 (7.4), SOFA score 3.6 (1.8) 8-hour measured creatinine clearance 168 (90) ml/min and cardiac output 8.8 (2.6) L/min. Twenty-seven patients (90 %) were mechanically ventilated and 12 (40 %) were receiving vasopressor therapy. Unbound plasma and ISF concentrations were frequently below the susceptibility breakpoint for pathogens commonly causative of skin and soft tissue infections (2 mg/L). In this patient cohort, the total and unbound plasma and unbound ISF ceftazidime areas under the concentration time curve (AUC) were 184.8 (51.3) mg·h/L, 46.2 (12.8) mg·h/L and 33.0 (34.4) mg·h/L respectively. The mean percentage of unbound ceftazidime penetration into the ISF was 57 %. The clearance of ceftazidime (total concentration) was 5.1 (1.8) L/h, elimination rate constant 0.34 (0.09) h⁻¹ and volume of distribution 15.3 (5.5) L. Comparative data from non-critically ill patients suggests that patients in the ICU post-trauma develop an altered volume of distribution (increased by ~ 50 %) and clearance (increased by 60 %).

CONCLUSIONS. Standard doses of ceftazidime in critically ill patients admitted post trauma appear inadequate. These patients appear to develop altered pharmacokinetics which leads to impaired antibiotic penetration into ISF. This may put the patient at risk of therapeutic failure. New dosing approaches may be required to optimize use of ceftazidime in these patients.

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0699

RECOMMENDED PIPERACILLIN-TAZOBACTAM DOSING IN CRITICALLY ILL PATIENTS REQUIRING CONTINUOUS VENO-VENOUS HEMOFILTRATION ENHANCES GRAM-NEGATIVE COLONIZATION AND INFECTION AND MAY INDUCE RESISTANCE

L. Remels¹, M. Diltor¹, P.M. Honoré¹, R. Jacobs¹, E. De Waele¹, V. Van Gorp¹, D.N. Nguyen¹, J. De Regt¹, J. Troublens¹, H. Spapen¹

¹University Hospital UZ Brussel, Intensive Care, Brussels, Belgium

INTRODUCTION. Piperacillin-tazobactam (PTZ) is a frequently used broad-spectrum β -lactam antibiotic in ICU patients. Pharmacological evidence shows that the currently recommended PTZ dose is often insufficient to maintain therapeutic serum concentrations in patients undergoing continuous renal replacement therapy (CRRT) (1). Such underdosing is unwarranted since it may lead to treatment failure and selection of resistant pathogens.

OBJECTIVES. We investigated whether treatment with PTZ in patients under continuous veno-venous hemofiltration (CVVH) resulted in (a) more frequent colonization/infection with Gram-negative (GN) micro-organisms and (b) selection of more resistant GN pathogens.

METHODS. Fifty patients treated with high-dose PTZ (4.0 g/0.5 g qid), 25 receiving CVVH and 25 controls, were consecutively studied. CVVH was delivered at a dose of 35 mL/kg/h using an AN69ST membrane. GN bacterial colonization/infection was defined as microbiological proof of GN micro-organisms in representative blood, respiratory, abdominal, or urinary cultures. GN organisms considered to be resistant were PTZ-resistant strains, ESBL-developing bacteria, and opportunistic multi-drug resistant micro-organisms such as *S. maltophilia* and *A. baumannii*, occurring during or within 72 h after discontinuation of PTZ treatment. Mann-Whitney U and Fisher Exact test were used for statistical comparison between groups.

RESULTS. Patients requiring CVVH were older (69 ± 12 vs. 62 ± 14; p = 0.1), more severely ill (APACHE II 25 ± 9 vs. 17 ± 7; p = 0.005) and were treated longer with PTZ (9.9 ± 3.3 vs. 8.8 ± 2.2 days; p = 0.1). PTZ was administered during 168 of 247 (68 %) CVVH days. More CVVH patients developed GN bacterial colonization/infection (19 vs. 6; p = 0.004). Compared to controls, CVVH patients displayed an almost threefold increase in the total number of cultured GN bacteria and a trend towards developing more resistant pathogens (19/44 vs. 6/16; p = 0.2). PTZ treatment duration was longer in those CVVH patients in whom resistance developed (8 ± 3 vs. 5 ± 2 days; p = 0.01).

CONCLUSIONS. Treatment with a "classic" PTZ dose during CVVH causes more GN bacterial colonization/infection and may induce more resistant GN strains. These microbiological findings suggest inadequate PTZ treatment during CRRT and support investigating the use of higher doses or continuous infusion of PTZ in this condition.

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0700

OPTIMIZING THE DOSING REGIMEN OF DAPTOMYCIN IN CRITICALLY ILL PATIENTS USING A PK/PD ANALYSIS AND MONTE CARLO SIMULATION

H. Barrasa González¹, A. Martín López¹, A. Isla Ruiz², A. Soraluze Olañeta², E. Asín Prieto², A. Rodríguez Gascón², A. Canut Blasco², S. Castaño Avila², G. Balzikueta Florez¹, B. Fernández Miret¹, F. Fonseca San Miguel¹, J. Maynar Moliner¹

¹Hospital Univ. Araba- Santiago, Vitoria, Spain, ²Universidad del País Vasco, Vitoria, Spain

INTRODUCTION. Pharmacokinetic (PK) of drugs in critically ill patients could vary from the general population. The pharmacokinetic/pharmacodynamic analysis (PK/PD) is a useful tool to optimize dosing regimens of antibiotic therapy.

OBJECTIVES. To evaluate the efficacy and safety of daptomycin for the treatment of infections caused by gram-positive organisms in the Intensive Care Unit (ICU) using a PK/PD analysis and Monte Carlo simulation (MCS).

METHODS. ICU 17-bed tertiary hospital. 350-850 mg of daptomycin was administered depending on the weight and type of infection. 5 or 6 each patient blood samples were taken by the following times: predose, 0.5, 4-8, 10-14, 24 and 48 h. Concentrations of the daptomycin were determined by HPLC-UV (validated technique). Demographic and laboratory data were collected. The PK study was performed using the WinNonlin program. The calculation of the probability of successful treatment (PST) for different minimum inhibitory concentrations (MIC), defined as the probability that the ratio area under the curve (AUC)/MIC is > 666 was performed. Subsequently, a population model using the NON-MEN 7.2 program was developed. Once the model was evaluated, simulations were performed (by MCS) with different doses (6, 8 and 10 mg/kg) to determine the PST for different MICs and the risk of toxicity (RT), defined as C_{min} > 24.3 mg/dL. Quantitative variables are expressed as mean and standard deviation (SD). Qualitative variables are expressed as percentages. The significance level of α was 0.05.

RESULTS. 10 patients (70 % male) were included. The mean age was 67 years (SD 10.8), with an average weight of 80 kg (SD 16.5) and creatinine clearance (CrCl) of 61 ml/min (SD 33.8). 50 % of patients had renal dysfunction (Cl_{Cr} < 60 ml/min). The mean dose was 5.7 mg/kg (SD 0.7). The PK parameters were: mean plasma clearance of 0.8 L/h (SD 2.4), volume of distribution of 8.6 L (SD 2.4), elimination half-life of 9.02 h (SD 5.6) and AUC of 676.1 mg * h/L (SD 274.3). The PST was 90, 40 and 0 % for organisms with MICs of 0.5, 1 and ≥ 2 , respectively. A statistically significant association between the presence of renal dysfunction and PST (p = 0.048) was observed in these patients, explained by the increase of the AUC. The PST with simulated doses of 6, 8 and 10 mg/kg was 90, 100 and 100 % for MIC of 0.5; 70, 80 and 90 % for MIC of 1 and 0 % for MIC ≥ 2 at any dose. The RT was not increased in any of the simulated dose.

CONCLUSIONS. In our series, daptomycin used doses ensure adequate plasma concentrations against microorganisms with MICs ≤ 0.5 mg/L. For microorganisms with higher MICs this issue is not assured, especially in patients with normal renal function. Simulation with higher doses increases the PST for microorganisms with MIC of 1 mg/L, without higher RT. No dose would be appropriate to treat microorganisms with MIC ≥ 2 .

0701

DOUBLE-CARBAPENEM USE FOR TREATMENT OF CARBAPENEM RESISTANT *KLEBSIELLA PNEUMONIAE* SEVERE INVASIVE INFECTIONS

G. De Pascale¹, A. Martucci², V. Di Gravio¹, R. Di Stefano³, L. Montini¹, G. Panarello², M.A. Pennisi⁴, A. Arcadipane², M. Antonelli¹

¹Sacro Cuore Catholic University, Policlinico A. Gemelli, Department of Anesthesiology and Intensive Care, Rome, Italy, ²ISMETT - Mediterranean Institute for Transplantation and Advanced Specialized Therapies, Department of Anesthesiology and Intensive Care, Palermo, Italy, ³ISMETT - Mediterranean Institute for Transplantation and Advanced Specialized Therapies, Clinical Pharmacy, Palermo, Italy

INTRODUCTION. Combination of Ertapenem and Meropenem or Doripenem has been proposed as rescue therapy in patients affected by Carbapenemase Producing *Klebsiella pneumoniae* (CPKP) infections.

OBJECTIVES. Investigate the clinical outcome and the epidemiological profile of critically ill patients who received a double-carbapenem regimen (DCR) to treat severe invasive CPKP infections (IIs).

METHODS. All patients with severe CPKP IIs treated with a DCR, admitted to the 20/14 beds mixed medical/surgical Intensive Care Units (ICU) of two Italian hospitals between January 2013 and December 2013, were retrospectively evaluated. A minimum 48 h treatment duration was required. Data were obtained by electronic medical records and microbiological laboratory responses.

RESULTS. During the 12 months study period 20 patients were treated with a DCR (ertapenem + meropenem): in all but one case (i.e. *Pseudomonas aeruginosa*), CR *Klebsiella pneumoniae* was isolated. Mean \pm SD age, SAPS II score, SOFA score were 52 \pm 17, 47.4 \pm 18 and 8 \pm 3, respectively. Mean ICU length of stay and duration of mechanical ventilation prior of infection were 15 \pm 12 and 7 \pm 5, respectively. Seventeen patients (pts) were affected by bacteraemia: 8 cases were secondary to other sources (intra-abdominal foci, surgical site infections and nosocomial pneumonia), 6 were central venous catheter associated and 3 had unknown origin. Three pts were affected by ventilator-associated pneumonia. Median [IQR] duration of DCR was 13.5 days [10-34]; dosage regimens ranged between 3 g/day and 6 g/day for Meropenem and 0.5 g/day and 2 g/day for Ertapenem, according to renal function; mean \pm SD delay of DCR initiation resembled time to obtain preliminary microbiological laboratory results (50 \pm 2 h). Ten out of 20 pts received additionally active antibiotics (colistin/gentamycin/amikacin) with a mean \pm SD delay of 9 \pm 5 h. Clinical cure was obtained in 60 % of cases (microbiologically eradication rate 50 %) and 9 patients died before hospital discharge. No DCR was interrupted because of potentially attributable severe adverse events.

CONCLUSIONS. The prolonged use of a DCR for the treatment of severe IIs due to CRKP was well tolerated and associated with similar clinical response and survival rates observed with "in vitro" full active antibiotic regimens. A larger well-matched case-control study might be the first step to identify whether the theoretically benefit of this new strategy is worthy to be tested in a prospective randomized clinical trial.

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0702

FACTORS INFLUENCING ANTIBIOTIC DE-ESCALATION IN POSTOPERATIVE PERITONITIS

P. Montravers¹, P. Augustin¹, M. Desmard¹, J. Guglielminotti¹

¹CHU Bichat-Claude Bernard-Paris Diderot, Anaesthesiology and Critical Care Medicine, Paris, France

INTRODUCTION. Antibiotic therapy (AB) de-escalation (DE) is highly recommended to shorten AB exposure and reduce selection pressure.

OBJECTIVES. In a cohort of ICU patients with postoperative peritonitis (POP), we analyzed the variables that influence DE.

METHODS. Between 1999 and 2011, all consecutive ICU cases of POP were included in a data base. We collected the following parameters: demography, underlying disease, severity at the time of diagnosis, characteristics of surgery, microbiologic data (identification,

susceptibility testing, presence of non-fermenting (NF) Gram negative (GN) bacilli, multidrug resistant strains (MDR). Changes in empiric AB were split into two categories: DE or non-DE (unchanged or enlarged definitive AB). Factors associated to non-DE were analyzed in monivariate and logistic regression analyses. Results are presented in mean \pm DS and proportions.

RESULTS. Overall, 206 POP (117 men, 61 \pm 17 year old, 30 % of fatal underlying disease, SAPS II 45 \pm 14, SOFA 7 \pm 3) were analyzed. Polymicrobial infection was observed in 173 (84 %) cases, and MDR strains in 72 (35 %) cases (43 GN and 54 Gram positive cocci). Empiric AB was a monotherapy in 45 (22 %), two drugs in 74 (36 %), three drugs or more in 87 (42 %) cases. The main AB drugs were piperacillin/tazobactam (n = 127;62 %), aminoglycosides (92;44 %), vancomycin (80;39 %), antifungal agents (69;33 %), imipenem (50;24 %). AB adequacy was achieved in 137 (66 %) cases. Changes of empiric AB were made in 178 (86 %) cases, including DE in 117 (77 %) while non-DE occurred in 89 (43 %) cases. The main changes were interruption of piperacillin/tazobactam (78;38 %), imipenem (31;15 %), aminoglycosides (75;36 %), vancomycin (52;25 %) and antifungal agents (26;13 %). In monivariate analysis, five factors were significantly associated with non-DE (table). In multivariate analysis, MDR strains (OR:3.59; CI 95 % [1.75-9.21], p = 0.001), NF GN bacilli (3.23; [1.17-9.46], p = 0.02) and empiric monotherapy (2.12; [1.26-8.01], p = 0.01) were associated with non-DE, while empiric vancomycin (OR:0.35; [0.15-0.81], p = 0.01) and adequate empiric AB; (0.13 [0.06-0.27], p < 0.001) were associated with DE.

	DE (n = 117)	non-DE (n = 89)	p	Odds-ratio [CI 95 %]
MDR strains	23(20)	50(56)	<0.0001	5.23 [2.85-9.87]
Empiric monotherapy	14(12)	31(35)	0.0001	3.93 [1.96-8.91]
NF GN bacilli	9(8)	21(24)	0.002	3.70 [1.64-8.96]
Empiric vancomycin	59(50)	21(24)	<0.0001	0.30 [0.16-0.55]
Adequate empiric AB	104(89)	33(37)	<0.0001	0.07 [0.03-0.14]

[Factors of non-DE in monivariate analysis]

CONCLUSIONS. Similarly to what is reported in ventilator-associated pneumonia, the factors influencing DE are mainly linked to difficult-to-treat organisms such as MDR and NF GN bacilli. Empiric vancomycin therapy can be frequently stopped.

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0703

EFFICACY OF ANTIBIOTIC EDUCATION ON ANTIBIOTIC USAGE AND RESISTANT PATTERN IN ALEXANDRIA UNIVERSITY HOSPITALS IN EGYPT

A.M. Elmenshawhy¹, T.H. Elbadawy², H.A.A. Abu Khabar³, S.F. Hafez⁴, E.E.M.H. Ibrahim⁵, A.M. Fayed¹

¹Alexandria University/Alexandria Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt, ²Alexandria University/Alexandria Faculty of Medicine, Cardiology and Angiology, Alexandria, Egypt, ³Alexandria University/Alexandria Faculty of Medicine, Anesthesia and Surgical Intensive Care, Alexandria, Egypt, ⁴Alexandria University/Alexandria Faculty of Medicine, Medical Microbiology and Immunology, Alexandria, Egypt, ⁵Alexandria University/Alexandria Faculty of Medicine, Chest Diseases, Alexandria, Egypt

INTRODUCTION. Deficiency of articles addressing impact of antibiotic education in the Egyptian ICUs, in addition to the absence of infectious disease specialty or antibiotic policy in most of Egyptian ICUs.

OBJECTIVES. To determine the efficacy antibiotic education on the antibiotic usage and resistant pattern in 2 university affiliated ICUs in Egypt.

METHODS. Quasi-experimental study with before and after prospective cohort in 2 ICU1 and ICU3 during the period from September 2007 till May 2013. The education program included lectures, academic detailing, prescribing feedback, empirical antibiotic guide, and fact sheets both through in service and off job training. This was performed in accordance with VAP prevention program in both units. Antibiotic abuse and its categories was adopted from HAP ATS 2005 guidelines.

RESULTS. A 599 patients were enrolled in the study. Baseline data (age, gender, APACHE II score, Glasgow coma scale and admission diagnosis) were similar except for cardiac and surgical patients. The antibiotic abuse decreased significantly in the post-intervention phase of all MV patients by 40.8 and 49.6 % (all p < 0.001) in ICU1 and ICU3 respectively. The use of antibiotic with no clear indication, early change (<48 h), replacing antibiotic to another of the same class, use of two β -lactams antibiotics, or usage of antibiotics of unlikely coverage (mainly anaerobes/Candida) were significantly decreased in the post intervention phase of ICU3 (all p < 0.001), while the prolonged use of antibiotics or the usage of antibiotics with redundant coverage decreased insignificantly. In ICU1 only the early change of antibiotics decreased significantly (all p < 0.001) whereas others categories decreased insignificantly. The antibiotic days, DDD antibiotic free days ICU stay and MV mortality changed insignificantly in both units in post-intervention phase. The early and appropriate VAP treatment decreased significantly in ICU1

(p = 0.003 and 0.004) and in ICU3 (p < 0.001 and 0.022) respectively. There were statistically significant decreases of gram negative sensitivity of imipenem by 43.9 and 40.9 %, piperacillin-tazobactam by 68.7 and 62.3 %, meropenem by 69 and 48.3 %, and cefeprozone sulbactam by 89.4 and 90.5 % (all p < 0.001) in ICU1 and ICU3 respectively in the post-intervention phase. To a lesser degree, the sensitivity to cefepime, trimethoprim sulfamethoxazole, and levofloxacin decreased significantly in both units, while 3rd generation cephalosporin, amoxicillin-clavulanate, ampicillin-sulbactam and amikacin decreased insignificantly in both units.

CONCLUSIONS. persuasive antibiotic education failed to decrease antibiotic usage or improve antibiotic resistance pattern.

REFERENCE(S). Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med. 2005;171(4):388-416

GRANT ACKNOWLEDGMENT. To Sanofi Aventis pharmaceutical company for printing the antibiotic guide

0704

EVALUATION OF TEMOCILLIN FOR TREATMENT OF NOSOCOMIAL INFECTIONS

N. Layios¹, M. Ciutea¹, M. Nys¹, P. Damas¹

¹CHU of Liege, Department of General Intensive Care, Liege, Belgium

INTRODUCTION. Temocillin is a semisynthetic betalactam that is highly stable to betalactamases and active against most enterobacteriaceae. Despite its interesting spectrum in the context of the rising incidence of multiresistant gram negative infections, its clinical use is not well documented.

OBJECTIVES. Our primary objective was to evaluate the clinical and microbiological efficacy of temocillin administered mainly through continuous infusion (6 g/day) in severe nosocomial infections. Our secondary objectives were: to seek for correlation between outcome and the timing of initiation of temocillin, the type of pathogen and the site of infection.

METHODS. This retrospective study was conducted in 104 adult critically ill patients who were hospitalized in a tertiary mixed 32-beds ICU from January 2007 until October 2013. The site of infection, the microorganism and its resistance pattern to betalactamases and the timing of initiation of temocillin (empirical versus adjusted therapy) were recorded. ICU, hospital and 28-day mortality were recorded.

RESULTS. 104 patients (75 males, median age 67) were predominantly treated with continuous infusion of temocillin (6 g/day) for the following hospital-acquired infections: 58 lower respiratory tract infections, 26 urinary tract infections, 12 BSI, 8 SSTI and intra-abdominal infections. Median duration of therapy was 7 days (IQR 5-8) and temocillin was more frequently prescribed as adjusted therapy than empirically (59.6 %/40.4 % respectively). 119 samples grew enterobacteriaceae among which 42.8 % were resistant to C3 s. Clinical cure was achieved in 53 patients, relapse was noted in 5 patients and clinical failure in 17 patients. Improvement was observed in 22 patients and 7 patients could not be assessed in the final analysis. Clinical and microbiological cure was superior in UTIs compared to all other sites of infection (73.1 %/43.6 %, p = 0.012 and 73.2 %/42.3 %, p = 0.012 respectively). Microbiological sampling was obtained in 91 (87.5 %) patients at the end of treatment. Among these patients, microbiological cure occurred in 52 (57 %) whereas resistance to temocillin appeared in 5(6 %) of them. The remaining 34 patients (37 %) had persistent colonization. Clinical and microbiological rates of cure were not correlated with the type of pathogen or with its intrinsic betalactamase secreting capacity nor with the timing of initiation of temocillin. ICU and 28-day mortality was 22.1 % and hospital mortality was 35.6 %. 28-day mortality was the same whichever the site of infection and the susceptibility pattern of the pathogen. However, it was higher among patients with clinical failure or relapse than among those showing clinical cure (50 %/16 %, p = 0.003).

CONCLUSIONS. Efficacy of temocillin should be questioned outside UTIs indication. Prospective PK/PD modelling and analysis in critically ill patients with selected organ compartmental approach (ELF) could help to refine indications and mode of administration.

0705

ANTIBIOTIC CONCENTRATIONS IN CEREBROSPINAL FLUID IN PATIENTS WITH VENTRICULITIS

G. Stringari¹, S. Markowitz², M. Beumier¹, M. Hites², F. Cotton³, F. Wolff³, L. Götting⁴, J.-L. Vincent¹, F. Jacobs⁵, F.S. Taccone¹

¹Erasme Hospital, Intensive Care, Bruxelles, Belgium, ²Erasme Hospital, Infectious Diseases, Bruxelles, Belgium, ³Erasme Hospital, Clinical Biochemistry, Bruxelles, Belgium, ⁴Azienda Ospedaliera di Verona, Anesthesiology and Intensive Care, Verona, Italy

INTRODUCTION. Pharmacokinetics (PKs) of antibiotics can be altered in critical illness. Also the penetration of antibacterials in the brain has not been well described in ICU patients with concomitant central nervous system (CNS) infections.

OBJECTIVES. To study the relationship between plasma and cerebrospinal fluid (CSF) concentrations of broad-spectrum antibiotics in patients with ventriculitis.

METHODS. We reviewed the data of all ICU patients (from June 2009 to December 2012), who were treated for ventriculitis with ceftazidime (CAZ), cefepime (CEF) or vancomycin (VAN) and in whom at least one drug concentration (C) was concomitantly determined in plasma and CSF. Antibiotic levels were measured using high-performance liquid chromatography (HPLC). We calculated the CSF/plasma antibiotic ratio as: [(CSF-C)/(plasma-C)*100].

RESULTS. In 9 patients (median age 55 years; 5 males) treated for ventriculitis, 19 antibiotic concentrations (9 CAZ, 4 CEF, 6 VAN) were obtained in CSF samples from an external ventricular drainage (EVD). All patients were treated with a continuous infusion of antibiotics (6 g/d for CAZ and CEF; VAN regimens were adapted daily to achieve serum concentrations between 20 and 30 mg/L). Five patients had subarachnoid haemorrhage and 4 had hydrocephalus occurring after tumor resection (n = 4). Median CSF concentrations were: 3.6 [ranges: 2.0-7.7] mg/L for CAZ; 2 [1.0-2.1] mg/L for CAZ; 2.4 [0.7-8.0] mg/L for VAN. The median CSF/plasma ratio was: 19 [range 2-36] % for CAZ; 30 [16-45] % for CEF; 8 [3-28] % for VAN.

CONCLUSIONS. In our study, the CNS penetration of broad-spectrum antibiotics in patients with ventriculitis ranges widely from 2 to 45 %. Most of drug CSF concentrations could be largely insufficient to treat less susceptible strains. Monitoring of CSF antibiotics concentration should be considered to optimize antibiotic levels in this setting.

0706

DE-ESCALATION VERSUS CONTINUATION OF EMPIRICAL ANTIMICROBIAL TREATMENT IN SEVERE SEPSIS: A MULTICENTER NON-BLINDED RANDOMIZED NONINFERIORITY TRIAL

M. Leone¹, C. Bechis², K. Baumstarck², J.Y. Lefrant³, J. Albanèse², S. Jaber⁴, A. Lepape⁵, J.M. Constantin⁶, L. Papazian², N. Bruder², B. Allaouchiche⁵, K. Bezuier⁷, J. Textoris², C. Martin², AzuRea Network

¹Nord, Marseille, France, ²Aix Marseille Université, Marseille, France, ³Nimes University Hospital System, Nimes, France, ⁴Montpellier University Hospital System, Montpellier, France, ⁵Hospices Civils de Lyon, Lyon, France, ⁶Clermont Ferrand University Hospital System, Clermont-Ferrand, France, ⁷Assistance Publique Hôpitaux de Marseille, Marseille, France

INTRODUCTION. In patients with severe sepsis, guidelines recommend de-escalating the empirical antimicrobial treatment. No randomized clinical trial tested this strategy in patients with severe sepsis.

OBJECTIVES. To compare the de-escalation strategy with the continuation of an appropriate empirical treatment in those patients.

METHODS. A multicenter, non-blinded, randomized noninferiority trial included patients with severe sepsis were randomly assigned to de-escalation or continuation of empirical antimicrobial treatment. Recruitment began in February 2012 to and ended in April 2013 at nine ICUs in France. Patients with severe sepsis were assigned to de-escalation (n = 59) or continuation of empirical antimicrobial treatment (n = 57). The primary outcome was the duration of intensive care unit (ICU) stay. We defined a non-inferiority margin of two days. If the lower boundary of the 95 % confidence limit for the difference in patients assigned to the de-escalation group was less than two days, as compared with that of patients assigned to the continuation group, de-escalation was considered to be noninferior to the continuation strategy. Secondary outcomes included mortality at 90 days, occurrence of organ failure, number of superinfections, and number of days with antibiotics during the ICU stay.

RESULTS. The mean duration of ICU stay was 15 ± 15 days in the de-escalation group and 12 ± 13 days in the continuation group (P = 0.71). After adjustment to severity score, the hazard ratio for death at 90 days in the de-escalation group was 1.48 (95 % confidence interval, 0.72 to 3.04; P = 0.29). A superinfection occurred in 16 (27 %) patients in the de-escalation group and six (11 %) patients in the continuation group (P = 0.03).

CONCLUSIONS. We cannot conclude that de-escalation was noninferior to the continuation strategy in terms of duration of ICU stay. It was associated with increases in superinfection rate and total duration of antibiotic treatment, without impact on mortality.

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0707

ANTIBIOTIC PRESCRIPTION DURING WEEKDAY, NIGHT AND WEEKEND SHIFTS

J. Vermassen¹, L. De Bus¹, B. Gadeyne¹, J. Decruyenaere¹, P. Depuydt¹

¹Ghent University Hospital, Department of Intensive Care Medicine, Ghent, Belgium

INTRODUCTION. Antibiotic prescription in the ICU is complex and may be influenced by organizational factors as well as prescriber's subjectivity. During night shifts and weekend shifts, antibiotic prescription may be different from that of weekday shifts due to time pressure, less in-depth knowledge of complex patient files, or lower availability of up-to-date microbiological information. Knowledge of physician's prescription behavior may help to identify potential areas for antibiotic stewardship interventions.

OBJECTIVES. To compare total antibiotic prescription and type of antibiotic prescribed between weekday shifts, night shifts and weekend shifts in a large medical and surgical ICU.

METHODS. From January 1st 2013 to March 31st 2014, all antibiotic prescriptions for newly diagnosed infections at the 36 bed ICU of the Ghent University Hospital were prospectively registered with the aid of the software program COSARA. COSARA was developed to assist the ICU physician in collecting data about antibiotic prescriptions and infection characteristics of ICU patients. Combination therapy was defined as beta-lactam plus a quinolone, glycopeptide or aminoglycoside. Time of prescription was defined as weekday shift (Monday to Friday 8am to 6 pm), night shift (Monday to Friday 6 pm to 8am) and weekend shifts (from Friday 6 pm to Monday 8am or on holidays).

RESULTS. A total of 1921 infections requiring antibiotic therapy were identified. Total antibiotic prescriptions amounted to 3,12/12 h during weekday shifts, 1,2/12 h during night shifts and 2,4/12 h during weekend shifts. Of these, 25,8 % were associated with severe sepsis or septic shock during weekday shifts, compared to 36,1 % during night shifts and 31,5 % during weekend shifts (p = 0.003). Carbapenems and piperacillin-tazobactam made up 10,2 %, respectively 31 % of weekday prescriptions, as compared to 14,7 %, respectively 41,7 % of night and 10,1 %, respectively 35,6 % of weekend prescriptions (p = 0,022 for carbapenems, p = 0,002 for piperacillin-tazobactam). The percentages of other antibiotics or of combination therapy did not differ between the three time periods. In a bivariate analysis, carbapenem prescription was associated with severe sepsis (OR 2,791; p < 0,001) and septic shock (OR 2,628; p < 0,001), but not with time of prescription. In contrast, piperacillin-tazobactam prescription was associated with night shift (OR 1,602; p = 0,005), severe sepsis (OR 2,735; p < 0,001) and septic shock (OR 3,443; p < 0,001).

CONCLUSIONS. In our ICU, prescription of carbapenems and piperacillin-tazobactam was more frequent in night shifts as compared to weekday and weekend shifts. Prescription of piperacillin-tazobactam was associated with night shifts when corrected for severity of infection.

0708

IN VITRO AND IN VIVO SYNERGISTIC ACTIVITY OF HIGH DOSES OF AMPICILLINE/SULBACTAM WITH COLISTIN VERSUS MEROPENEM WITH COLISTIN IN VENTILATOR ASSOCIATED PNEUMONIA (VAP) CAUSED BY ACINETOBACTER BAUMANNII (AB)

F. Frantzeskaki¹, S. Vouli², E. Paramythiotou¹, A. Flevari¹, K. Paraskevi², M. Tsala², A. Armagamis³, L. Zerva², G. Dimopoulos¹

¹Attikon University Hospital, 2nd Department of Critical Care, Athens, Greece, ²Attikon University Hospital, Clinical Microbiology Laboratory, Athens, Greece

INTRODUCTION. Multidrug resistant *Ab* is a common cause of VAP associated with significant morbidity and mortality in the intensive care unit (ICU) setting. Several studies have shown in vitro synergistic activity of the combination of sulbactam with colistin or meropenem and colistin.

OBJECTIVES. We prospectively compared the in vitro synergistic activity and the respective clinical efficacy and safety of the combination of high doses of ampicilline/sulbactam(A/S) with colistin (COL) versus meropenem (MEM) with colistin in VAP caused by multidrug resistant *Ab*.

METHODS. This prospective study was performed at a 23-bed polyvalent ICU. All mechanical ventilated patients > 72 h who developed VAP and had positive *Ab* tracheal aspirates (> 10⁶cfu/ml) were randomly assigned to receive IV A/S 6gx4 and COL 3 MIUX3 (group A) or MEM 2gx3 and COL 3MIU x3 (group B), all adjusted to creatinine clearance. Five days after the initiation of therapy, follow up cultures were drawn and clinical and microbiological evaluation of all patients was performed. The in vitro efficacy of the two-drug combinations was studied in five isolated strains of *Ab*. Concentrations (MICs) and antibacterial interactions were determined by the broth microdilution method and the checkerboard method, respectively. After 24 h incubation, microplates were visually inspected for the determination of the Fractional Inhibitory Concentration (FIC) index (synergy: FIC ≤ 0.5, additivity: 0.51 - < 4, antagonism: ≥ 4). Observed % of growth inhibition (I_{OBS}) was compared with a theoretical one (I_{THE}) if the drugs were acting independently of each other with the following equation: I_{THE} = I_A + I_B - I_AxI_B where I_A and I_B are the % of

growth inhibition of the drugs alone. Bliss synergy and antagonism was concluded when the I_{OBS} was significantly greater or smaller, respectively than I_{THE} for all replicates.

RESULTS. Twenty (20) patients with VAP (mean age ± SD:60 ± 3), with positive *Ab* tracheal aspirates > 10⁶ were enrolled. Among them, eight (8) patients were included in Group A and twelve (12) in Group B. Clinical and microbiologic success was observed in 6 patients of Group A (75 %) and 10 patients of Group B (83 %) (p = 0.1). In vitro data were available in strains isolated from five patients (three of group A and two of group B). All five strains were resistant to MEM and A/S. Three strains showed susceptibility to colistin, while the remaining two were resistant. COL and MEM synergy was proved for all five isolates, by both analysis methods. FIC index did not show synergistic activity of A/S and COL combinations. Bliss analysis showed additionally COL and A/S synergy for the two COL resistant isolates. Clinical and microbiological success was observed in these five patients.

CONCLUSIONS. The combination of A/S with COL or MEM with COL might be a successful treatment option in vivo, in critically ill patients with VAP caused by multidrug resistant *Ab*, although synergistic activity is not always proved in vitro.

0709

EMPIRIC ANTI-PSEUDOMONAS ANTIBIOTIC THERAPY IN COMPLICATED INTRA-ABDOMINAL INFECTIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

K. Blot¹, D. Vogelaers², S. Blot¹

¹Ghent University, Faculty of Medicine and Health Sciences, Ghent, Belgium, ²Ghent University Hospital, General Internal Medicine, Ghent, Belgium

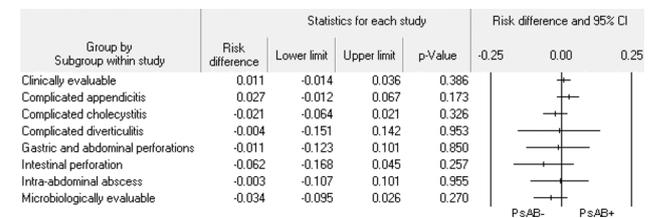
INTRODUCTION. In complicated intra-abdominal infections (cIAI), infections due to anatomical barrier disruption, one of the clinical challenges faced is the polymicrobial aetiology. It is unclear whether empiric coverage of *Pseudomonas aeruginosa* has an added benefit.

OBJECTIVES. To assess whether cure rates in cIAI with versus without empiric coverage of *Pseudomonas*.

METHODS. The Medline database was systematically searched (1995-January 2014). Eligible studies were randomized controlled trials reporting cIAI in adults, empiric antibiotic therapies with and without *Pseudomonas* coverage, and clinical cure rates. Antibiotics were classified based on European Committee on Antimicrobial Susceptibility Testing (EUCAST) clinical breakpoints table v4.0. Methodological quality was assessed using the Downs and Black tool. Random effects meta-analysis calculated risk differences (RD) and subgroup analysis of patient populations.

RESULTS. The systematic review identified 12 randomized controlled trials. Cure rates were reported for clinically (n = 5) and microbiologically evaluable patients (n = 2), and per anatomic infection site (n = 5). Pooled risk differences did not favour one antimicrobial regimen over another (p = 0.50). Subgroup analysis of cIAI sites such as appendicitis (p = 0.17), cholecystitis (p = 0.33), diverticulitis (p = 0.95), intestinal perforation (p = 0.26), and intra-abdominal abscess (p = 0.96) revealed no differences (figure 1). One study preferred imipenem/cilastatin to tigecycline for complicated appendicitis (RD 13.0 %, 2.7-23.4 %, p = 0.01). Another revealed a trend favouring moxifloxacin over piperacillin/tazobactam with amoxicillin/clavulanate for intestinal perforations (RD -19.5 %, -39.2-0.2 %, p = 0.052).

CONCLUSION. Empiric coverage against *Pseudomonas* did not improve cure rates. This questions whether broad-spectrum antibiotics with coverage of *Pseudomonas* are necessary in community-acquired cIAI. Further research should analyse treatment effects per hospital-acquired infections and infection sites, since results may differ in these populations.



[Figure 1. Subgroup analysis of patient populations]

0710

DO EARLY ANTIBIOTICS IN SEPSIS REDUCE MORTALITY? - A RETROSPECTIVE STUDY IN INTENSIVE CARE UNITS IN STOCKHOLM

M. Cronhjort¹, S. Rysz¹, M. Sandström², E. Joëlsson-Alm³, J. Mårtensson⁴, C. Svensen³

¹Karolinska Institutet, Södersjukhuset, Stockholm, Sweden, ²Karolinska Institutet, Ane/IVA Södersjukhuset, Stockholm, Sweden, ³Södersjukhuset, Anestesi/Intensivvård, V Anestesi/Intensivvård, Stockholm, Sweden, ⁴Karolinska University Hospital Solna, AnOpIVA Solna, Stockholm, Sweden

INTRODUCTION. Kumar et al. showed a linear correlation between time to antibiotics and mortality in septic shock [1]. This has resulted in recommendations that antibiotics should be administered within one hour of the recognition of septic shock [2]. The Swedish recommendation is that antibiotics should be administered within one hour from arrival in hospital [3]. Kumar's results have not been repeated in following studies.

OBJECTIVES. The aim was to determine if antibiotics within one hour of admission to hospital with sepsis is correlated to reduced mortality.

METHODS. Patients aged ≥ 18 years treated in an ICU in Stockholm for sepsis were selected. All patients met the criteria of sepsis according to the 1992 Society of Critical Care Medicine/American College of Chest Physicians consensus conference definition [4]. Some patients had septic shock and some had severe sepsis. Patients who had been diagnosed with sepsis in the ICU 2005-2012 were identified in the electronic monitoring system (Clinisoft®). Information on time of arrival to hospital, time for administration of antibiotics, and blood cultures were retrieved from the medical charts. Primary outcome, 90 day mortality, was retrieved from Statistics Sweden. The number of patients with sepsis in the ICUs was 628. The time of administration of antibiotics was available for 217 patients, who were included

in the analysis. Data was analysed by logistic regression, controlling for age, gender and SAPS III-score at arrival in the emergency.

PRELIMINARY RESULTS. Mean age was 60 years. 40.5 % were female. The SAPS III score was 43.5. Ninety day mortality was 28 % in the group that received early antibiotics and 31 % in the group that received antibiotics late. The OR for mortality within 90 days was 1.4(CI 0.9-1.8) with late antibiotics compared to antibiotics within one hour of arrival (ns). 33 % of the patients received antibiotics within one hour. Male patients were more likely to receive early antibiotics.

CONCLUSION. In this material antibiotics within one hour from arrival in hospital did not impact mortality. This study questions the importance of administration of antibiotics within one hour after admission to hospital.

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0711 ADSORPTIVE CAPACITY OF A NOVEL CYTOKINE FILTER FOR MEROPENEM AND CIPROFLOXACIN

C. König¹, A.C. Röhr², O.R. Frey², T. Fuchs³, A. Köberer³, S. Kluge⁴, S. Braune⁴, A. Nierhaus⁵, D. Wichmann¹, C. Langebrake¹, A. Brinkmann¹

¹University Medical Center Hamburg-Eppendorf, Department of Pharmacy, Hamburg, Germany, ²General Hospital of Heidenheim, Department of Pharmacy, Heidenheim, Germany, ³General Hospital of Heidenheim, Department of Anaesthesia and Intensive Care Medicine, Heidenheim, Germany, ⁴University Medical Center Hamburg-Eppendorf, Department of Intensive Care Medicine, Hamburg, Germany

INTRODUCTION. Early and efficient antibiotic use is crucial for successful treatment of sepsis. A novel extracorporeal cytokine filter has recently been developed as an adjunct treatment option for sepsis. The adsorptive capacity of this filter with regards to antibiotics potentially leading to underdosing is not well understood.

OBJECTIVES. To evaluate the in vitro adsorptive capacity of a novel extracorporeal cytokine filter for meropenem and ciprofloxacin.

METHODS. Meropenem (MER, 16 mg/l) and ciprofloxacin (CIP, 2.5 mg/l) in reconstituted whole blood were run through a cytokine filter (CytoSorb[®], CytoSorbents) built into a continuous renal replacement therapy system (multiFiltrate[®]; haemofilter AV 600 S, Fresenius Medical Care) in haemodialysis mode with a blood flow of 12 l/h and a dialysate flow of 2 l/h. Over a sampling time of 18 h (h) both antibiotics were administered via continuous infusion (MER 192 mg/h; CIP 30 mg/h) and samples were taken pre- and post-cytokine- and dialysis filter as well as from the dialysate solution. Analysis was performed immediately after sampling by high performance liquid chromatography with UV-detection.

RESULTS. Within the first 1.5 h the cytokine filter clearance (l/h) decreased from 5.4 to 1.4 for MER and from 6.3 to 4.9 for CIP, respectively. For MER after 4 h and for CIP after 10 h no significant changes in concentration in corresponding pre- and post-cytokine filter samples were measurable. During the observation period of 18 h approx. 400 mg of meropenem and 300 mg of ciprofloxacin were adsorbed by the cytokine filter.

The mean dialysis clearances (l/h) of MER and CIP were 2.0 and 1.7, respectively. They remained stable throughout the investigation and no saturation effects occurred.

CONCLUSIONS. In this in vitro investigation, the cytokine filter showed a high adsorptive capacity for MER and CIP within the first hours. The observed differences regarding time to saturation are explainable by the slower infusion rate (mg/h) resulting in a lower concentration and the higher plasma protein binding of CIP in contrast to MER.

The results imply that in order to avoid initial antibiotic underdosing with concurrent cytokine filter treatment an additional loading dose of MER and CIP may be reasonable. Further studies are needed to investigate the adsorptive capacity of the cytokine filter in vivo for different antibiotics to quantify saturation effects and to optimise antibiotic dosing. In the meantime therapeutic drug monitoring is recommended to minimise the risk of treatment failure.

Electrolytes, micronutrients & vitamins: 0712–0725

0712 SEVERE HYPONATRAEMIA IN CRITICAL ILLNESS

S.D. Lee¹, M. Gilmartin¹, A. Nee², T. Steele², C.H. Toh³, I. Welters^{1,4}

¹Royal Liverpool University Hospital, Intensive Care Unit, Liverpool, United Kingdom, ²University of Liverpool, Institute of Ageing and Chronic Disease, Liverpool, United Kingdom, ³University of Liverpool, Institute of Infection and Global Health, Liverpool, United Kingdom

INTRODUCTION. Hyponatraemia (serum sodium concentration < 135 mmol/L) is common in critical illness with an incidence of 30.3 % in patients admitted to Intensive Care (1). The correction of hyponatraemia may depend on the amount of fluid and sodium administered to hyponatraemic patients.

OBJECTIVES. The aim of this retrospective study was to investigate the influence of sodium and fluid administration on correction of severe hyponatraemia (serum sodium concentration < 125 mmol/L) in patients admitted to Intensive Care.

METHODS. We identified severely hyponatraemic patients from a database with 1034 Intensive Care admissions which contained patient demographics, admission diagnosis, and serial electrolyte concentrations for the first 4 days of admission. The total amount of sodium administered during the first 4 days of critical illness was calculated, taking into account all drugs, fluids and nutrition the patients received. Furthermore, the total amount of enteral and intravenous volume administered and the respective fluid balance were determined daily. Data were statistically analysed with R.

RESULTS. The incidence of severe hyponatraemia was 2.2 % (23 patients). Mean age was 58.8 ± 14 years and the mean APACHE II score was 22.7 ± 6.1. 43 % of patients were female. The average amount of sodium administered during the first four days was 1281 ± 517 mmol/L, leading to an average increase of serum sodium concentrations from 120.3 ± 4.4 to 134.3 ± 3.7 mmol/L over 4 days. The mean increase in serum sodium concentration was 7.7 ± 5.8 mmol/L from admission to day 1, 4.5 ± 3.6 mmol/L from day

1 to day 2 and 2 ± 2.5 mmol/L from day 2 to day 3. Over the 4 day observation period, patients accumulated a total of 7815 ± 6361 ml of fluid, with the fluid balance being positive by 2176 ± 2300 ml on day of admission, 2390 ± 2531 ml on day 1, 1830 ± 2111 ml on day 2 and 1718.89 ± 1798 ml on day 3. None of the hyponatraemic patients received hypertonic saline to correct serum sodium levels. Admission sodium levels correlated significantly with serum phosphate and albumin concentrations ($r = 0.424$, $p = 0.044$ and $r = -0.474$, $p = 0.022$).

CONCLUSIONS. All severely hyponatraemic patients showed an increase in serum sodium within the first 4 days of Intensive Care admission with isotonic fluids (sodium concentration of 131-154 mmol/L), indicating that hypertonic saline may not be required to correct severe hyponatraemia. The increase of serum sodium observed in our patient cohort was in line with recent guidelines (2) suggesting a rise of < 10 mmol/24 h to avoid osmotic demyelination. Due to the retrospective design of this study, neither urine osmolality nor urine sodium concentrations were available, which limits diagnosis of the underlying cause of hyponatraemia. Further research should focus on diagnosis and treatment of hypotonic versus non-hypotonic hyponatraemia (2).

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0713 THE RELATIONSHIP BETWEEN NUTRITION STATUS AND VITAMIN D LEVELS

K.M. Mogensen¹, J.D. Rawn², M.K. Robinson², K.B. Christopher³

¹Brigham and Women's Hospital, Department of Nutrition, Boston, United States, ²Brigham and Women's Hospital, Department of Surgery, Boston, United States, ³Brigham and Women's Hospital, Renal Division, Boston, United States

INTRODUCTION. Malnutrition is associated with increased mortality in the critical ill. It is unclear if vitamin D deficiency is independent of malnutrition.

OBJECTIVES. We hypothesized that nutrition status would be independent of vitamin D levels.

METHODS. Single center observational study of 773 adult ICU patients admitted from 2004-2010 in Boston. All patients had 25(OH)D measured prior to hospitalization. Patients deemed at nutritional risk had a formal standardized evaluation by a Registered Dietitian from 10 days prior to 2 days after ICU admission. The exposure of interest, nutritional status was defined as not at risk, at risk, nonspecific malnutrition or protein-energy malnutrition (mild, moderate or severe protein-energy malnutrition, or marasmus). The primary outcome was 30-day mortality. A one-way ANOVA was conducted to determine if 25(OH)D was different for nutritional status groups. Adjusted odds ratios were estimated by multivariable logistic regression models with inclusion of covariate terms for age, race, gender, Deyo-Charlson Index, type (medical vs surgical), and number of organs with acute failure. The discriminatory ability was quantified using the C statistic. Calibration was assessed using the Hosmer-Lemeshow χ^2 goodness-of-fit test. We next evaluated the improvement in model performance introduced by the addition of 25(OH)D status to the model. Nonparametric bootstrapping analyses were used to test if 25(OH)D status mediated the nutrition status-mortality association.

RESULTS. In the cohort, nonspecific malnutrition was recorded in 14 %, specific malnutrition in 10 %, and 11 % were at risk for malnutrition. Malnutrition was absent in 64 %. The 30-day mortality rate was 19 %. Mean 25(OH)D was 26.5 ng/ml. There was no statistically significant difference in 25(OH)D levels between nutrition status groups as determined by one-way ANOVA ($F(3,769) = 0.34$, $p = 0.80$). Malnutrition was a robust predictor of 30-day mortality and remained so following multivariable adjustment. The adjusted odds of 30-day mortality in patients with nonspecific malnutrition or specific protein-energy malnutrition was 1.82 (95 %CI 1.17-2.83; $P = 0.008$) compared to that of patients with no malnutrition. The adjusted model showed good calibration (Hosmer-Lemeshow (HL) Chi squared 4.83, $P = 0.78$) and discrimination (AUC, 0.793 (95 %CI 0.75-0.83)). Addition of 25(OH)D status to the model did not significantly alter discrimination for 30-day mortality of the model (AUC 0.793 to 0.798 (Chi squared 1.36, $P = 0.24$). Further, the net reclassification improvement (NRI) was estimated at 0.02 ($P = 0.23$) and the integrated discrimination improvement (IDI) was estimated at 0.005 ($P = 0.14$) both indicating no improvement in model performance with addition of 25(OH)D. Finally, 25(OH)D did not mediate the relationship between nutrition status and 30-day mortality.

CONCLUSIONS. Vitamin D status does not appear to be related to nutritional status in this critically ill cohort.

0715 HYPOMAGNEAEMIA IN CRITICAL CARE

L.E. Homer¹, R. Kolamunnage-Dona², T. Steele¹, C.-H. Toh³, C. Downey⁴, I.D. Welters^{1,4}

¹University of Liverpool, Institute of Ageing and Chronic Disease, Liverpool, United Kingdom, ²University of Liverpool, Translational Medicine, Liverpool, United Kingdom, ³University of Liverpool, Institute of Infection and Global Health, Liverpool, United Kingdom, ⁴Royal Liverpool and Broadgreen University Hospital, Liverpool, United Kingdom

INTRODUCTION. In critically ill patients the prevalence of hypomagnesaemia ranges from 19.6-60.6 % (1,2). The impact of hypomagnesaemia on mortality is conflicting & the relationship with length of stay & other biochemical derangements remains unclear. If routine magnesium replacement is effective in normalising magnesium levels in hypomagnesaemia is not known.

OBJECTIVES. The aim of this study was to; establish the time course of serum magnesium concentrations during the first four days of critical care admission, with daily magnesium replacement in hypomagnesaemic patients; to explore the effect of hypomagnesaemia on 28-day mortality & length of critical care stay; determine the associations between comorbidities and serum magnesium concentrations.

METHODS. This observational, retrospective single centre study included 1038 intensive care admissions between January 2008 & January 2012. Total serum magnesium concentrations & routine biochemistry results were collected for days 1-4 of critical illness. Age, gender, APACHE II score, length of stay & 28 day mortality were recorded. Statistical analysis was performed with SPSS version 20. Significance was taken as $p < 0.05$. Patients with serum magnesium concentrations < 0.7 mmol/L routinely received 20 mmol/L magnesium sulfate once daily.

RESULTS. Of 1038 admissions (996 different patients) 7 admissions were excluded due to missing data. Of the remainder, 114(11.1 %) had hypermagnesaemia on admission (> 1.00 mmol/L), 478(46.4 %) were normomagnesaemic (0.75-1.00 mmol/L) & 439(46.4 %) hypomagnesaemic (< 0.75 mmol/L). Severe hypomagnesaemia

(< 0.5 mmol/L) was present in 33(7.5 %) of patients. There were significantly less men in the hypomagnesaemia group compared to the normomagnesaemia group (27.3 % vs 60.0 %, $p < 0.0001$); the mean age was 59.0(16.31) years. Univariate analysis revealed significant differences in admission ionised & adjusted calcium, sodium, potassium, phosphate, albumin and chloride (all $p < 0.05$) between hypo- and normomagnesaemic patients. There was no difference in mortality or incidence of sepsis in patients with normal versus dysmagnesaemia. There was a significant difference between the normomagnesaemic and severely hypomagnesaemic patients in the incidence of cardiovascular comorbidities ($p < 0.05$) & gastrointestinal co-morbidities ($p = 0.005$). Total serum magnesium significantly increased from day 1 to day 4 in all groups ($p < 0.0001$), indicating a trend towards normalisation of magnesium levels in hypomagnesaemic patients.

CONCLUSIONS. The incidence of hypomagnesaemia in critical care patients is high. Magnesium concentrations on admission were not associated with mortality. With routine replacement of magnesium in hypomagnesaemic patients normalisation of magnesium concentrations was generally reached after four days.

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0717
INFLUENCE OF DYSKALEMIA AT ADMISSION AND EARLY DYSKALEMIA CORRECTION ON SURVIVAL OF CRITICALLY-ILL PATIENTS

S. Mankikian¹, M. Darmon^{2,3}, J.-F. Timsit^{1,4,5}, R. Sonnevill¹, M. Garouste-Orgeas^{5,6}, B. Souweire⁷, C. Schwebel⁸, D. Goldgran-Toledano⁹, S. Ruckly¹⁰, H. Kallej¹¹, E. Azoulay¹², C. Adria¹³, L. Bouadma^{1,4,5}, OUTCOMEREA Study Group

¹AP-HP, Hospital Bichat, Medical and Infectious Diseases ICU, Paris, France, ²University Hospital, Medical ICU, Saint-Etienne, France, ³Jean Monnet University, Jacques Lisfranc Medical School, Saint-Etienne, France, ⁴Univ Paris Diderot, IAME, UMR 1137, Sorbonne Paris Cité, Paris, France, ⁵INSERM, IAME, UMR 1137, Paris, France, ⁶Saint Joseph Hospital, Polyvalent ICU, Paris, France, ⁷Saint-Etienne University Hospital, Medical Surgical ICU, Clermont-Ferrand, France, ⁸Grenoble University Hospital, Polyvalent ICU, Grenoble, France, ⁹Gonesse General Hospital, Polyvalent ICU, Gonesse, France, ¹⁰University Grenoble 1, Integrated Research Center U 823, Epidemiology of Cancers and Severe Diseases, Albert Bonniot Intsitute, Grenoble, France, ¹¹General Hospital, Medical Surgical ICU, Cayenne, France, ¹²AP-HP, Saint Louis Hospital, Medical ICU, Paris, France, ¹³AP-HP, Hospital Cochin, Department of Physiology, Paris, France

INTRODUCTION. The relationship between imbalances in potassium homeostasis and cardiovascular disease events has been well established for many years. Little information is available on the potential effect of dyskalemia at admission and on early dyskalemia correction on ICU mortality.

OBJECTIVES. We assessed

- 1) the prevalence of dyskalemia at ICU admission,
- 2) the impact of dyskalemia at ICU admission on day-28 mortality or
- 3) the influence of an early dyskalemia correction within 48 h after admission on day-28 mortality.

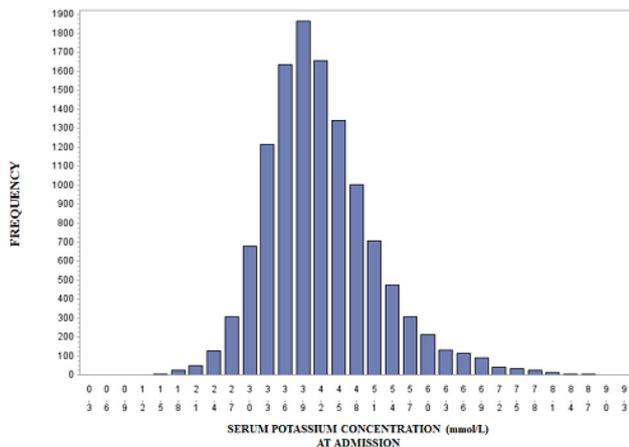
METHODS. Observational multicentre cohort study in 12,090 patients recorded in the OUTCOMEREA database between 2000 and 2013 from 18 French ICUs for more than 2 calendar-days with at least 2 kalemia measurements. Hypokalemia and hyperkalemia were defined as serum potassium concentration < 3.5 and > 5.5 mmol/l respectively.

The serum potassium correction rate (mmol/L per day) was calculated as follows: in case of hyperkalemia [(serum potassium concentration at admission - serum potassium on day 2)/time in hours between the two measurements] x 24 and in case of hypokalemia [(serum potassium concentration on day 2 - serum potassium at admission)/time in hours between the two measurements] x 24.

RESULTS. Independently of severity scores, chronic illnesses, and causes of admission, dyskalemia was independently associated with day 28 prognosis ($p < 0.0001$).

Among the 3,403 patients with dyskalemia, the mean \pm standard deviation (SD) correction rate in 48 h after admission was 0.02 ± 0.03 mmol/L per hour in patients with hypokalemia and 0.08 ± 0.07 mmol/L in patients with hyperkalemia.

When adjusted on risk factors for ICU death and level of initial dyskalemia, the rate of kalemia correction was independently associated with day 28 prognosis HR = 0.072 95 %CI [0.012-0.417] per mmol/L of correction during the first day, $p = 0.0033$.



[KALEMIA DISTRIBUTION AT ADMISSION]

CONCLUSIONS. About one-third of critically-ill patients had a dyskalemia at ICU admission. Our results indicate that in ICU, dyskalemia at admission and dyskalemia correction rate is associated with day-28 mortality.

0718
FEASIBILITY OF GASTRIC CONTENT ULTRASONOGRAPHIC MEASUREMENT BY INTENSIVISTS IN SURGICAL INTENSIVE CARE

H. Darmon¹, C. Bourillon¹, J. Chatelon¹, D. Safran¹, R. Pirracchio¹

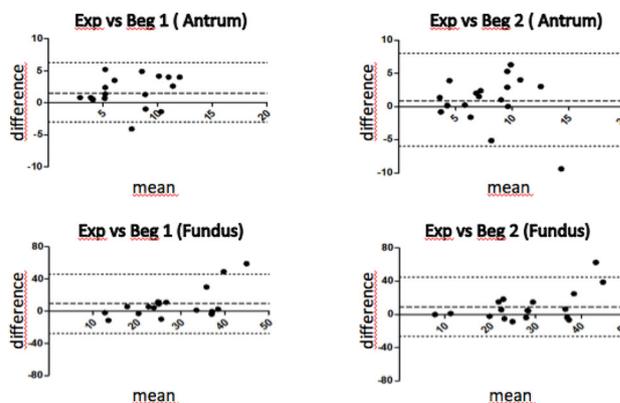
¹European Hospital Georges Pompidou, Paris, France

INTRODUCTION. Gastric residual volume monitoring is useful in surgical intensive care unit where patients are at high risk of gastrointestinal intolerance to nutrition. Previous studies have shown the utility of preoperative ultrasonographic (US) assessment of gastric content and volume (1) (2).

OBJECTIVES. The aim of our study was to assess the performance of the US measurement of antral and fundal cross-sectional areas (ACSA and FCSA) between an expert radiologist (exp), a senior intensivist and a resident intensivist (beg 1 & 2) in a surgical ICU population of patients receiving enteral nutrition (EN).

METHODS. Surgical ICU patients receiving enteral nutrition were included in this prospective, single-centre study. Exclusion criteria were gastrectomy, esophagectomy, or the presence of scars or stomas making it impossible to use ultrasonography. Two quantitative measurements were performed using a Philips® ultrasound CX50 (abdominal probe 1-5 MHz): ACSA and FCSA. The measurements were successively by the 3 operators. The agreement between the measures obtained by the expert and the non-experts was illustrated by the Bland and Altman method. The results are expressed as mean \pm 2SD on the graph of Bland and Altman.

RESULTS. 9 patients were enrolled and 111 US measurements were made. The mean age was 55.5 ± 16.7 years; the Simplified Acute Physiology Score II was 52.8 ± 14.9 . The average body mass index was 27 ± 3 kg/m². For the expert, the average ACSA was 8.2 ± 3.3 cm², and FCSA was 32.7 ± 16.8 cm². On the Bland and Altman plots (Figure), bias and limits of agreement were smaller for the antral measures as compared to the fundal measures: for ACSA (cm²) exp versus (vs) deb1: 1.5 [-3.3-6.3]; exp vs deb2: 0.9 [-6.2-8.0]; for FCSA (cm²): exp vs deb1: 9.4[-27.6-46.3]; exp vs deb2: 9.3 [-26.2-44.8]. The agreement between novice intensivists and expert seems satisfactory for both measures.



[Bland and Altman graph]

CONCLUSIONS. This study suggests that US measurement of ACSA and FCSA is feasible in surgical ICU by intensivist. ACSA measurement seems more accurate than measuring FCSA. Such an approach could allow gastric volume monitoring avoiding EN interruptions due to aspirations. A second phase of the study is now ongoing to determine a critical threshold for ACSA to diagnose elevated gastric volume, suggesting digestive intolerance.

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0719
EXISTING PRACTICES IN THE MANAGEMENT OF HYPONATREMIA AND EFFICACY AND SAFETY OF VARIOUS TREATMENT MODALITIES IN PATIENTS WITH HYPONATREMIA ADMITTED TO ICU

A. Ranjalkar¹, R.D. Savio², K. Rajeev³, J.K. John¹

¹Medical Trust Hospital, Critical Care, Cochin, India, ²Medical Trust Hospital, Cochin, India, ³Pushpagiri Medical College, Statistics, Thiruvalla, India

INTRODUCTION. Hyponatremia is the most common dyselectrolytemia in ICU patients and is an independent predictor of mortality. Its etiology, presentation and response to therapy and outcomes are highly unpredictable and rapid correction can lead to myelinolysis. The adherence to recommended doses of hypertonic saline for correction of hyponatremia is very variable and there is widespread belief that the calculated amounts of hypertonic saline produces overcorrection in Indian patients.

OBJECTIVES.

1. To describe the demographic profile and clinical characteristics of patients with hyponatremia and the management practices followed in such patients admitted to a tertiary level "open" ICU from South India.
2. To study the efficacy and safety of the different therapeutic strategies used.

METHODS. 50 consecutive adult patients admitted to Medical ICU from 1/10/2013 to 1/4/2014 with serum Sodium < 130 meq/l were prospectively studied after informed consent. The management of hyponatremia was done by the admitting consultants.

RESULTS. n-50. 52 % female.

Hypervolemic	11
Hypovolemic	19
Euvolemic	20

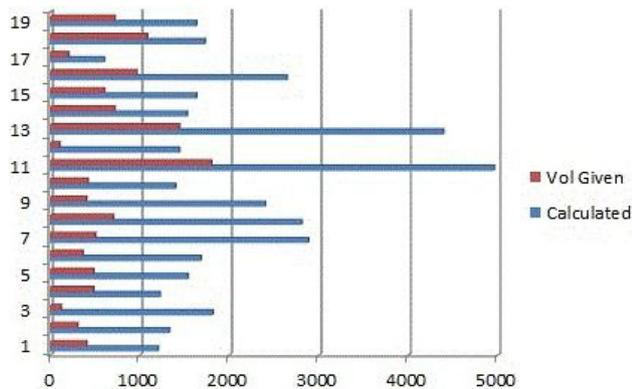
[Volume status]

Hypertension was the most common comorbidity (48 %) and the commonest symptom was altered sensorium (52 %). 14 % patients were receiving hydrochlorothiazide. The mean Sodium level was 116.96 ± 10.6 and the lowest value was 94 meq/l.

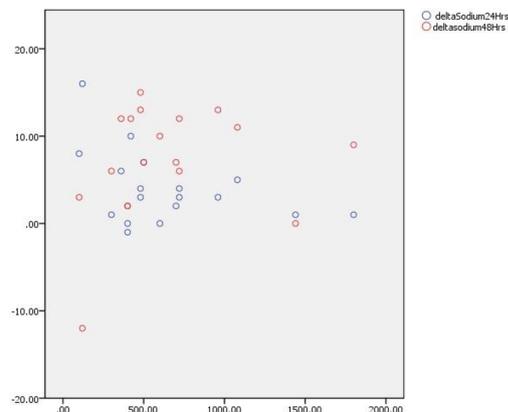
Treatment	Frequency	Percent
3 % NaCl	19	38
Oral Salt	15	30
09 % NaCl	14	28
Fluid Restriction	8	16
Vaptan	8	16
Offender drug Withdrawal	7	14
Loop Diuretic	7	14
Untreated	5	10

[Treatment modalities]

The amount of actual hypertonic saline used was much lesser (30 % of calculated) than the formula estimated volume required for appropriate correction. Rapid correction (more than 10 meq/l/d) was seen in 42 % of patients receiving hypertonic saline even with this administration. Overcorrection of sodium level was associated with increased mortality (p=0.035). 14(28 %) patients died of which 4(8 %) were receiving hypertonic saline. 2 % patients developed Central pontine myelinolysis and these patients had received hypertonic saline but had no rapid or overcorrection of sodium.



[3 % saline volume calculated/given]



[Daily change in serum Sodium with 3 % saline]

CONCLUSIONS. The volume of hypertonic saline calculated based on bodyweight and serum sodium levels consistently produces overcorrection of sodium levels in South Indian patients. The usage of hypertonic saline was restricted to the more severely hyponatremic patients and in general, less than 50 % of the daily calculated volume of hypertonic saline only was administered. In contrast to the commonly reported rate of infusion of 3 % saline at 2 ml/kg/hr, the actual rates used varied from 0.1 to 0.5 ml/kg/hr (Mean calculated volume 2042 ml ± 251 vs actual volume given 598 ml ± 105).

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0720**THE EFFECTS OF VITAMIN C ON THE OXIDATIVE STRESS OF CRITICALLY ILL PATIENTS**

E. Tsigou¹, K. Venetsanou¹, E. Boutzouka¹, A. Gavala¹, M. Korre¹, T. Katsoulas¹, G. Baltopoulos¹

¹Athens University School of Nursing ICU, 'Ag. Anargyroi' Hospital, Athens, Greece

INTRODUCTION. Intensive Care Unit (ICU) pts suffer from oxidative stress which contributes to the augmentation of the systemic inflammation and to the subsequent mitochondrial dysfunction, tissue injury, organ failure, and death. Levels of vitamin C, a major antioxidant substance, have been found below-normal in ICU pts and it has been postulated that the provision of the usual replacement dose may not suffice for the amelioration of oxidative stress.

OBJECTIVES. To evaluate the effects of vitamin C on the serum antioxidant status and on the severity of multi-organ dysfunction in ICU pts with SIRS.

METHODS. Thirty ICU pts (18 male, aged 56.95 ± 18.69 years, APACHE II score 19.03 ± 5.09) suffering from SIRS, participated in a prospective, non-randomized trial, receiving either placebo or vitamin C at medium or high doses (150 and 250 mg/kg, respectively, divided in 3 doses) for 72 h, starting from their 2nd day of admission. Exclusion criteria included pre-existing renal failure. We recorded clinical characteristics and SOFA score on study days 0 and 5. We determined serum concentrations of total antioxidant capacity (TAC) and Malondialdehyde (MDA) at 0, 48 and 96 h. Data are presented as mean ± SD. Comparisons at different time points into the same group, and between groups were carried out by repeated measures analysis of variance (ANOVA) and one way ANOVA respectively, applying GraphPad 4.0

RESULTS. TAC and MDA concentration, and differences between baseline values and values at 96 h are presented in table 1. Baseline values did not differ between groups. TAC increased in the high treatment group and MDA decreased in both treatment groups after vitamin C infusion. There was a trend towards SOFA score reduction on day 5 in treated groups. No adverse effects were recorded.

	0 h	48 h	96 h	p
TAC (mmol/l)				
Medium (n = 18)	5.07 ± 1.57	5.45 ± 1.55	5.82 ± 1.86	0.18
High (n = 7)	4.81 ± 1.25	7.60 ± 2.09	7.25 ± 1.95	<0.001
Control (n = 5)	5.42 ± 1.39	5.76 ± 0.97	6.07 ± 0.85	0.58
MDA (µmol/l)				
Medium (n = 18)	8.97 ± 5.23	7.78 ± 5.02	7.45 ± 5.27	<0.001
High (n = 7)	10.90 ± 5.00	9.29 ± 5.06	8.28 ± 5.02	<0.001
Control (n = 5)	8.14 ± 4.11	7.07 ± 2.69	8.75 ± 5.50	0.78

[Table 1. TAC and MDA concentrations]

CONCLUSIONS. Vitamin C can improve serum antioxidant status and severity of multi-organ dysfunction in critically ill pts with systemic inflammation. The clinical implications of the above finding need further investigation in larger randomized trials.

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0721**DYSNATREMIAS IN SUBARACHNOID HEMORRHAGE**

V. Spatenkova¹, O. Bradac², L. Jurak³, P. Skrabalek⁴

¹Regional Hospital, Neurointensive Care Unit, Liberec, Czech Republic, ²Central Military Hospital and Charles University, Department of Neurosurgery, Prague, Czech Republic, ³Regional Hospital, Department of Neurosurgery, Liberec, Czech Republic, ⁴Regional Hospital, Department of Clinical Biochemistry, Liberec, Czech Republic

INTRODUCTION. Dysnatremias are common and have a risk for pure prognosis in subarachnoid hemorrhage (SAH).

OBJECTIVE. To determine which type of dysnatremia is more frequent and prognostically serious in SAH.

METHODS. We performed a 10-year dysnatremias study of 344 patients (pts) with SAH. Each of the 2 parts covered a five-year period, the retrospective study had 165 pts and the prospective 179 pts. Hyponatremia was defined as serum sodium (SNa⁺) < 135 mmol/l (mild 134-130, moderate 129-125, severe 125 mmol/l), hypernatremia SNa⁺ > 150 mmol/l (mild 151-155, moderate 156-160, severe 160 mmol/l).

RESULTS. Hyponatremia was more frequent than hypernatremia in both parts of the study. In the retrospective there were 32 (19 %) pts with mean SNa⁺ 131.09 ± 3.03 mmol/l (16 % mild, 3 % moderate, 1 % severe), in the prospective part 36 (20 %) pts with mean SNa⁺ 131.53 ± 2.47 mmol/l (16 % mild, 3 % moderate, 1 % severe), without significant differences (p = 0.933). Hypernatremia occurred more often in the prospective study (28 pts, 16 %, mean SNa⁺ 154.47 ± 3.92 mmol/l; 7 % mild, 4 % moderate, 5 % severe), than in the retrospective (13 pts, 8 %, mean SNa⁺ 153.33 ± 2.84 mmol/l; 5 % mild, 2 % moderate, 1 % severe), (p = 0.030). No differences were in hypo/hypernatremia (4 % retrospective to 4 % prospective pts). Cerebral salt wasting syndrome occurred more often (3 % and 4 % pts respectively) than syndrome of inappropriate secretion of antidiuretic hormone (0 and 1 patient respectively). Central diabetes insipidus was not common either (1 % and 2 % pts respectively). Hypernatremic pts had higher hospital mortality (p < 0.001) and hospital mortality outcome (p = 0.001) than hyponatremic pts (p = 0.626, p = 0.260 respectively).

CONCLUSIONS. These results showed that in patients with SAH, hyponatremia occurred more often than hypernatremia, but these patients had higher mortality and worse outcome. CSWS, not SIADH, was the more frequent type of hyponatremia in SAH.

This study was supported by grants from the Scientific Board of the hospital, number VR 140304.

0722**COPPER AND ZINC DISORDERS IN CRITICAL ILLNESS - A PILOT STUDY**

R. Yagubyan¹, V. Kochergin¹, K. Krylov², S. Rodionova³, S. Fedorov¹, A. Zvyagin³, S. Sviridov⁴

¹Pirogov Russian National Research Medical University, Anesthesiology and Intensive Care, Moscow, Russian Federation, ²Burdenko Research Institute of Neurosurgery, Anesthesiology and Intensive Care, Moscow, Russian Federation, ³A.V. Vishnevsky Institute of Surgery, Anesthesiology and Intensive Care, Moscow, Russian Federation

INTRODUCTION. Critical illness is always accompanied by systemic inflammatory response syndrome (SIRS) and this process leads to disbalance, among others, of trace elements homeostasis. Nowadays changes in Copper (Cu), Zinc (Zn) and Selenium content are mostly investigated in critical illness¹.

OBJECTIVES. The aim of this pilot prospective study was to determine connection between whole blood and urine levels of Zn and Cu and severity of SIRS in of critically ill patients.

METHODS. This prospective pilot study included 47 surgical patients who either was after elective neurosurgery (EN) or had purulent wounds of soft tissues (PWST) or had acute necrotizing pancreatitis (ANP) or had peritonitis of any origin (PER), admitted to intensive care unit (ICU). The severity of SIRS was lowest in EN, than PWST and ANP, and highest in PER. We performed analysis of Cu and Zn (whole blood and urine) in 24 h after admission to ICU using ICP-MS. Statistical analysis was performed using IBM SPSS Statistics. All the data is presented as mean standard deviation.

RESULTS. Patients included 53 % - women and 47 % - men, mean age was 40.1 ± 33.9 y.o.. Population of the groups is summarised in Table 1.

Table 1.

	EN	PWST	ANP	PER
N (n, %)	12, 25,5 %	16, 34 %	12, 25,5 %	7, 15 %
<i>[Groups]</i>				

Zn and Cu levels in whole blood and urine are presented in Table 2.

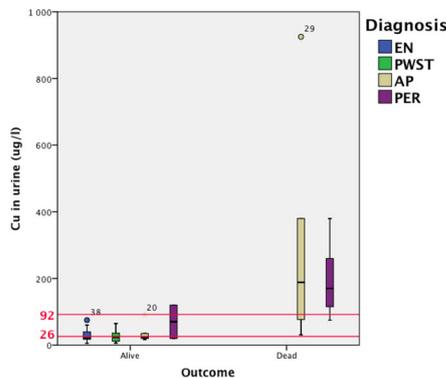
Table 2.

Diagnosis	Cu (µg/l)		Zn (µg/l)	
	in blood	in urine	in blood	in urine
EN	1120,4 ± 204,8	29,2 ± 21,3	5115,8 ± 814,7	631,3 ± 393,7
PWST	1094,8 ± 243,6	27,2 ± 19,4	4656,1 ± 1503,1	1717,9 ± 1573,9
AP	786,0 ± 247,5	166,8 ± 262,3	4479,2 ± 881,2	3352,8 ± 3564,5
PER	552,1 ± 239,2	162,9 ± 121,7	3248,6 ± 1582,6	2469,3 ± 1663,5

[Cu and Zn content in blood and urine]

We performed statistical analysis and found significant correlation between Cu levels in whole blood and severity of SIRS ($r = -0,6, p < 0,001$). Also we found strong significant correlation between Cu levels in urine and outcome ($r = 0,7, p < 0,001$, Fig. 1).

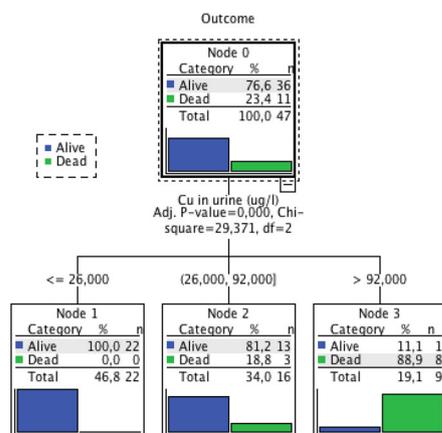
Figure 1.



[Copper content and outcome]

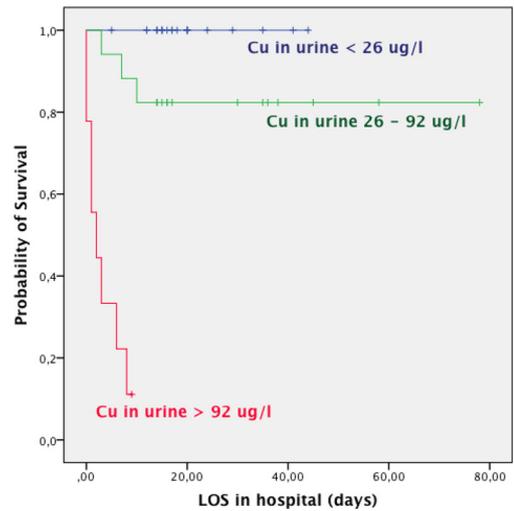
We also tried to classify our small group of 47 patients based on outcome and Cu level in urine. We found that probability of survival is drops down to 0 % in patients with Cu level in urine over 92 µg/l (Fig. 2 and Fig. 3).

Figure 2.



[Classification Tree]

Figure 3.



[Kaplan-Meier Curves for Overall Survival]

CONCLUSIONS. Based on that small prospective pilot study we could suggest that Cu content in whole blood proportionally decreases with increasing of SIRS severity in critically ill patients. Also we might conclude that Cu level in urine over 92 µg/l is an independent predictive factor of patients worst outcome.

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0723

EARLY PLASMA VITAMIN C CONCENTRATION, ORGAN DYSFUNCTION AND ICU MORTALITY

H.J.S. de Grooth¹, A.M.E. Spoelstra-de Man¹, H.M. Oudemans-van Straaten¹

¹VU University Medical Center, Adult Intensive Care Unit, Amsterdam, Netherlands

INTRODUCTION. Oxidative stress and consequent antioxidant depletion due to inflammation, ischemia and reperfusion contribute to (micro)circulatory impairment and organ dysfunction. Because Vitamin C (Vit-C) is crucial for endothelial protection, deficiency may aggravate (micro)circulatory injury and organ dysfunction.

OBJECTIVES. To determine plasma Vit-C concentrations in a heterogeneous group of ICU patients and evaluate its association with vasopressor support, acute kidney injury (AKI), multiple organ failure and mortality.

METHODS. Plasma Vit-C was measured by HPLC on days 1 and 3 of ICU admission. Concentrations were related to mean hourly norepinephrine support in days 1 to 4, Acute Kidney Injury Network (AKIN) stage, Sequential Organ Failure Assessment (SOFA) score (all using Spearman's ρ), and mortality (using logistic regression).

RESULTS. Two groups of patients were included: 22 patients undergoing mild hypothermia after an out-of-hospital cardiac arrest and 29 patients with mixed ICU diagnoses (major trauma, sepsis, major neurological disease and other). 66 % of patients were male and mean age was 59 (SD 12) years. Median SOFA score was 9 (IQR 7-11) on day 1 and 7 (IQR 3-10) on day 3. 15 patients (29 %) died in the ICU.

Median Vit-C plasma concentration was 24 µmol/l (IQR 16-36, n = 51) on day 1 and 19 µmol/l (IQR 14-26, n = 37) on day 3 ($p < 0,001$). Deficiency ($< 20 \mu\text{mol/l}$) and severe deficiency ($< 11 \mu\text{mol/l}$) occurred in 41 % and 14 % of patients on day 1, and in 59 % and 16 % on day 3.

In the mixed-diagnoses group, mean hourly norepinephrine dose correlated with Vit-C on day 1 ($\rho = -0,43; p = 0,02$) and day 3 ($\rho = -0,58; p = 0,007$) and patients with severe Vit-C deficiency on day 3 received significantly higher hourly norepinephrine doses (median 480 µg/h (IQR 73-656) vs. 3 µg/h (IQR 0-214), $p = 0,002$).

Patients developing acute kidney failure (AKIN stage 3) had lower Vit-C concentrations ($p = 0,01$, figure 1) and Vit-C was related to absolute ($\rho = -0,48; p = 0,003$) and relative ($\rho = -0,47; p = 0,003$) creatinine increase from day 1 to day 3.

Day 1 Vit-C was not associated with SOFA scores ($\rho = -0,16; p = \text{ns}$), but day 3 Vit-C correlated with SOFA day 1 ($\rho = -0,43; p = 0,007$) and SOFA day 3 ($\rho = -0,61; p < 0,001$). Severe Vit-C deficiency on day 3 was associated with subsequent mortality in the ICU (OR 8,5; 95 %CI 1,4-50; $p = 0,019$).

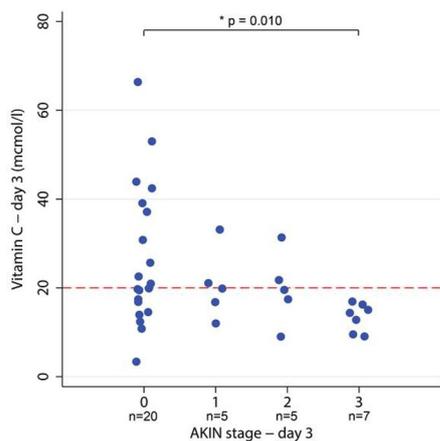


Figure 1. Plasma vitamin C concentrations on day 3 categorized by AKIN stage on day 3. Dashed line is deficiency plasma concentration in non-ICU patients. * p-Value using rank-sum test.

[Figure 1. Vitamin C by AKIN stage.]

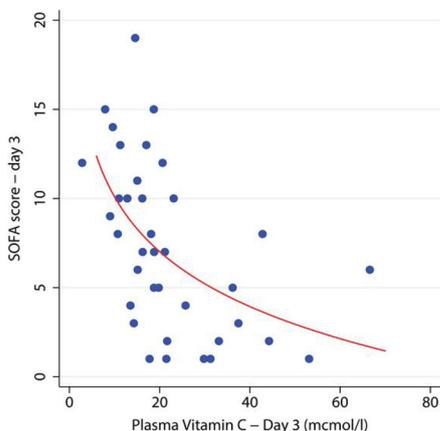


Figure 2. Vitamin C plasma concentration on day 3 versus SOFA score on day 3. Red line is an OLS regression fit. $SOFA = 20.3 - 3.08 * \log_2(Vit-C)$, $P_{pearson} < 0.001$, $R^2 = 0.31$.

[Figure 2. Vitamin C and SOFA score.]

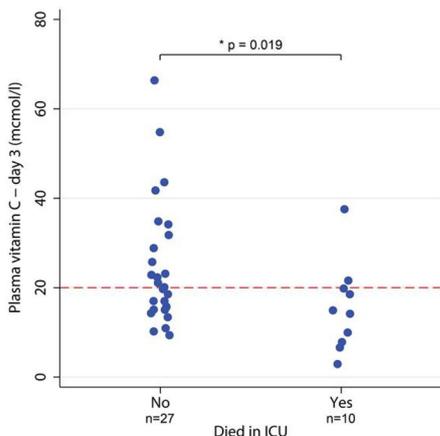


Figure 3. Plasma vitamin C concentration on day 3 categorized by subsequent ICU mortality. Dashed line is deficiency plasma concentration in non-ICU patients. * p-Value using rank-sum test.

[Figure 3. Vitamin C by ICU mortality.]

CONCLUSIONS. In this cohort of ICU patients, early plasma Vit-C deficiency was associated with increased vasopressor support, acute kidney injury, multiple organ dysfunction and mortality. The reciprocal relationship between oxidative stress and antioxidant depletion precludes any inference of causality, but (severe) Vit-C deficiency may contribute to organ dysfunction and failure.

The authors declare no conflict of interest.

0724
NUTRITIONAL SUPPORT IN ICU PATIENTS REQUIRING INTRAORTIC BALLOON PUMP

J.M. Gomez-Lama¹, C.F. Lübbe-Vazquez¹, M. Gonzalez-Granados¹, P. Saavedra Santana², J.L. Romero-Lujan¹, S. Ruiz Santana¹

¹University Hospital of Gran Canaria Dr Negrin, Intensive Care Unit, Las Palmas de Gran Canaria, Spain, ²Las Palmas de Gran Canaria University, Mathematics and Informatics Department, Las Palmas de Gran Canaria, Spain

INTRODUCTION. Cardiogenic shock is a common diagnosis in ICU patients. Nutritional strategy of these patients is far from being conclusive in medical literature and despite of the evidence its use remains controversial (1,2).

OBJECTIVES. To retrospectively evaluate the energy delivery given to patients in cardiogenic shock requiring Intraaortic Balloon Pump (IABP).

METHODS. This study was conducted in the 10-bed Cardiovascular Section out of a 30-bed-medical-surgical ICU. All patients admitted to the Cardiovascular Section from January 1, 2009 to December 31, 2013 who received IABP support were analyzed. Demographic data, severity scores, hours of Mechanical Ventilation (MV), catecholamines doses, ICU and hospital length of stay at admission and/or while on IABP and/or at withdrawal were recorded. In addition number of hours that studied patients required IABP was also registered. Energy target was set at 25 kcal/kg/day. Caloric administration linked to intravenous fluid therapy and/or propofol and/or enteral nutrition was recorded while patients required IABP. Daily glucose administration and insulin requirements were also reviewed. Categorical variables are expressed as frequencies and percentages, and continuous variables as mean and standard deviation (SD) when data followed a normal distribution, or as median and interquartile (25th-75th percentile) range (IQR) when distribution departed from normality.

RESULTS. Results are shown in Tables 1, 2 and 3 and in Figure 1. Two thousand three hundred and twelve patients were admitted to cardiovascular ICU section. Sixty-three patients received IABP support. Fifty patients of them had it inserted for coronary artery disease and the remaining thirteen after cardiac surgery. Median duration of IABP support was 40 h (IQR: 24,55). Median caloric intake while on IABP was 292 kcal (IQR: 147, 820). Finally, ratio administered versus targeted kilocalories was 18 % (IQR: 10.1, 28).

CONCLUSIONS. Patients in cardiogenic shock while on IABP only received less than 20 % of prescribed caloric intake. Caloric intake was given by fluid therapy including propofol and eventually as trophic enteral feeding.

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N	63
Age, years, mean ± SD	63.6 ± 11.6
Men/women, n	46/17
Apache-II, mean ± SD	17.6 ± 8.2
SOFA (ICU admission), median (IQR)	6 (4; 8)
SOFA (ICU discharge), median (IQR)	0 (0; 3)
SOFA (IABP at insertion), median (IQR)	7 (4; 8.5)
SOFA (IABP at withdrawal), median (IQR)	4 (2; 8)
Weight, kg, mean ± SD	73.1 ± 12.0

Table 1

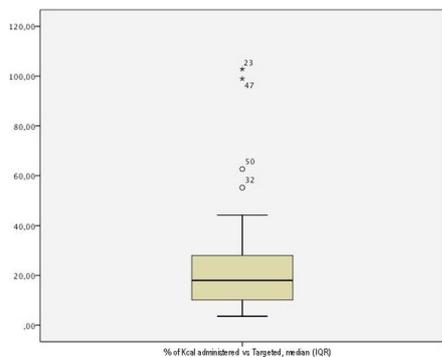
ICU length stay, days, median (IQR)	5.6 (2.9 ; 10)
Hospital length stay, days, median (IQR)	17.8 (8.1 ; 31.6)
ICU admission diagnosis, n (%)	
Cardiovascular Surgery	13 (20.6)
Coronary Artery disease	50 (79.4)
IABP (hours inserted), median (IQR)	40 (24 ; 55)
Mechanical Ventilation, hours, n (%)	
No MV	23 (36.5)
< 24h	15 (23.8)
24-120 hr	10 (15.9)
>120 hr	14 (22.2)
Norepinephrine IABP insertion (µg/kg/min), n (%)	
0	32 (50.8)
0-0.5	7 (11.2)
0.5-1	14 (22.2)
>1	10 (15.9)
Norepinephrine IABP withdrawal (µg/kg/min), n (%)	
0	42 (66.7)
0-0.5	7 (11.2)
0.5-1	6 (9.5)
>1	8 (12.7)
Dopamine IABP insertion, n(%)	
NO	36 (57.1)
YES	27 (42.9)
Dopamine IABP withdrawal, n(%)	
NO	36 (57.1)
YES	27 (42.9)
Deaths, n (%)	11 (17.5)

*IABP: Intraaortic Balloon Pump, MV: Mechanical Ventilation.

Table 3. Nutritional Data: patients during IABP support

N	63	
Nutrition hours, median (IQR)	35 (22, 52)	
Kcal, median (IQR)	Targeted	1750 (1550 ; 1925)
	Administered	292 (147 ; 820)
% de Kcal administered vs Targeted, median (IQR)	18.0 (10.1 ; 28.0)	
Nutritional support route	Intravenous	54 (85.7)
	EN	9 (14.3)
Nutritional types, n(%)	Fluids	53 (84.1)
	EN + Fluids	7 (11.1)
	EN	3 (4.8)
Glycemic level (mg/dL), median (IQR)	158 (142 ; 185)	
Insulin units administered, n (%)	0	16 (25.4)
	< 10	15 (23.8)
	10 - 50	15 (23.8)
	> 50	17 (27.0)

* EN: Enteral nutrition



[Figure 1. % Kcal administer vs Targeted]

0725 CAUSES OF HYPONATREMIA IN TRAUMATIC BRAIN INJURY PATIENTS IN ICU SETTINGS

K. Ahmad¹, Z. Alrais¹, S. Majeed², A.A. Wahab³, A. Zocco³, H.I. Elkholy³, J.I. Mathew³, A.Y. Elzayyat³, H. Elkholy³, M. Elias³

¹Surgical Intensive Care Unit Rashid Hospital Trauma Centre Dubai Health Authority, Dubai, United Arab Emirates, ²Neurosurgery Department Rashid Hospital, Dubai, United Arab Emirates, ³Surgical Intensive Care Unit Rashid Hospital, Dubai, United Arab Emirates

INTRODUCTION. Hyponatremia is commonly seen in Traumatic Brain Injury (TBI) patients. There are various causes of hyponatremia, but Syndrome of Inappropriate ADH (Antidiuretic Hormone) Secretion-SIADH and Cerebral Salt Wasting (CSW) are the most common.

OBJECTIVES. To know the different causes of hyponatremia in traumatic brain injury patients in the Intensive Care Unit (ICU) settings.

METHODS. A retrospective audit study was conducted at Surgical Intensive Care Unit on 150 patients diagnosed with various traumatic brain injuries, admitted with or who developed hyponatremia (S.Na < 135 mmol/L-at least 3 readings) during ICU stay. Standard guidelines and protocols were followed to diagnose different causes of hyponatremia in these patients, which are present on the DHA Website-File net. The data was collected by reviewing patient online electronic record system-Client Information System (CIS), being used in our unit for patient electronic record documentation.

RESULTS. Males were predominant than females, 87 % v 13 %. 129 were adult & 21 pediatric patients (≤12 years). 60 % cases were with severe head injury, 29 with moderate and 31 % mild head injuries. Predominant age group remained from 25-48 years, 53 % (52/150). Mean serum sodium before treatment was 131.2 ± 2.9 with lowest value of 117 mmol/L, and mean serum sodium post treatment was 137.6 ± 2.5. SIADH was diagnosed in 39(26 %) cases and CSW in 32(21 %) patients as a cause of hyponatremia. While in 53 % (79/150) of patients others causes of hyponatremia were found, mainly dehydration(8), during weaning(20) and post extubation phase(10), overtreatment with desmopressin(7), overuse of fluids(15), use of hypotonic fluids(3), use of diuretics (2) and mannitol(12). Comorbid conditions like Diabetes, Hypertension, Ischemic heart disease, Chronic renal failure, Chronic alcoholic and bronchial asthma were found in 10 % of cases, all other (90 %) were found previously healthier. No case was found with adrenal insufficiency or hypothyroidism as a cause of hyponatremia.

CONCLUSIONS. SIADH and CSW are the two most common causes of hyponatremia in traumatic brain injury patients, but there are various other causes as well especially in the ICU settings.

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Sepsis: Experimental studies: 0739

0739 POLYMYXIN B-IMMOBILIZED FIBER COLUMN HEMOPERFUSION IN TREATMENT FOR SEPTIC SHOCK CONTRIBUTES TO CONSTRICT PERIPHERAL BLOOD VESSELS

M. Sugiura¹, C. Mitaka², G. Haraguchi², M. Tomita³, N. Inase¹

¹Tokyo Medical And Dental University, Respiratory Medicine, Tokyo, Japan, ²Tokyo Medical And Dental University Graduate School, Critical Care Medicine, Tokyo, Japan, ³Medical Hospital of Tokyo Medical and Dental University, Clinical Research Center, Tokyo, Japan

INTRODUCTION. Polymyxin B-immobilized fiber column hemoperfusion (PMX) was first developed in 1994 and has been reported to be effective for patients with septic shock. It is not clear whether the PMX treatment is particularly useful for what characteristics of the patient.

OBJECTIVES. The objective of the present study was to investigate what factors have contributed to the improvement by PMX treatment.

METHODS. We investigated consecutive 78 patients with severe sepsis or septic shock who were performed PMX treatment in the ICU of Tokyo Medical and Dental University between April 2004 and July 2013. We retrospectively reviewed demographic data, routine biochemistry, microbiological data, infection focus, the Acute Physiology and Chronic Health Evaluation (APACHE) II score, the Sequential Organ Failure Assessment (SOFA) score, changes in the heart rate, mean arterial pressure (MAP), and PaO₂/F_iO₂ ratio and survival time of them. In addition, we separated all patients into two groups for analyses: those whose inotropic score improved after the PMX treatment (improvement group) and those whose inotropic score did not improve after the PMX treatment (non-improvement group). We compared with two groups.

RESULTS. In all patients, inotropic score significantly decreased from 18.06 to 9.94 (P = 0.011) after PMX treatment, while PaO₂/F_iO₂ ratio did not significantly change (P = 0.956). When we separated into two groups, inotropic score at pre-PMX treatment was significantly higher in the improvement group than in the non-improvement group (P = 0.001), in other words, the improvement group has taken large amounts of catecholamine before the PMX treatment. In the improvement group PaO₂/F_iO₂ ratio was significantly improved after PMX treatment (P = 0.041). Other factors, such as organ dysfunction, MAP before the PMX treatment and chronic illness, did not contribute to the improvement.

CONCLUSIONS. Our study suggested that the hemodynamics of septic shock patients could be improved by using PMX. In particular, good effect will be obtained when peripheral blood vessels were dilated due to septic shock.

Ultrasonography in the ICU: 0740-0753

0740 COMPARISON BETWEEN ULTRASOUND OR BRONCHOSCOPY GUIDED PERCUTANEOUS DILATIONAL TRACHEOSTOMY IN CRITICALLY ILL PATIENTS - A RETROSPECTIVE COHORT STUDY

A. Gobatto¹, B. Besen¹, P. Tierno¹, M. Park¹, P. Mendes¹, F. Cadamuro¹, D. Joelsons¹, L.U. Taniguchi², L.M. Malbouisson¹

¹Universidade de São Paulo, São Paulo, Brazil

INTRODUCTION. Percutaneous dilational tracheostomy (PDT) is routinely performed in the intensive care unit (ICU) with bronchoscopic guidance. Recently, ultrasound (US) has emerged as a new safety adjunct tool to increase efficacy of PDT. However, available data are limited to case series without any control group.

OBJECTIVES. Evaluate the efficacy and safety of US versus bronchoscopy-guided PDT in critically ill patients.

METHODS. All patients submitted to PDT after the standardization of US-guided PDT technique in our institution were analysed. Demographic and procedure-related variables, complications and clinical outcomes were collected and compared between patients undergoing US or bronchoscopy-guided PDT.

RESULTS. Sixty patients had been submitted to PDT and were enrolled, of whom 11 under bronchoscopy guidance and 49 under US guidance (Table 1). Procedure was performed faster in the US group compared to the bronchoscopy group (12 vs 15 min respectively, p = 0.028) (Table 2). None of the patients had any major complication. Minor complication rates were not different between groups, as well as median time from tracheostomy to mechanical ventilation liberation, median ICU and hospital length of stay, ICU mortality and hospital mortality (Table 3).

CONCLUSION. US-guided PDT is effective, safe and is associated with similar complication rates and clinical outcomes when compared to bronchoscopy-guided PDT.

	Bronchoscopy (n = 11)	Ultrasound (n = 49)	p Value
Male gender, n(%)	5 (46)	31 (67)	0.189
Age, years	49 (18.7)	52 (19.8)	0.417
SAPS 3, median [25th, 75th]	66 [61-67]	59 [50-72]	0.263
Anatomical Difficulties, n(%)			0.191
None	9 (82)	46 (94)	
Short Neck	1 (9)	3 (6)	
Limited Neck Extension	1 (9)	0	
MV before tracheostomy, days, median [25th, 75th]	15 [14-23]	13 [10-22]	0.004

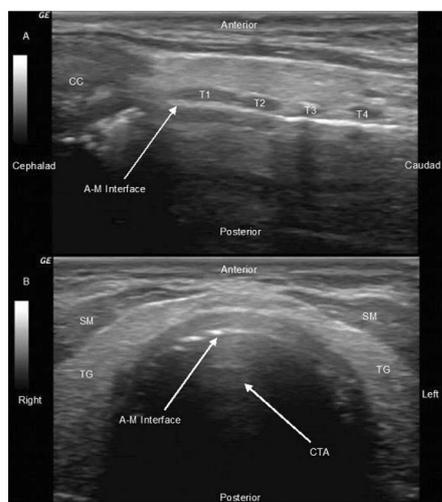
[Table 1 - General characteristics of the patients]

	Bronchoscopy (n = 11)	Ultrasound (n = 49)	p Value
Procedure difficulty, n(%)			0.464
Easy	7 (64)	28 (57)	
Some difficulty	3 (27)	15 (31)	
Difficult/Very difficult	1 (9)	6 (12)	
Number of tracheal punctures, median [25th, 75th]	2 [1-2]	1 [1-2]	0.735
Change in puncture site after US, n(%)	not applicable	9 (18 %)	
Procedure length (minutes), median [25th, 75th]	15 [15-22]	12 [8-15]	0.028

[Table 2 - Procedure data]

	Bronchoscopy (n = 11)	Ultrasound (n = 49)	
Hypotension, n(%)	1 (9)	6 (12)	1
Minor Bleeding, n(%)			0.491
Prolonged local compression	1 (9)	1 (2)	
Local wound care	0	1 (2)	
Drop in peripheral oxygen saturation, n(%)	1 (9)	2 (4)	0.462
Atelectasis, n(%)	1 (9)	1 (2)	1
Time between tracheostomy and liberation from MV, hours, median [25th, 75th]	48 [24 - 54]	48 [42 - 96]	0.284
ICU length of stay, days, median [25th, 75th]	20 [16-30]	20 [25.5 - 25]	0.411
Hospital mortality, n(%)	7 (64)	21 (43)	0.318

[Table 3 - Complications and clinical outcomes]



[Figure 1]

Figure 1. A) Cervical left parasagittal scan. Cricoid cartilage (CC), the tracheal cartilages (T1-T3), comet tail artifact (CTA), Air-mucosa (A-M) interface. B) Transverse scan. SM, strap muscle; TG, thyroid gland.

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0741

SONOGRAPHIC B-LINES AND PRESSURE OF END TIDAL CO₂ IN DIFFERENTIATING ACUTE DYSPNEA

H.M. Hassaballa¹, W.A. Radwan¹, K.A. Alwahab¹, M. Khalaf¹, A. Samir¹

¹Cairo University, Critical Care Department, Cairo, Egypt

INTRODUCTION. Acute dyspnea is a common presentation in the emergency department and critical care setting. Early differentiation of cardiac causes of dyspnea from pulmonary related causes is of great significance(1). Clinical data including history and clinical examination may sometimes fail to differentiate the cause of dyspnea(2). Point of care Lung ultrasound and pressure end tidal CO₂ may add more diagnostic accuracy.

OBJECTIVES. Our study compared the diagnostic accuracy of clinical criteria for diagnosis of heart failure related acute dyspnea as calculated with modified Boston criteria (3) to pressure of end tidal Co₂ and to b lines on lung ultrasound.

METHODS. We conducted a prospective study. In Cairo university hospitals, between December 2012 to February 2014, 250 patients with acute dyspnea were recruited, of whom 25 patients were excluded. 225 patients were subdivided into heart failure related acute dyspnea group (n = 118) and pulmonary (asthma/COPD) related acute dyspnea group (n = 107). History, clinical examination, standard laboratory tests, chest X ray, lung ultrasound for bilateral symmetrical b lines and pressure end tidal co₂ level were collected.

RESULTS. Lung ultrasound had the best performance, with sensitivity 100 % and specificity of 94 % and area under the receiver-operating curve (AUROC) 0.97. Clinical evaluation using modified Boston criteria had sensitivity 84 % and specificity of 83 % and AUROC 0.96. The pressure of end tidal Co₂ had sensitivity 81 % and specificity of 79 % and AUROC 0.94.

CONCLUSIONS. Point of care lung ultrasound gives accurate differentiation between cardiac related acute dyspnea from pulmonary related acute dyspnea.

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GRANT ACKNOWLEDGMENT. We conducted our study within the course of our regular work at Cairo university hospitals, with no extra funding in any form.

0742

THE PROGNOSTIC VALUE OF MAGNETIC RESONANCE IMAGING IN MODERATE AND SEVERE TRAUMATIC BRAIN INJURY: A SYSTEMATIC REVIEW AND META-ANALYSIS

H. Haghbayan¹, A. Boutin², M. Laflamme¹, F. Lauzier^{2,3,4}, M. Shemilt², L. Moore^{1,2}, R. Zarychanski², D. Ferguson⁵, A.F. Turgeon^{2,3}

¹Université Laval, Department of Social and Preventive Medicine, Québec, Canada, ²CHU de Québec Research Center (Hôpital de l'Enfant-Jésus), Population Health and Optimal Health Practices Research Unit (Trauma - Emergency - Critical Care Medicine), Québec, Canada, ³Université Laval, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Québec, Canada, ⁴Université Laval, Department of Medicine, Québec, Canada, ⁵University of Manitoba, Department of Internal Medicine, Section of Critical Care Medicine, Winnipeg, Canada, ⁶Ottawa Hospital Research Institute, Clinical Epidemiology Unit, Ottawa, Canada

INTRODUCTION. Traumatic brain injury (TBI) represents a major cause of mortality and morbidity worldwide. Determining long-term prognosis is important for assisting clinical decision-making and informing substitute decision makers. However, the prediction of neurological outcome remains problematic. Magnetic resonance imaging (MRI) is increasingly used to evaluate structures such as the brainstem in the acute phase of TBI for neuroprognostication despite its unestablished prognostic value. We undertook a systematic review of prognostic studies on MRI performed in the acute-phase of moderate or severe TBI.

OBJECTIVES. To determine the prognostic value of acute-phase structural MRI in patients with moderate or severe TBI.

METHODS. We searched MEDLINE, EMBASE, BIOSIS and Cochrane CENTRAL from inception to August 2012. We included observational cohort studies of adults with moderate or severe TBI that evaluated the association of structural MRI performed within 28 days of the TBI with neurological outcome. Our primary outcomes were the Glasgow outcome scale (GOS), the extended GOS (GOSe) and mortality. An unfavourable outcome was defined as a score of 1, 2 or 3 on the GOS and as a score of 1 to 4 on the GOSe. We generated summary effect estimates employing a random effects model with the Mantel-Haenszel method and reported relative risks (RR) with 95 % confidence intervals (95 % CI). We explored statistical heterogeneity with the I² statistic. Subgroup analyses planned a priori were undertaken to investigate heterogeneity and robustness of the results.

RESULTS. We identified 19,416 records and included 29 (n = 1,483) studies, of which 18 (n = 905) were eligible for meta-analysis. Brainstem lesions were significantly predictive of unfavourable GOS (9 studies, n = 465, RR = 2.77, 95 % CI 1.56 to 4.92, I² = 86 %) and of mortality (3 studies, n = 131, RR = 2.71, 95 % CI 1.21 to 6.07, I² = 0 %). The association of brainstem lesions with GOS was also derived through a second method by the dichotomization of two scoring systems (Firsching and Adams-Gentry) into grades of brainstem lesions vs. non-brainstem lesions (6 studies, n = 386, RR = 2.70, 95 % CI 1.79 to 4.07, I² = 63 %). In subgroup analyses, we found that the prognostic significance of brainstem lesions was derived from lesions confined to the midbrain and pons. Bilateral symmetric lesions were associated with greater risk of unfavourable GOS compared to unilateral lesions.

CONCLUSIONS. Brainstem lesions, especially lesions of the midbrain or pons and bilateral lesions, are predictors of unfavourable GOS and mortality. Further studies controlling for established and potential prognostic predictors are required to assess the additive value of acute MRI as a prognosticator for TBI.

0743

A COMPARISON BETWEEN LEFT VENTRICULAR OUTFLOW TRACT VELOCITY TIME INTEGRAL AND INFERIOR VENA CAVA COLLAPSIBILITY INDEX AS A PREDICTOR TO FLUID RESPONSIVENESS IN CRITICALLY ILL SEPTIC PATIENTS

M.E.M. Abodorra¹, S.M. El Awady², A.M. Fayed², T.H. El Badawy³

¹Alexandria University, Faculty of Medicine, Critical Care, Alexandria, Egypt, ²Alexandria University, Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt, ³Alexandria University, Faculty of Medicine, Cardiovascular Medicine, Alexandria, Egypt

INTRODUCTION. The amount of fluids used to resuscitate patients in acute circulatory failure is difficult to quantify and traditional methods used are not accurate.(1) The ability of inferior vena cava collapsibility index should be investigated to detect fluid response in spontaneously breathing critically ill septic patients.

OBJECTIVES. To compare between left ventricular outflow tract Velocity time integral (VTI_{LVOF}) and Inferior vena cava collapsibility index (IVCCI) as a predictor to fluid responsiveness in spontaneously breathing critically ill septic patients after infusion of 100 cc fluids over one minute and after 500 cc fluids over 15 min.

METHODS. This study was conducted on 40 adult male and female critically ill septic patients. VTI_{LVOF} was measured by echocardiography before fluid resuscitation, after 100 cc over 1 min and after additional 400 cc over 14 min. IVCCI was measured simultaneously with VTI_{LVOF}. IVCCI was calculated by the following formula (Expiratory diameter- Inspiratory diameter/Expiratory diameter). The studied population was separated into two groups, responders and non-responders according to increase in VTI_{LVOF} after 500 cc fluid (ΔVTI 500) by 15 %. The percent of change of IVCCI after 100 ml and after 500 ml fluid infusion were calculated as ΔIVCCI 100 and ΔIVCCI 500 respectively. Receiver operator characteristic (ROC) curves were generated for IVCCI (100 and 500) and ΔIVCCI (100 and 500) to determine the best cutoff value.

RESULTS. Among 40 included patients, 20 (50 %) were responders with pneumonia being the most common site of infection. The area under the ROC curve for IVCCI 100 was 0.910 (p < 0.001). The best cut off value was >45 % with sensitivity, specificity, PPV, and NPV was 90 %, 65 %, 72 %, 88.67 % respectively. The accuracy was 77.5 %. While that for IVCCI 500 was 0.908 (p < 0.001) with a best cut off value was >37 % with sensitivity, specificity, PPV, NPV was >90 %, 70 %, 75 %, 87.5 % respectively. The accuracy was 80 %. The AUC for ΔIVCCI 100 was 0.75 with a best cutoff value <14 % (p = 0.006) with

sensitivity, specificity, PPV and NPV 70, 85, 83.3 and 73.9 % respectively. The accuracy was 77.5 %. While the AUC for ΔIVCCI 500 was 0.745 with a best cut off value ≤ 29 % with sensitivity, specificity, PPV and NPV was 65, 75, 72.2 and 68.1 %. The accuracy was 70 %.

	ALL PATIENTS	RESPONDERS	NON-RESPONDERS	P-VALUE
Age in years	53.47 ± 14.26	49.60 ± 17.27	57.35 ± 9.38	p = 0.088
Heart rate b/min	107.87 ± 11.47	108.30 ± 13.50	107.45 ± 9.36	p = 0.818
MAP mmHg	57.50 ± 11.66	54.85 ± 12.20	60.15 ± 10.74	p = 0.153
ΔVTI 100	8.25 ± 3.01	10.68 ± 1.85	5.81 ± 1.66	p < 0.001
ΔVTI 500	14.30 ± 4.14	17.95 ± 2.05	10.65 ± 1.71	p < 0.001
IVCCI 100	35.04 ± 15.93	46.64 ± 7.97	23.45 ± 13.21	p < 0.001
IVCCI 500	29.16 ± 13.73	39.33 ± 6.87	18.99 ± 11.05	p < 0.001
Δ IVCCI 100	15.63 ± 10.42	10.28 ± 5.19	20.98 ± 11.65	p = 0.006*
Δ IVCCI 500	28.60 ± 10.59	24.15 ± 6.73	33.06 ± 11.96	p = 0.008*

[Characteristics of the general population and comp]

CONCLUSIONS. In spontaneously breathing critically ill septic patients IVCCI > 45 % after 100 cc and IVCCI > 37 % after 500 cc are usually fluid responsive while lower values do not exclude fluid responsiveness. ΔIVCCI 100 and 500 have a low predicting ability to determine fluid responsiveness in spontaneously breathing critically ill patients.

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0744
COMPARISON OF WEB-BASED TO TRADITIONAL CLASSROOM-BASED TRAINING OF LUNG ULTRASOUND FOR THE DETECTION OF PNEUMOTHORAX

T. Edrich^{1,2}, M. Stopfkuchen-Evans², P. Song², A. Szabo², D. Dankl¹, P. Scheithorn³, G. Frendl², D. Varelmann²

¹Paracelsus Medical University, Department of Anesthesiology, Perioperative Medicine, and Critical Care Medicine, Salzburg, Austria, ²Brigham and Women's Hospital, Harvard Medical School, Department of Anesthesia, Perioperative, and Pain Medicine, Boston, United States, ³Ludwigs-Maximilians-University, Department of Anesthesiology, Munich, Germany

INTRODUCTION. Lung ultrasound (LUS) is a well-established method that can exclude pneumothorax with a sensitivity and specificity that is equivalent or superior to chest X-ray. While anesthesiologists and intensivists often are facile with the use of ultrasound to guide central venous catheter placement and regional anesthesia techniques that entail a risk of pneumothorax, the use of LUS for pneumothorax detection has not been widely taught. In anticipation of an increased training demand for LUS, efficient and scalable teaching methods should be developed.

OBJECTIVES. To compare the improvement in LUS skills after either web-based or classroom-based training. We hypothesized that web-based training will not be inferior to classroom-based training beyond a non-inferiority limit of 10 % and that both will be superior to no training.

METHODS. After a pre-test, anesthesiologists were randomized to either web-based (Group Web), classroom-based (Group Class), or no training (Group Control), and then completed a post-test. Groups Web and Class returned for a retention test 4 weeks later. All three tests were similar, testing both practical and theoretical knowledge. Teaching for Group Class consisted of a standardized power-point lecture conforming to the Consensus Conference on Lung Ultrasound.^{1,2} This was followed by hands-on training. Group Web received a narrated video of the same power-point presentation, followed by an on-line demonstration of LUS which also instructs the viewer to perform a LUS on himself using a clinically-available ultrasound machine and submit smart-phone snapshots of the resulting images as part of a portfolio system. Group Web received no other hands-on training.

RESULTS. Groups Web, Class, and Control contained 21, 21, and 7 anesthesiologists, respectively. Baseline characteristics including age, gender, and level of training did not differ significantly. Figure 1a compares the improvement after training compared to the control group (means and 95 % confidence intervals). Figure 1b shows the difference between the improvement of groups Class and Web using a 2-sample T-test with the mean and both 95 % confidence limits to the left of both the a priori non-inferiority limit and zero.

CONCLUSIONS. When teaching anesthesiologists the ultrasound techniques necessary to detect pneumothorax, web-based teaching is not inferior to classroom-based teaching.

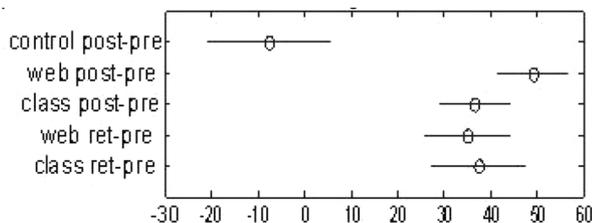


Fig. 1a. Improvement in test score between post- and pre-tests as well as between retention- and pre-tests (%)

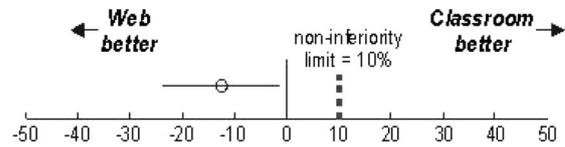


Fig. 1b. Two-sample T-test for the learning achieved by group Class minus the learning of group Web (%). The 95% confidence interval lies to the left of the non-inferiority limit (and zero) demonstrating non-inferiority of Web training compared to Classroom training.

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0745
LUNG ULTRASOUND IN ASSESSING AND MONITORING SEPSIS-INDUCED LUNG INJURY

N. Uenishi¹, T. Tawata¹, S. Tsuzuki¹, N. Jingushi¹, A. Hirakawa², K. Yamanaka¹, N. Takeyama³

¹Fujita Health University, Department of General Internal Medicine and Emergency Medicine, Aichi, Japan, ²Fujita Health University, Department of Disaster Medicine and Traumatology, Aichi, Japan, ³Fujita Health University, Department of Emergency and Acute Intensive Care Medicine, Aichi, Japan

INTRODUCTION. Recently lung ultrasound (LUS) has been increasingly used for diagnosing several pulmonary conditions. However the role of LUS in the assessment and monitoring of lung injury in septic patients has not yet been well studied.

OBJECTIVES. In patients with sepsis we aimed to explore (1) the correlations between LUS findings and the severity of lung injury, (2) the ability of LUS findings to reflect the temporal changes in the severity of lung injury, and (3) the concordance between LUS and chest radiograph (CXR) as a test for assessing and monitoring of lung injury.

METHODS. We evaluated 28 patients aged 18 years and older with sepsis admitted to the ICU in a university hospital. Patients were studied with arterial blood gas, portable CXR, and LUS within 48 h of admission. We scored the LUS findings with a prespecified scoring system (LUS score), which is based on ultrasound patterns in 12 predefined chest regions. The patterns included normal aeration, multiple irregularly spaced B-lines, multiple abutting B-lines, and consolidation. We scored the CXR findings with a previously validated scoring system (CXR score) [1]. These scores were compared with PaO₂/FiO₂ ratio (P/F), oxygenation index (mean airway pressure x FiO₂/PaO₂) (OI), Murray's lung injury score (LIS) [2], and duration of mechanical ventilation (MV). Areas under the receiver operating characteristic curves (AUC) were compared between LUS and CXR scores for the ability to discriminate between P/F ≤ 300 and P/F > 300. In 13 patients, the changes in LUS and CXR scores were compared with the changes in P/F between the baseline and follow-up evaluation. Correlations were assessed using the Spearman's rank correlation and comparison of AUC values was performed using the DeLong test. Statistical significance was defined as a two-tailed p-value < 0.05.

RESULTS. The LUS score significantly correlated with P/F (r_s = -0.64, p < 0.001), OI (r_s = 0.56, p = 0.004), LIS (r_s = 0.68, p < 0.001), and duration of MV (r_s = 0.60, p = 0.004). Similarly, the CXR score significantly correlated with P/F (r_s = -0.54, p = 0.003), OI (r_s = 0.64, p < 0.001), LIS (r_s = 0.76, p < 0.001), and duration of MV (r_s = 0.50, p = 0.017). There was no difference between LUS score (AUC 0.87) and CXR score (AUC 0.86) in the ability to discriminate between P/F ≤ 300 and P/F > 300. In 13 patients, follow-up evaluation was carried out 1 to 5 days after the initial evaluation. The LUS score correctly reflected the improvement or worsening of oxygenation in 11 out of 13 (85 %) patients, and CXR score in 8 out of 13 patients (62 %).

CONCLUSIONS. LUS appears to be as reliable a tool as CXR to assess and monitor the severity of lung injury in septic patients. Since it is noninvasive and easily repeatable at the bedside, LUS might be an attractive alternative to CXR in evaluating lung injury in septic patients.

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GRANT ACKNOWLEDGMENT. Conflicts of interest: none declared.

0746
DOES THE ADDITION OF DIAGNOSTIC LUNG ULTRA-SOUND IMPACT ON CHEST PHYSIOTHERAPY INTERVENTION IN CRITICALLY-ILL PATIENTS?

M.L. Riley¹, G. Cork², L. Osman², G. Ntoumenopoulos³

¹Guy's and St. Thomas' NHS Foundation Trust, Physiotherapy, London, United Kingdom, ²Guy's and St. Thomas' NHS Foundation Trust, London, United Kingdom, ³Australian Catholic University, Sydney, Australia

INTRODUCTION. Pulmonary dysfunction based algorithms can facilitate more consistent application of PT interventions in critical care (CC) and improve patient outcome¹. Chest X-rays (CXR) are used to identify pulmonary dysfunction, but have limited diagnostic accuracy in comparison to lung ultrasound (LUS)².

OBJECTIVES. This study aims to evaluate the impact of LUS delivered by a consultant physiotherapist on subsequent treatment intervention by the respiratory PT team within CC.

METHODS. A convenience sample of patients who had received LUS delivered by the PTC between October 2011 -October 2012 within CC. Details of PT interventions were reviewed using the electronic notes system on the day prior to and the day following LUS. The respiratory problem identified by the attending PT was recorded under one or more of the following categories; secretion retention, ventilation:perfusion mismatch, loss of lung volume or respiratory pump failure. This was used as an indicator of PT diagnosis of pulmonary dysfunction. Patient's that did not receive PT intervention on the day prior to and the day following LUS were excluded.

RESULTS. Fifty patient notes were reviewed, 15 were excluded from analysis (Figure 1). A mean period of 1.5 days (range 0-6) elapsed between the last CXR and PT review. The level of agreement between the radiologist reported CXR and PT delivered LUS was 58 %

(19/35). Physiotherapy identified problems changed on 51 % (18/35 patient records) of occasions post LUS intervention (Figure 2).

Assessment Method	Identified Pathology			
	Consolidation	Reduced lung volumes	Effusion	Pulmonary Oedema
Lung Ultrasound	26	3	19	1
Chest Radiograph	22	3	12	1

[Figure 1]

USS diagnosis	Physiotherapist Identified Problem				
	V/Q Mismatch	Reduced lung volumes	Respiratory pump failure	Retained Secretions	
Effusion	Pre-USS	0	8	4	12
	Post-USS	4	7	2	10
	% change	400	-12.5	-50	-17
Consolidation	Pre-USS	2	10	5	18
	Post-USS	6	7	3	13
	% change	200	-30	-40	-28
Reduced Volumes	Pre-USS	0	0	0	2
	Post-USS	1	1	0	2
	% change	100	100	0	0

[Figure 2]

CONCLUSIONS. Given the retrospective nature of this study it is difficult to establish the clinician's true clinical diagnosis of pathology and using the problem list as a substitute for pulmonary dysfunction may not be sensitive enough. This notes review suggests that the addition of PTC delivered LUS may have an impact on the identification of physiotherapy problems on subsequent PT assessment. However given the small sample size definitive conclusions cannot be drawn.

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0747

DIAGNOSTIC VALUE OF BEDSIDE LUNG ULTRASOUND (LUS) FOR ASSESSMENT OF PULMONARY ABNORMALITIES IN NEUTROPENIC PATIENTS (PTS) WITH HEMATOLOGICAL MALIGNANCIES (HM) AND ACUTE RESPIRATORY FAILURE (ARF)

V. Novikov¹, G. Gastyan¹, I. Kostina², A. Gavrilov³

¹Scientific Center for Hematology, ICU, Moscow, Russian Federation, ²Scientific Center for Hematology, Dept of Radiology, Moscow, Russian Federation, ³M.V. Lomonosov Moscow State University, Moscow, Russian Federation

INTRODUCTION. ARF is the frequent reason for admission of pts with HM in ICU. Chest computed tomography (CT) is the standard tool to assess of pulmonary pathologies, but the CT is limited by necessity to transfer critical ill pts to the radiology department and radiation exposure. Recently, bedside LUS is increasingly used in pts with ARF [1].

OBJECTIVES. To assess value of LUS in diagnostics of lung lesions in neutropenic pts with ARF.

METHODS. In prospective study 24 neutropenic pts (median age 55 yrs) with HM and ARF were enrolled. Examination of the pts included CT, LUS, bronchoalveolar lavage. The lung weight was calculated using a software Multivox-DICOM (Russia), adapting for CT measurements. LUS was performed with a microconvex 1-5 MHz transducer (M-TURBO, SonoSite, USA). B-lines, consolidation, pleural effusion in 23 lung zones were assessed by LUS. The total numbers of B-lines were counted as the total B-line score (TBS). 46 examinations have been performed in 24 pts.

RESULTS. In 33 cases CT revealed pleural effusion (median 100 ml, min - 30 ml, max - 700 ml). There were CT signs of pulmonary consolidations in 31 cases, lung edema in 19 cases, combination of lung edema and consolidation in 19 cases. LUS detected pleural effusion in 31 cases (median 160 ml, min 140 ml, max 400 ml). In 41 cases B-lines were revealed (median TBS was 33.5, min 1, max 81). Lung consolidations were detected by LUS in 22 cases, combinations of consolidation and B-lines in 39 cases. There were correlations between TBS and lung weight ($r = 0.35$; $P = 0.004$), between volumes of effusion estimated by LUS and CT ($r = 0.6$; $P = 0.0001$). There were differences in LUS manifestations of pneumonia of various etiology. The most TBS and consolidation zones were detected in pneumocystic pneumonia and invasive pulmonary aspergillosis (see tab 1, where. * - $p < 0.05$ in comparison with bacterial pneumonia, # - $p < 0.05$ in comparison with aspergillosis).

Pneumonia	TBS, Me (min-max)	Consolidations, (min-max)	Me (min-max)	Me (min-max)
Bacterial pneumonia	17 (0-93)	4 (0-19)		19 (0-38)
Pulmonary aspergillosis	32 (0-101)*	1 (0-25)		15 (1-38)
Pneumocystis pneumonia	42 (0-105)*	0 (0-4)#		5 (0-44)*#

[LUS artefacts of pneumonia in neutropenic pts (Me.)]

CONCLUSIONS. LUS can be used for assessment of pulmonary abnormalities in neutropenic patients. Pts with aspergillosis and pneumocystis pneumonia had more B-lines than pts with bacterial pneumonia. Pts with pneumocystis pneumonia had less consolidation and A-lines than pts with aspergillosis.

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0748

A POINT OF CARE ULTRASOUND DURING CATHETERIZATION OF INTERNAL JUGULAR VEIN; SONOGRAPHIC ASSESSMENT OF THE VENOUS EXCAVATION (SAVE) PROTOCOL

S.-M. Park¹, H. Kim², H. Doh², C.-Y. Koh³

¹Hallym University Sacred Heart Hospital, Emergency Medicine, Gang-won, Korea, Republic of, ²Dongguk International University, Emergency Medicine, Seoul, Korea, Republic of, ³Dankook University, Emergency Medicine, Cheonan, Korea, Republic of

INTRODUCTION. Central venous catheterization plays an important role in treating critically ill patients in Emergency department and ICU. Though central venous catheterization has many advantages, it can cause various complications such as bleeding, pneumothorax, and infection. In recent years ultrasound guided central venous catheterization is recommended to reduce the known complications. But so far, no study suggests an overall guideline that can be used throughout all stages of central venous catheterization.

OBJECTIVES. We devised an ultrasound guideline for prevention and early detection of complications with CVC, and named it SAVE protocol. This study is designed to show the efficacy of the SAVE protocol in catheterizing the IJV.

METHODS. All patients who underwent internal jugular vein catheterization in one emergency center were included in the study. Among the enrolled patients, 97 underwent SAVE. The SAVE protocol consisted of 1) checking the condition of the internal jugular vein and pre-CVC lung ultrasound to rule out preexisting pneumothorax 2) ultrasound guided puncture of central vein, 3) sonographic detection of guide wire before dilation, 4) post-CVC lung ultrasonography to find post procedural complications. The primary outcome of the study was the success rate of each stage. The secondary outcome was the time taken to execute the SAVE exam. The whole process of patient's care was recorded by video for the purpose of time analysis. And physicians described anatomical site, reason for catheterization, and acute mechanical complications.

RESULTS. In all subjects, guide wire was visible within the lumen of the IJV. Median access time, from insertion to the detection of guide wire in IJV via ultrasound, was 20 s. After the CVC was inserted, post-CVC lung ultrasonography was completed within 70 s on median time. It took more than 5 min to identify chest x-ray image. Acute mechanical complications - happened to 3 patients - were detected immediately by the SAVE protocol.

CONCLUSIONS. This study shows SAVE protocol could both detect complications at an early stage and prevent complications in all patients. Through this study, we recommend applying the SAVE protocol to all patients in need of central venous catheterization.

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0749

DIAPHRAGMATIC M-MODE ULTRASONOGRAPHY: A USEFUL TOOL FOR PREDICTING WEANING SUCCESS

A. Flevari¹, D. Konstantonis¹, M. Lignos¹, T. Christodouloupolou¹, O. Apostolopoulou¹, F. Frantzeskaki¹, C. Diakaki¹, A. Strilakou¹, E. Paramythiotou¹, A. Armaganidis¹

¹2nd University Department of Critical Care Medicine, Attikon Hospital, University of Athens, Medical School, Athens, Greece

INTRODUCTION. Patients admitted in the ICU often fail to wean from mechanical ventilation (MV). The new classification of weaning¹ defines "difficult weaning" when extubation is achieved within seven days from the first trial and after a maximum of three attempts and "prolonged weaning" when extubation is achieved after more than seven days and a minimum of three attempts.

OBJECTIVES. To investigate the usefulness of M-mode ultrasonographic (US) diaphragmatic excursion (DE) in prospectively evaluating weaning outcomes in comparison to Rapid Shallow Breathing Index (RSBI).

METHODS. We present preliminary data of our ongoing study. A prospective observational study is being conducted in patients with difficult or prolonged weaning, in a general university ICU, after approval by the local ethics committee. The hemidiaphragms of 20 patients were evaluated by M-mode ultrasonography (5-MHz probe), as previously described². Patient's bed head was set at 30° angle. A DE of less than 10 mm during quiet breathing was considered positive and indicative of weaning failure³. US was performed twice: while on Pressure Support Ventilation (PSV) at PIP 12 - PEEP 5cmH2O and at 10 min T-piece. RSBI (at PIP 5cmH2O, to compensate for circuit resistance) was also calculated at bedside. Spontaneous Breathing Trial (SBT) was classified as either a success or a failure by the patients' physician. P value was set at 0.05 level of significance.

RESULTS. 20 patients (12 men) were included. Mean age was 59.5 (SD 16.2) years. Mean APACHE II was 22.7 (SD 8). Table 1 presents Odds ratio, sensitivity, specificity, PPV and NPV value for sonographic DE and RSBI. A DE of less than 10 mm during PSV, increased 15.9 fold the odds for weaning failure, but it was not statistically significant at 5 % level. On the contrary, a < 10 mm excursion during SBT augmented 15-fold the odds for weaning

failure, in a statistically significant way and provided higher specificity and positive predictive value compared to RSBI.

Odds ratio, sensitivity, specificity, PPV and NPV value for M-mode US diaphragmatic excursion and RSBI

	OR	CI	p	Sensitivity	Specificity	PPV	NPV
Diaphragmatic excursion of < 10 mm (at PSV: PIP 12 - PEEP 5)	15.9	0.69-363	0.08	0.38	1	1	0.7
Diaphragmatic excursion of < 10 mm (at SBT)	15	1.7-136.2	0.02	0.75	0.83	0.75	0.83
RSBI (set > 105, under PIP 5cmH ₂ O)	32.1	1.48-693.5	0.03	1	0.67	0.67	1

OR = Odds Ratio; CI = Confidence Interval; PPV = Positive Predictive Value; NPV = Negative Predictive Value; PIP = Peak Inspiratory Pressure, PEEP = Positive End-Expiratory Pressure

[Table 1]

CONCLUSIONS. Our preliminary data suggest that diaphragmatic M-mode ultrasonography could be another tool in predicting weaning success, but the ideal cut-off point remains to be evaluated.

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0750

CENTRAL VENOUS CANNULATION: IS THE LANDMARK TECHNIQUE CORRECT?

J. Rees¹, Y. Haroon¹, S. Saha², S. Derekshani³

¹Barts Health NHS Trust, Anaesthetics and Critical Care, London, United Kingdom, ²Barking, Havering and Redbridge University Hospitals Trust, Anaesthetics and Critical Care, Romford, United Kingdom, ³Barking, Havering and Redbridge University Hospitals Trust, Radiology Department, Romford, United Kingdom

INTRODUCTION. The internal jugular vein (IJV) is of great importance in intensive care medicine and anaesthesia. Over the previous decade, we have seen an increasing use of ultrasound locating devices to identify the vein for insertion of a catheter in the UK. This has predominantly occurred due to national guidelines¹. Prior to this guidance, IJV CVCs were inserted under the landmark technique. This consists of locating the point medial to the carotid artery at the level of the cricoid cartilage (being at the spinal level of C6) aiming at the ipsilateral nipple^{2,3,4}. The IJV is noted to be easier to cannulate at or below the level of the cricoid cartilage as the diameter of the vein increases from this point due to merging of tributary veins⁵.

OBJECTIVES. We found that ultrasound images showed certain patients demonstrated a bifurcation in the IJV at variable anatomical positions. Distally to this point the vein becomes narrower, therefore identifying the point at which central venous cannulation becomes more difficult. This probed us to investigate the prevalence of this anatomical difference, and to challenge the teaching of the landmark technique-is the cricoid cartilage the ideal vertical landmark?

METHODS. We examined computed tomography angiogram scans of 345 patients who had received their scan for other clinical reasons. We examined for any bifurcation in the left or right IJV in the cervical/high thoracic area and correlated this split with the spinal level.

RESULTS. We gained results for all 345 patients. 63 % of patients were male and 27 % were female. There was a unimodal distribution of ages skewed to the older patients.

We found that 82 % of our cohort demonstrated a notable radiological bifurcation in their IJV. These bifurcations corresponded with the following spinal levels: C2 in 1 % of patients, C3 in 27 % of patients, C4 in 36 % of patients, C5 in 22 % of patients, C6 in 11 % of patients, C7 in 3 % of patients and T1 in 0.7 % of patients. No patients demonstrated bifurcations at other spinal levels within the neck.

CONCLUSIONS. This study therefore illustrated that 96.5 % of our cohort who demonstrated a bifurcation did so at level C6 or above. This reinforces that IJV cannulation using the landmark technique at the level of the cricoid cartilage (C6) *does* provide the best vertical landmark for vessel diameter in all patients, and hence successful insertion of the CVC.

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0751

IMPACT OF PLEURAL FLUID REMOVAL ON CONTINUOUS CHEST ELECTRICAL IMPEDANCE TOMOGRAPHY EXAMINATIONS OF INTENSIVE CARE PATIENTS

D. Bläser¹, T. Becher¹, I. Lautenschläger¹, T.-A. Meinel¹, A. Frerichs¹, D. Schädler¹, N. Weiler¹, I. Frerichs¹

¹University Medical Center Schleswig-Holstein, Campus Kiel, Department of Anesthesiology and Intensive Care Medicine, Kiel, Germany

INTRODUCTION. Electrical impedance tomography (EIT) is increasingly used for bedside monitoring of regional lung volumes and ventilation in intensive care patients. Pleural

effusion may impact the EIT findings because of the presence of excessive electrically conductive fluid in the pleural cavity.

OBJECTIVES. To study the effect of pleural fluid removal on regional lung aeration determined by EIT.

METHODS. Six critically ill postsurgical patients (four men, two women, mean age \pm SD: 62 \pm 13 yr) suffering from unilateral pleural effusion of non-cancerous origin were examined by EIT (PulmoVista500, Dräger Medical, Lübeck, Germany) in the intensive care unit. The study was approved by the Ethics Committee of the Medical Faculty of Christian-Albrechts University, Kiel, Germany. EIT data were acquired at a scan rate of 50 images/s before and during thoracocentesis. One patient was excluded from the study because of pneumothorax development. Pleural fluid (total volume of 400 to 700 ml) was removed in 100 ml steps. All patients breathed spontaneously, one patient was sitting and the other four were supine during the procedure.

RESULTS. The analysis of EIT data revealed a large almost linear increase in regional electrical impedance at the chest side where the fluid was removed (mean goodness of fit \pm SD: 0.95 \pm 0.07). Only slight increase of impedance was noted at the contralateral chest side. By the end of the fluid removal, regional electrical impedance increased in the average by 373 % at the affected and by 53 % at the unaffected side.

CONCLUSIONS. Our study results imply that EIT findings are impacted by the removal of fluid in patients suffering from pleural effusion. These effects are predominantly located at the affected side of the chest but are also discernible at the contralateral side where they probably reflect the accompanying mediastinum shift with an increase in lung aeration. Our findings confirm observations in patients studied before and after the removal of malignant pleural fluid [1] and show that one-sided pleural pathology must be taken into account during interpretation of EIT examinations as previously found in case of empyema [2].

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0752

ASSESSMENT OF LEFT VENTRICULAR FUNCTION IN CRITICALLY ILL PATIENTS BY MITRAL ANNULAR PLANE SYSTOLIC EXCURSION (MAPSE)

G.J. Himaaldev¹, G. Brar², J. Chacko²

¹29434, Narayana Hrudayalaya, Intensive Care, Bangalore, India, ²Manipal Hospital, Critical Care, Bangalore, India

INTRODUCTION. Left ventricular (LV) dysfunction is common in critically ill patients. Echocardiographic assessment of systolic function by ejection fraction (EF) may be technically difficult due to poor windows and often inaccurate. Mitral annular plane systolic excursion (MAPSE) may be a more precise and easily measured alternative that could reflect both systolic and diastolic dysfunction.

OBJECTIVES. We aimed to study the efficacy of MAPSE as a tool to assess LV function in critically ill patients.

METHODS. We conducted this prospective observational trial on 86 consecutive adult patients admitted to our Multidisciplinary Intensive Care Unit. Echocardiographic assessment was performed on day 1. EF was measured by the Teichholz method. MAPSE was measured from the medial and lateral annulus and averaged. Diastolic function was assessed by E/E' ratios by tissue doppler imaging from the septum and lateral wall and trans-mitral velocities measured by pulse wave doppler.

RESULTS. A complete echocardiographic study was possible in 82 (95.3 %) patients. Systolic dysfunction, defined as EF less than 50 %, was observed in 21 (25.6 %) and severe diastolic dysfunction, defined as E/E' more than 13, was present in 15 (18.3 %) patients. MAPSE correlated positively with EF ($r = 0.7$, $p < 0.0001$) and negatively with E/E' ratio ($r = 0.6$, $p = 0.0013$). MAPSE of less than 10.1 mm has a sensitivity of 82.7 % and specificity of 79.8 % in detecting severe LV dysfunction; a MAPSE of less than 9.7 mm predicted systolic dysfunction with a specificity of 86.8 % and a sensitivity of 81.2 %.

CONCLUSION. MAPSE may be a useful, easy to use tool to measure left ventricular function in critically ill patients. Besides correlating well with systolic function as measured by EF, it detects severe diastolic dysfunction and may be a useful alternative to more complex measures such as tissue doppler imaging.

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0753

ULTRASONOGRAPHIC IDENTIFICATION AND SEMI-QUANTITATIVE ASSESSMENT OF UNOCULATED PLEURAL EFFUSIONS IN CRITICALLY ILL PATIENTS BY RESIDENTS AFTER A FOCUSED TRAINING

E. Bégot^{1,2}, T. Duvoid¹, A. Grümman¹, F. Dalmay³, N. Pichon^{1,2}, B. François^{1,2}, M. Clavel^{1,2}, P. Vignon^{1,2}

¹CHU Limoges, ICU, Limoges, France, ²CIC 1435, Limoges, France, ³CHU Limoges, Biostatistics Department, Limoges, France

INTRODUCTION. Pleural ultrasonography is currently a required element to achieve competence in general critical care ultrasound (GCCUS) which should be part of the training of every intensivists.

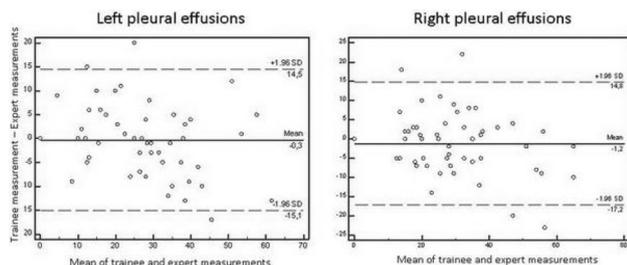
OBJECTIVES. To assess the ability of residents novice in ultrasonography to accurately identify and quantify unoculated pleural effusions in ICU patients after a limited training program.

METHODS. 147 patients (mean age: 62 \pm 17 yrs; simplified acute physiologic score II: 35 \pm 15; 78 % ventilated) with a suspected pleural effusion underwent a thoracic ultrasonography performed successively by a recently trained resident novice in ultrasound and by an experienced intensivist with expertise in GCCUS, considered as reference. Ultrasonographic examinations were performed randomly and independently. In the presence of a pleural effusion, the maximal interpleural distance was measured at the thoracic base.

RESULTS. Residents performed a mean of 38 \pm 18 examinations (range: 10-54). Agreement between residents and experienced intensivists for the diagnosis of left- and right-sided pleural effusions was good-to-excellent (Kappa: 0.74 [95 % CI: 0.63-0.85] and 0.86 [95 % CI: 0.78-0.94], respectively). Similarly, the interobserver agreement for the diagnosis of large left-sided and right-sided pleural effusions with an interpleural distance $>$ 50 mm and $>$ 45 mm respectively (estimated volume \geq 800 mL) was good (Kappa: 0.73 [95 % CI: 0.37-1.0] and 0.77 [95 % CI: 0.51-1.0], respectively). The agreement was significantly

higher when the pleural effusion was significantly relevant, i.e. with an interpleural distance > 20 mm ($p = 0.003$). Concordance for the measurement of left and right maximal interpleural distance was excellent (intraclass concordance coefficient: 0.86 [95% CI: 0.77-0.91] and 0.85 [95% CI: 0.75-0.90], respectively). Mean bias for left and right interpleural distance was -0.3 mm (95% CI: -2.4; 1.8 mm) and -1.2 mm (95% CI: -3.4; 1.1 mm), respectively (figure).

CONCLUSIONS. After a focused training program, residents novice in ultrasound accurately identify and quantify unoculated pleural effusions in ICU patients using chest ultrasonography.



[Figure]

Transfusion & haemostasis: 0754–0767

0754

EPIDEMIOLOGY OF HAEMORRHAGIC COMPLICATIONS IN ADULTS UNDERGOING EXTRACORPOREAL MEMBRANE OXYGENATION IN INTENSIVE CARE

C. Aubron^{1,2}, J. De Puydt^{3,4}, M. Bailey¹, F. Belon⁵, Z. Mcquilten^{1,2}, M. Schmid¹, J. Sheldrake⁴, G. Cappelier⁵, C. Scheinkestel¹, J. Cooper^{1,4}, V. Pellegrino³, D. Pilcher^{1,4}

¹Australian and New Zealand Intensive Care Research Centre, Monash University/ Epidemology and Preventive Medicine, Melbourne, Australia, ²Monash University, Epidemology and Preventive Medicine, Transfusion Research Unit, Melbourne, Australia, ³Antwerp University Hospital, University of Antwerp, Anaesthesiology, Edegem, Belgium, ⁴Alfred Hospital, Intensive Care Unit, Melbourne, Australia, ⁵Jean Minjot Hospital, Intensive Care Unit, Besançon, France

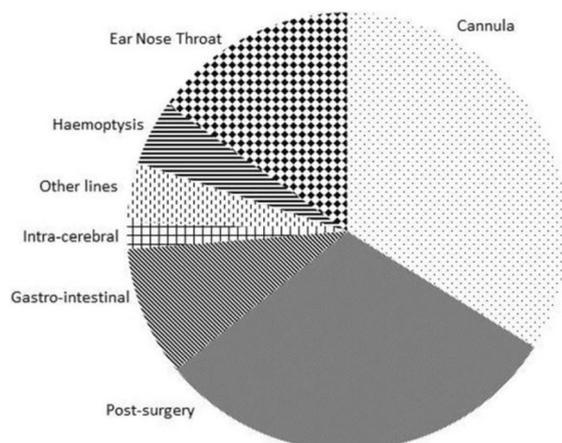
INTRODUCTION. Extra corporeal membrane oxygenation (ECMO) in the intensive care unit (ICU) is a rescue therapy for reversible cardiac and/or respiratory failure. Haemorrhagic events represent the most frequent complication while on ECMO and have been shown to worsen patient prognosis. A better knowledge of their risk factors is crucial to identify and implement strategies to improve management and outcome of patients undergoing ECMO. **OBJECTIVES.** To describe haemorrhagic complications in patients undergoing ECMO in ICU.

To identify risk factors for haemorrhagic complications during ECMO.

METHODS. We retrospectively analysed patients receiving veno-venous (VV) and veno-arterial (VA) ECMO in ICU between 2010 and 2013 at the Alfred Hospital (AU) and the University Hospital of Besançon (FR) in 2013. Demographics, patient severity at ICU admission and ECMO initiation, ECMO characteristics, anticoagulation, transfused blood products, coagulation test results and other factors influencing haemostasis were collected. Bleeding events were defined as bleeding reported in the medical chart associated with any transfusion of 3 or more red blood cell (RBC) units in 24 h, 4 or more RBC units in 48 h or any intracerebral haemorrhage. Characteristics of patients with and without bleeding were compared as well as variables between days with and without bleeding. Logistic regression analysis was conducted to identify variables independently associated with bleeding events and to assess the impact of bleeding on patient outcome.

RESULTS. 149 ECMO episodes were analysed (111 VA and 38 VV) leading to 1347 ECMO days. 87 ECMO episodes (58%) were complicated by at least one bleeding event. Variables associated with bleeding events included patient severity at ICU admission (APACHE III: 84 ± 35 vs 68 ± 30 , $p = 0.005$) and prior to ECMO initiation (SOFA score: 11.5 ± 4 vs 9.5 ± 3.1 , $p = 0.002$), post-surgical status (33% vs 6%, $p < 0.001$) and type of ECMO (71% of VA vs 40% of VV, $p = 0.018$).

205 ECMO days with 271 bleeding events were identified. Sources were mainly ECMO cannula (34%), surgical site (30%) and Ear, Nose and Throat (15%) (Fig 1).



[Fig 1 Sources of bleeding events]

The lowest calcemia, arterial pH, fibrinogen level and platelet count, and highest INR, APTT and bilirubin level were all associated with bleeding.

Bleeding was associated with hospital mortality (OR 2.2, CI 95% 1.05-4.61, $p = 0.002$).

CONCLUSIONS. This bi-centre observational study confirmed that haemorrhagic complications frequently occur in patients undergoing ECMO, with cannula site being the most frequent source of bleeding. Bleeding was independently associated with hospital mortality. Optimisation of coagulation status should be a priority in order to treat and prevent haemorrhagic complications in this population.

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0755

POSTOPERATIVE BLEEDING IN PATIENT AFTER LUNG TRANSPLANTATION, THE ROLE OF EXTRACORPOREAL MEMBRANE OXYGENATION

M. Panigada¹, R. Russo¹, M. Monti², R. Trotti³, G.E. Iapichino², L. Gattinoni^{1,2}

¹Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Dipartimento di Anestesia, Rianimazione ed Emergenza-Urgenza, Milano, Italy, ²Università degli Studi di Milano, Dipartimento di Fisiopatologia Medico-Chirurgica e dei Trapianti, Milano, Italy, ³Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, CED Dipartimento di Medicina Rigenerativa, Milano, Italy

INTRODUCTION. Extracorporeal Membrane Oxygenation (ECMO) is increasingly being used in our institution to facilitate bridging to lung transplantation (LTx) and to lung recovery after surgery. Unfortunately, surgical side bleeding is one of the most common complications associated with the use of ECMO [1].

OBJECTIVES. To investigate the role of ECMO on postoperative bleeding after lung transplantation.

METHODS. We retrospectively analyzed data from 31 consecutive adult patients who underwent lung transplantation in our hospital from January 2013 to February 2014. 9 patients needed veno-venous ECMO for the perioperative management. Major bleeding was defined as the need for surgical revision. Data are presented as mean \pm standard deviation or median and interquartile range, Student's t-test, Mann-Whitney Rank Sum Test, Fisher Exact test and ROC Curve were used for statistical analysis as appropriate. A p value < 0.05 was considered significant.

RESULTS. Patients who required ECMO compared to patients who did not, had a higher incidence of major bleeding events (55 vs. 9%, $p = 0.012$), higher amount of transfused packed red blood cells

(23 [14 - 30] vs. 3 [0 - 9] units, $p < 0.001$), higher amount of transfused fresh frozen plasma (16 [4 - 25] vs. 1 [0 - 5] units, $p < 0.001$), higher amount of transfused platelets (1 [1 - 5] vs. 0 [0 - 0] pools, $p < 0.001$), lower postoperative fibrinogen (220 ± 53 vs. 328 ± 104 mg/dL, $p = 0.007$), lower postoperative platelet count

($75 [54 - 84]$ vs. $161 [113 - 215] \times 10^3$ cells/mm³, $p < 0.001$) and longer Intensive Care Unit (ICU) stay

(13 [8 - 27] vs. 5 [3 - 11] days, $p = 0.019$). Major bleeding occurred 2 \pm 1 days after lung transplantation. Patients who experienced major bleeding in the postoperative period had a lower post-transplant platelet count ($75 [48 - 83]$ vs. $143 [106 - 202] \times 10^3$ cells/mm³, $p = 0.002$) and lower fibrinogen (217 ± 70 vs. 319 ± 101 mg/dL, $p = 0.02$), compared to patients who did not. A cut-off platelet value of 83.5×10^3 cells/mm³ (AUC 0.85) early after surgery identified patients at high risk for major bleeding.

CONCLUSIONS. Perioperative use of ECMO, low postoperative platelet count and fibrinogen are risk factors for major bleeding after lung transplantation. Patients supported with ECMO had a longer ICU stay.

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0756

INFLUENCE OF PHLEBOTOMY PRACTICES ON ANAEMIA DEVELOPMENT IN SPANISH ICUS: THE ANEXUS STUDY

G. Tirado¹, P. Marcos², A. Serrano³, M. Quintana⁴, A. Campos², I. Pozuelo⁴, R. Roig², J.C. Ruiz-Rodríguez⁵, M. Muñoz⁶, Transfusion in critically ill patient SEMICYUC

¹Hospital Royo Vilanova de Zaragoza, Zaragoza, Spain, ²Hospital Germans Trias i Pujol de Badalona, Barcelona, Spain, ³Hospital Clínico Universitario de Valencia, ICU, Valencia, Spain, ⁴Hospital Universitario La Paz de Madrid, Madrid, Spain, ⁵Hospital Vall d'Hebrón, Barcelona, Spain, ⁶GIEMSA, Medicina Transfusional Universidad de Málaga, Málaga, Spain

INTRODUCTION. Blood testing is an essential part of critical ill patients' monitoring, but excessive blood testing is a contributing factor of anaemia development in ICU patients.

OBJECTIVES. In this analysis of the ANEXUS (ANemia and blood EXtraction in intensive care UnitS) study data we determine phlebotomy practices and its relation with patient severity.

METHODS. Multicenter, prospective, 7-day observational study in 7 consecutive weeks at five ICUs of tertiary hospitals. **Exclusion criteria:** Age < 16 years, ICU-LOS > 28 d. **Collected data:** Demographics, pre-existing comorbidities, previous treatments, hospital length of stay (H-LOS), ICU-LOS, admission diagnosis, severity scores (APACHE II, SOFA), ICU outcomes, daily number of requested blood tests, number of blood test tubes and phlebotomy volumes were recorded. **Statistics:** Data are expressed as mean \pm standard deviation or incidence (%). Comparison of variables was performed using Pearson's χ^2 test (categorical), ANOVA or Kruskal-Wallis test (continuous). Correlation for continuous variables was assessed with Spearman's r . A P value < 0.05 was considered significant. Research Ethics Committee approved the protocol.

RESULTS. 562 patients (mean age 58.1 ± 16.08 years; mean admission APACHE II score: 18.3 ± 8.1 ; median ICU LOS 16 (0-112 days) were included. Main admission diagnoses were medical diseases (56.7%), post-surgical (39%) and trauma (3.2%), and mean admission haemoglobin (Hb_a) 11.5 ± 2.4 g/dL (70% anaemic; 25% with $Hb < 10$ g/dL). On the observation day, Hb_o was 9.9 ± 4.9 g/dL ($P < 0.01$ vs. Hb_a), median SOFA score 4 (0-18), mean number of tests ordered 2.18 ± 1.39 , median number of blood test tubes 4.82 ± 2.08 , and phlebotomy volume 31.6 ± 17.9 mL. Number of requested tests and phlebotomy volumes increase with SOFA score ($P < 0.01$) and decreased with ICU-LOS ($p < 0.01$), but were also influenced by week stay (max on Wednesday, median 26.7 mL; min on Sunday, 24.2 mL). At least CBC, biochemistry and coagulation (3 test tubes) was daily requested in 78.8% of patients. Three or more blood

test tubes were daily drawn from 87.6 % of patients with less severe illness (SOFA 0-3). As for ICU outcomes, mean Hb was 9.86 ± 2.7 g/dL ($P < 0.01$, vs. Hb₀) and 92.6 % of patients were anaemic upon discharge (57.6 % with Hb < 10 g/dL), transfusion rate was 40.2 % (median 4 RBC concentrates), and in-ICU mortality rate 11.9 %.

CONCLUSIONS. In our series, the prevalence of anaemia in critically ill patients is high upon ICU admission (62 %) and even higher at discharge (92.6 %). Anaemia in ICU patients may have a multifactor origin, daily number of blood tests ordered and phlebotomy volumes, which are influenced by illness severity, week day and ICU-LOS, seems to play a role in Hb decline during ICU stay. These data strongly support a more rational, restrictive and tailored use diagnostic phlebotomies in critically ill patients.

0757

MAJOR BLEEDING IN SURGICAL ICU PATIENTS: EARLY IDENTIFICATION OF COAGULATION ABNORMALITIES, THEIR PROGNOSTIC VALUE AND IMPACT ON ICU MORTALITY

K. Arvaniti¹, M. Topalidou², A. Kalakonas¹, V. Papadopoulos², A. Pitsoulis¹, A. Karagianni², V. Papageorgiou², C. Pasvanti¹, A. Kioumi², D. Matamis¹

¹Papageorgiou General Hospital, Critical Care Unit, Thessaloniki, Greece, ²Papageorgiou General Hospital, Hematology Department, Thessaloniki, Greece

INTRODUCTION. Bleeding in surgical patients complicates critical illness with serious consequences. Scoring systems have been described to predict bleeding, however, most of them are not easily applicable in all surgical ICU patients.

OBJECTIVES. Our aim was to estimate the prognostic value of early deterioration of coagulation markers for major bleeding and adverse outcome in surgical ICU patients.

METHODS. 12-month, prospective, observational study, including surgical ICU patients with major bleeding, either upon ICU admission or during their ICU hospitalization. Major bleeding was defined as shock requiring volume replacement and vasoactive drugs, bleeding into serious anatomical sites, transfusion of > 2 units of red blood cells (RBC), in exclusion of other causes of shock. Patients were evaluated intraoperatively and during the first 48 h. The following parameters were studied: type of surgical intervention (urgent vs. scheduled), pre-, intra- and post-operative values and their evolution overtime for hemotocrit-Hct, platelets-PLT, INR, aPTT, fibrinogen, D-dimers, creatinine-Cr (all previous with their min and max values), units of RBC, FFP and cryoprecipitate transfusions, ICU outcome, patients' characteristics. Adjusted Cox proportional hazard regression analysis was used to identify risk factors with their predictive value for major bleeding and mortality.

RESULTS. Between December 2011 and November 2012, 33 surgical ICU patients (among 450 ICU admissions, 7.3 %) presented major bleeding. The patients' characteristics were: mean age, 64 years (range 32-83), sex, male 76 %, urgent operation for major bleeding, 16 patients (48 %) with a 63 % mortality, scheduled operation for other than bleeding cause, 17 (52 %), with a 12 % mortality. In univariate analysis, minimumHct ($p = 0.033$), maximumINR ($p = 0.003$), maximum-aPTT ($p = 0.033$), decrease of fibrinogen ($p = 0.043$), maximumCr ($p = 0.047$), intraoperative changes of aPTT (DaPTT, $p = 0.009$) and Cr (DCr, $p = 0.043$) and total units of transfusions [RBC, $p = 0.001$], PLT ($p = 0.001$), cryoprecipitate ($p = 0.022$), were associated with increased mortality. In multivariate analysis, only the type of surgical operation (urgent, OR = 12.5, $p = 0.002$) and intraoperative change of aPTT (DaPTT, OR = 2.7, per 10 s increase, the risk of death was multiplied almost three times). These two parameters predicted appropriately 66 % of deaths (Nagelkerke $R^2 = 0.655$, $p < 0.001$).

CONCLUSIONS. Our preliminary results indicate that a) urgent operations increase the risk for major bleeding and mortality in surgical critically ill patients, b) intraoperative change of aPTT is probably an early predictive marker, alerting physicians for a more targeted therapeutic intervention in the first critical 48 h. A further analysis is actually ongoing while studies for protocolized management of this patients' category is urgently needed.

0758

RED BLOOD CELL TRANSFUSION IN ICU PATIENTS WITH SEPTIC SHOCK - CHARACTERISTICS OF PATIENTS, UNITS GIVEN, TIMING AND ASSOCIATION TO MORTALITY

S.L. Ryggaard¹, L. Grønlykke¹, L.B. Holst¹, H. Ullum², J. Wetterslev³, K. Rostgaard⁴, A. Perner¹

¹Rigshospitalet, University of Copenhagen, Dep. of Intensive Care, Copenhagen Ø, Denmark, ²Rigshospitalet, University of Copenhagen, Dep. of Clinical Immunology, Copenhagen Ø, Denmark, ³Rigshospitalet, University of Copenhagen, Centre for Clinical Intervention Research, Copenhagen Ø, Denmark, ⁴Statens Serums Institut, Epidemiologic Research, Copenhagen S, Denmark

INTRODUCTION. Red blood cell (RBC) transfusion is recommended by the Surviving Sepsis Campaign. Between 45 - 60 % of patients with septic shock receive RBCs in the intensive care unit (ICU) (1-3). However, this practice is debated due to potentially harmful effects of RBC transfusion including infections, acute lung injury and even increased mortality (4).

OBJECTIVES. We described the use of RBCs in ICU patients with septic shock, including patient characteristics, number of units given in ICU and in the 14 days before and after admission, the age of the units given and any association to 90-day mortality.

METHODS. We did a retrospective, multi-center observational cohort study in 8 Danish ICUs and included all patients diagnosed with septic shock in a 3-year period who were registered in the ICU database (CIS by Daintel, Copenhagen). We extracted admission type, haematological cancer, SAPS II, SOFA score, time of ventilation and 90-day mortality. We retrieved data regarding RBC transfusions in the study period from Scandinavian Donations and Transfusions (SCANDAT) database, including date of donation, date of transfusion and number of units transfused to the patients.

RESULTS. 1637 patients were included, and among these 888 (54 %) received RBCs at ICU, median 5 (2 - 10) units with a median unit age of 12 (8 - 18) days. Patients transfused in ICU had higher SAPS II, and SOFA score at admission, and more had haematological cancer and were surgical admissions than those not transfused, but 90-day mortality did not differ between groups (57 vs. 61 %, $p = 0.10$).

Among all the 1637 included patients, 1234 (75 %) received RBCs either before or after ICU admission. Patients transfused in ICU also received more units prior to ICU admission than those not transfused in ICU.

	Overall - n = 1637	Patients transfused in ICU - n = 888 (54 %)	Patients not transfused in ICU - n = 749 (46 %)	P-values
Age (years) - median (IQR)	66 (57 - 75)	66 (56 - 74)	68 (58 - 77)	$p = 0.01$
Sex - male - no. (%)	986 (60)	538 (61)	488 (60)	
Type of admission - surgical - no. (%)	789 (48)	468 (53)	321 (43)	$p < 0.05$
Haematological cancer - no. (%)	157 (10)	110 (12)	47 (6)	$p < 0.0001$
SAPS II - median (IQR)	53 (42 - 67)	55 (44 - 67)	51 (41 - 67)	$p = 0.05$
1st day SOFA score - median (IQR)	10 (8 - 13)	11 (8 - 13)	10 (8 - 13)	$p = 0.01$
Mechanical ventilation (days) - median (IQR)	4 (1 - 11)	9 (4 - 16)	1 (1 - 3)	$p < 0.0001$
ICU length of stay (days) - median (IQR)	6 (3 - 14)	12 (7 - 21)	3 (2 - 5)	$p < 0.0001$
RBC units before ICU admission - median (IQR)	2 (0 - 5)	3 (0 - 6)	1 (0 - 4)	$p < 0.0001$

[Patient characteristics]

CONCLUSIONS. This study is the largest assessing the use of RBC transfusions in ICU patients with septic shock. Transfused patients were more severely ill than non-transfused, but mortality at day 90 did not differ. Most patients also received RBC transfusions before or after their ICU admission.

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0759

THE EFFICACY OF A TEMPORARY INFERIOR VENA CAVA FILTER IN CRITICALLY ILL PATIENTS WITH CONTRAINDICATIONS TO ANTICOAGULANT THERAPY

F.S. Taccone¹, D. De Backer¹, B. Nicholas², C. Waldmann³, C. Cadavid⁴

¹Erasme Hospital, Intensive Care, Bruxelles, Belgium, ²Royal London Hospital, Barts Health, Critical Care, London, United Kingdom, ³Royal Berkshire NHS Foundation Trust, Intensive Care, Reading, United Kingdom, ⁴Hospital Pablo Tabon Uribe, Intensive Care, Medellin, Colombia

INTRODUCTION. The Angel[®] Catheter is a novel device that combines the features of a temporary self-expanding filter placed in the inferior vena cava (IVC), which is attached to a multilumen femoral central venous catheter (CVC). It could be then used in those patients at-risk of thromboembolic events (TEs) and complications related to anticoagulation.

OBJECTIVES. To report the safety and efficacy of the Angel[®] Catheter in patients included in an international Registry.

METHODS. An initial feasibility clinical trial was conducted in two hospitals in Colombia (n = 8 patients), and the remaining patients were included in the European Registry for the Angel[®] Catheter (n = 37). All these patients had clinical contraindications to the administration of either prophylactic or therapeutic doses of anticoagulants. After filter placement, correct positioning (between the lumbar vertebrae L1 and L3) was assessed using x-rays or CT-scan. When the catheter had to be removed, a venogram was performed, whenever possible, to exclude the presence of large clots.

RESULTS. A total of 45 patients were treated with the catheter. The average age of the patients was 42 ± 19 years with a Body Mass Index of 25 ± 6 . The hospital stay was 27 ± 20 days. The most common indication for placement of the catheter was prophylaxis of TEs 32 (71 %), deep venous thrombosis (DVT) in 4 (9 %) and pulmonary embolism (PE) in 9 (20 %). Over 95 % of the devices were inserted in the ICU (41/45); the median time from ICU admission to filter placement was 3 days. The location of the IVC filter was between L1 and L3 in 62 % of the patients, above L1 in 4 %, below L3 in 25 % and unknown in 9 %. The median indwelling period was 5 days (ranges: 1-14 days). In the patients for which full venogram images were available (n = 31), 3 (10 %) had larger than 2-cm clots trapped in the filter and one was treated with the local injection of 5 mg alteplase; the remaining 28 (90 %) patients had smaller or no clots. There were no reports of PEs, Catheter-related bloodstream infections or catheter related thrombosis. There was one report of DVT in the cumulative 235 Catheter days.

CONCLUSIONS. The initial clinical experience with the Angel[®] Catheter in critically ill patients at high risk of TEs and with contraindications to anticoagulation support the safety of this device and the effectiveness with no reported significant complications.

0760

TISSUE ISCHEMIA IN SEVERE TRAUMATIC HEMORRHAGIC SHOCK IN DEPENDENCE OF CARDIAC OUTPUT AND HEMOGLOBIN MONITORED BY MICRODIALYSIS

F. Burša¹, L. Pleva², J. Maca¹, P. Sklienka¹, P. Ševčík¹

¹University Hospital Ostrava, Faculty of Medicine University of Ostrava, Department of Anesthesiology and Intensive Care Medicine, Ostrava, Czech Republic, ²University Hospital Ostrava, Faculty of Medicine University of Ostrava, Trauma Center, Ostrava, Czech Republic

INTRODUCTION. In adult people up to 40 years of age, polytrauma is the most frequent cause of death. The treatment is focused mainly on hemorrhagic shock and trauma-induced coagulopathy. The goal is to ensure adequate tissue oxygen delivery. It is provided by achieving adequate organ perfusion with well oxygenated blood. Tissue metabolism could

be monitored locally by microdialysis. Lactate/pyruvate ratio (LPR) obtained by the microdialysis measurement is useful marker of tissue ischemia.

OBJECTIVES. The aim of this study is to find out influence of cardiac output and hemoglobin level to LPR as surrogate to anaerobic tissue metabolism.

METHODS. Multiple trauma patients between 18 and 60 years were enrolled in this prospective, observational study between 2010 and 2013. Microdialysis monitoring was initiated within 6 h. The observed parameters included blood hemoglobin (Hb, hemoglobin g/l), cardiac index (CI, cardiac index, l/min/m²), central venous saturation (ScvO₂, %), blood arterial lactate (L, mmol/l) and tissue lactate and pyruvate (LPR). The Ethics Committee of the University Hospital Ostrava, Czech Republic approved the study.

RESULTS. 53 patients were enrolled. Average age was 39.8 ± 16.7 and average ISS was 43.4 ± 12.2. We analysed 3252 records of the LPR and appropriate monitored markers. Hb < 70 g/l was related to pathologic arterial lactate over 4.5 mmol/l and borderline value of LPR (24.2) and ScvO₂ (70.8 %). When Hb was ≥ 70 g/l we observed lower lactate and normal LPR and ScvO₂. Normal CI (3.2 - 4.8 l/min/m²) together with Hb < 70 g/l led to ischemic value of LPR (LPR over 25). Moreover, CI ≥ 4.8 l/min/m² was not connected with tissue ischemia even though Hb was < 70 g/l. All data are with statistical significance (p < 0.05).

CONCLUSION. Microdialysis measurement provided information that maintaining CI ≥ 3.2 l/min/m² and Hb level ≥ 70 g/l could be advantageous in avoiding the tissue ischemia. In a clinical condition, when Hb is < 70 g/l, it is appropriate to carefully observe the patients clinical status and others markers (such as ScvO₂), to avoid occult ischemia and, in case the ischemia eventually developed, to consider the RBC transfusion. Achieving the supranormal cardiac output (CI ≥ 4.8 l/min/m²) could be beneficial particularly when Hb < 70 g/l. We suggest that LPR could be useful transfusion trigger because of its ability to assess onset of ischemia due to low local DO₂.

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0761

ARE WE USING FRESH FROZEN PLASMA APPROPRIATELY IN THE ICU?

K. Krishnareddy¹, J. Al Tunajji², B. Mathai², J. Kristensen²

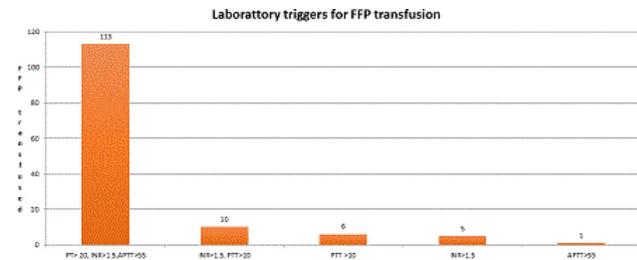
¹Sheikh Khalifa Medical City, Critical Care, Abu Dhabi, United Arab Emirates, ²Sheikh Khalifa Medical City, Abu Dhabi, United Arab Emirates

INTRODUCTION. Fresh Frozen Plasma is widely used in the intensive care setting. Control of bleeding and transfusion prior to an invasive procedure are the common indications for infusion of FFP. Many studies have shown that FFP is transfused at an inappropriate dose as well as without clear indications in the ICU setting (1,2).

OBJECTIVES. Is to analyze the transfusion triggers for FFP in our Institution.

METHODS. A Retrospective review of charts was performed over a 12-month period (August 2012- August 2013) in our mixed medical/surgical adult ICU. Data regarding number of units transfused per patient was obtained from blood bank.

RESULTS. 198 episodes of transfusions occurred in 73 patients (8.5 %) out of 850 admissions. Coagulopathy associated with septic shock and liver cirrhosis were the most common conditions associated with increased need for FFP transfusion. Thirty six percent of FFP transfusions were due to active bleeding and 22.7 % were given prior to an invasive procedure. Median dose of FFP transfused was 7.3 ml/kg (5.4-12.0 ml/kg). Laboratory triggers for FFP transfusion is shown in



[Figure 1]

In patients where FFP was transfused prior to a procedure, 34 % of the patients had a normal coagulation profile. Of the patients with abnormal coagulation (INR > 55, PT > 20secs, APTT > 55secs) who received FFP, 40 % had documented bleeding, 17.9 % were transfused prior to a procedure and 42.1 % of the patients had no documented bleeding or need of an invasive procedure.

CONCLUSION. The common indications for transfusion of FFP were active bleeding, pre-procedural transfusion and abnormal coagulation profile. A significant proportion of patients were transfused with normal coagulation profile or without obvious indications.

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0762

PROGRESSIVE STUDY OF MODIFICATIONS IN TRANSFUSION TRIGGERS AND THE IMPLICATIONS FOR PROGNOSIS IN PATIENTS FOLLOWING EMERGENCY DIGESTIVE SURGERY IN ICU

I. Macias-Guarasa¹, R. Gutierrez-Rodriguez¹, R. Rivera-Fernandez¹

¹Carlos Haya University Hospital, Intensive Care Unit, Malaga, Spain

OBJECTIVE. comparative study of pretransfusional triggers and their implications for the observed mortality rate after emergency digestive surgery.

METHODS AND MATERIALS. retrospective, descriptive, comparative study of patients admitted to ICU following digestive surgery in two periods between 2009-2010 and 2011 and 2012. Variables: demographics, sex, age, hospital and ICU mortality. Associated comorbidity according to Charlton Index, gravity according to APACHEII and SOFA scores.

Pre-surgery hemoglobin, platelets, International normal ratio (INR), prothrombin time, TP %. Mean pretransfusion haemoglobin, platelets or TP % according to blood products received in surgery or during admission. Significance rated at P < 0.05. X2 for qualitative variables and T Student for quantitative variables.

RESULTS. we analyzed 150 patients after emergency digestive surgery, mostly secondary to a sepsis of biliary or urinary origin. 62 were admitted 2009-2010 and the rest, 88, 2011-2012. Analysis showed the following significant differences between groups P < 0.05: Group 1, 2011-2012), age, 59 ± 16, than in group 2, 2009-2010, 64.6 ± 16 years. Equally, gravity according to scores, SOFA 1.4 vs 2.4 ± 3.1, APACHE II 20.4 ± 7.3 vs 24.4 ± 5 and Charlson index 1.2 ± 2.5 vs 2.4 ± 1.4. The mean pre-transfusion haemoglobin (mean of all haemoglobin prior to receiving transfusion throughout admission), in group 1, 2011-2012, was significantly lower P < 0.05, 7.2 ± 0.8, compared with group 2, 2009-2010, 7.6 ± 0.64. The same was true of platelets, (64,000 ± 72000, vs 109,000 ± 89,000) and TP % (41.5 % vs 48.97 ± 13). Need for transfusion was also comparatively lower in group 1, 2011-2012, with a mean of 4.32 ± 1.9 hematite concentrations, and 299 ± 367 cc of plasma, compared with 5.48 ± 6.38 hematite, and 900 ± 111 cc of plasma in group 2, 2009-2010. P < 0.05. Surgery times were much longer in group 2, 2009-2010, 227 ± 136 min vs 189 ± 56 min, in group 1, 2011-2012. P < 0.01.

CONCLUSIONS. lowering the transfusion trigger can lead to restriction of the use of blood products, but our sample was not consistent and could not be corroborated and it is possible that the observed multiple transfusions related more to individual factors related to the surgical techniques employed.

0763

USE OF A MASSIVE HAEMORRHAGE PROTOCOL IN A UK DISTRICT GENERAL HOSPITAL IS ASSOCIATED WITH A REDUCTION IN MORTALITY

L. Lambert¹, B. Taylor², W. Alistair³

¹Royal Shrewsbury Hospital, Shrewsbury, United Kingdom, ²New Cross Hospital, SpR Anaesthetics, Wolverhampton, United Kingdom, ³Royal Shrewsbury Hospital, Consultant Anaesthetist, Shrewsbury, United Kingdom

INTRODUCTION. Massive haemorrhage is associated with significant morbidity and mortality. In the context of major trauma managed in a large centre, the use of a massive haemorrhage protocol emphasizing early haemostatic resuscitation reduces mortality (1). However, it is not clear if these models are effective in non-trauma patients (2). There is some concern that these protocols may increase the wastage of blood products which might be a concern in smaller hospitals. (3)

OBJECTIVES. To audit the activation of and compliance with a massive haemorrhage protocol in a UK district general hospital. To assess if compliance with the protocol resulted in a difference in mortality, morbidity, length of ICU stay, or use of blood products.

METHODS. Retrospective audit over 12 months analyzing the case notes of all patients who had suffered a massive haemorrhage against a massive haemorrhage protocol which emphasizes early haemostatic resuscitation.

RESULTS. The protocol was activated in 9 patients, but unfortunately notes were unavailable for one as he was undergoing outpatient treatment. A further 9 patients were identified as having had a massive transfusion, without activation of the protocol, from blood bank data as having been issued emergency uncrossmatched group O blood, or having had more than 10 units of any blood products in a 24 h period.

Where a massive haemorrhage protocol was used, 1/8 patients (12.5 %) died. Where a major transfusion was conducted without activation of the protocol, 7/9 patients died (77.8 %). This finding was statistically significant (p = 0.0152) using a 2-tailed fishers exact test. Fewer units of red cells (p = 0.0011) and FFP (p = 0.0034) were used in patients managed according to the protocol, but there was no difference in the use of platelets or cryoprecipitate. Two patients in the group where the protocol had not been activated were given cryoprecipitate despite normal fibrinogen levels, and a further two in this group were not given cryoprecipitate despite fibrinogen levels under 1 g/l

CONCLUSIONS. Use of a massive haemorrhage protocol which focuses on rapid haemorrhage control, haemostatic resuscitation and early use of blood is associated with a lower mortality than management of major bleeds without the protocol. This appears to apply in predominantly non-trauma patients in a non-specialist centre.

This was a retrospective audit, and the group in whom the protocol was not activated had a higher expected mortality, therefore the results warrant further research

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0764

CAN THE PLATELET AGGREGATION TEST BE USEFUL FOR THE EMERGENCY CONTROL OF HEMOSTASIS DURING PREGNANCY?

A. Kolesnichenko¹, V. Potylitsina², M. Stolyar³, I. Olkhovskiy³

¹Krasnoyarsk State Medical University, Krasnoyarsk, Russian Federation, ²Krasnoyarsk Regional Center Protection of Maternal and Child, Krasnoyarsk, Russian Federation,

³Krasnoyarsk Branch of Hematology Research Center, Krasnoyarsk, Russian Federation

INTRODUCTION. Platelets play a key role in both hemostasis and thrombosis and their functionality tends to be more crucial than the number of platelets available. Accurate assessment of it function is vital for identifying patients with platelet dysfunction or hyperfunction. Antenatal patients with platelet function disorders should be managed in care centers that are well equipped to tackle any obstetric hemorrhage or thrombosis that can ensue during labor and delivery. However, tests of platelet aggregation is still not standardized and the border of values norms are variable.

OBJECTIVES. Aim of this report is to assess of normal values of optical and impedance aggregometry in pregnant.

METHODS. Platelet aggregation in whole blood and plasma was measured in 24 healthy men, 29 healthy women and also 135 pregnant women, 30 (27-34) age: 10 women was in the first trimester pregnancy, 59 women was in the second trimester pregnancy and 66 women was in the third trimester pregnancy. Aggregation was measured by impedance and optical method on Chronolog-700, was collagen (2 µg/ml) and ADP (5 µM) - inducer.

RESULTS. Healthy women have higher parameters of platelet aggregation (1.2 - 1.5 times; P < 0,05) compared with men. The results of impedance measurements (6.0 - 21.0 ohms) and optical tests (20 -80 % units) varies in a wide range regardless of gestational. But between this two methods is not observed any correlation.

CONCLUSIONS. Use of platelet aggregation test in order to monitor of hemostatic disorders at pathological pregnancy is limited by lack of the required level of standardization and variation of the of normal values.

0765

ANAEMIA IN CRITICAL CARE DUE TO REPEATED BLOOD SAMPLING

F. Arif¹, A. Dean¹, A. Patel¹

¹Royal Surrey County Hospital, Intensive Care Unit, Surrey, United Kingdom
Critical care anaemia is multifactorial. Critical illness is associated with reduced red cell life span, reduced erythropoietin production and response by the bone marrow (1). During inflammation, hepcidin synthesis is upregulated and leads to iron trapping in macrophages and hence reduced plasma iron levels (2). Repeated blood sampling also contributes to anaemia in the intensive care.

It has been shown that 60 % of patients admitted to the critical care unit are anaemic (Hb < 130 g/l males and < 120 g/l in females). Between 20-30 % have a first Hb concentration of < 90 g/l on admission but after 7 days this increases to 80 % (3). Allogeneic red blood cells are transfused in up to 45 % of critical care patients (8 % of the UK blood supply (5)), but this has not been shown to improve survival when the Hb > 7 g/l (3). In the SOAP study, there was a positive association between the number of blood samples taken and the total volume taken with the degree of organ dysfunction (4).

Methods. We retrospectively audited our blood sampling practices and recorded the volume of blood drawn from our patients who had a critical care stay of > 20 days. When blood is drawn from an arterial line, 5 ml of blood is discarded and from a central venous catheter, 10 ml is discarded. We assumed that blood was taken from arterial lines (hence discarded amount = 5 ml) unless stated as a venous sample.

RESULTS. We collected data from 21 patients who had critical care stays between 25-166 days. The volume of blood taken ranged from 1665-9016 ml (average 3533 ml). However, the amount of blood discarded from repeated sampling ranged from 1010-5165 ml (average 2052 ml). The average amount of blood taken per patient/day = 73.4 ml.

CONCLUSIONS. We need to reduce the incidence of iatrogenic anaemia in critical care. Although regular blood sampling is vital to provide the correct treatments, care needs to be taken to avoid unnecessary blood loss.

Improvement suggestions

- Blood conservation devices to reduce discarded blood
- Low volume blood sampling tubes
- Review the need for daily lab glucose
- Reduce volume in blood culture bottles
- Add extra tests onto old samples rather than to re-bleed
- CEVOX monitor for ScvO₂
- Check haematinics when Hb < 10 g/dL
- ?need for VBG from PICC lines
- Daily review of blood gas intervals i.e. is 2 hourly necessary
- Daily review of routine lab bloods.

0766

ANTICOAGULATION MONITORING DURING EXTRACORPOREAL MEMBRANE OXYGENATION IN ADULT PATIENTS

G.E. Iapichino¹, M. Panigada², C. L'Acqua¹, M. Cressoni¹, N. Bottino², L. Gattinoni^{1,2}

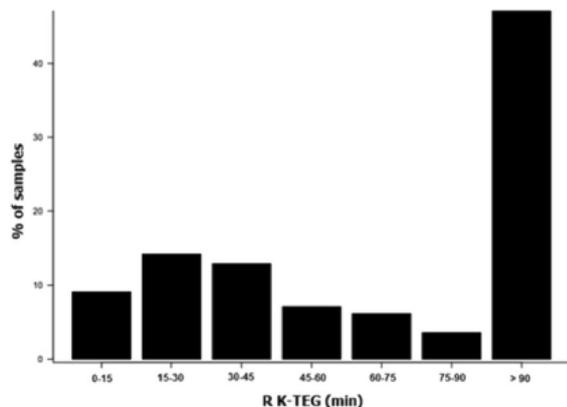
¹Università degli Studi di Milano, Dipartimento di Fisiopatologia Medico-Chirurgica e dei Trapianti, Milano, Italy, ²Fondazione IRCCS Ca' Granda - Ospedale Maggiore Policlinico, Dipartimento di Anestesia, Rianimazione ed Emergenza-Urgenza, Milano, Italy

INTRODUCTION. Veno-venous extracorporeal membrane oxygenation (ECMO) requires blood anticoagulation to prevent activation of the coagulation cascade led by the presence of indwelling catheters and the extracorporeal circuit. Anticoagulation is usually achieved with Unfractionated Heparin (UH) infusion; however, variability of the anticoagulation degree and monitoring methods exists among centers [1]. Activated Partial Thromboplastin Time (aPTT) is one of the most frequently used monitoring methods. Thromboelastography (TEG) may be an alternative, point-of-care tool to monitor anticoagulation during extracorporeal membrane oxygenation, but it has been used only anecdotally.

OBJECTIVES. To compare anticoagulation monitoring using a PTT, i.e. current clinical practice at our institution, with the reaction time (R) parameter at TEG.

METHODS. Thirty-two consecutive patients undergoing femoro-femoral veno-venous ECMO for acute respiratory failure from December 2011 to August 2013 admitted at our intensive care unit, were included in the study. UH was titrated to achieve an aPTT ratio of 1.5-2.0. Kaolin-activated TEG assay (K-TEG) was simultaneously performed. R (minutes) parameter of 310 K-TEG samples was compared to the corresponding aPTT value.

RESULTS. Median ECMO duration was 8 [6-9] days. During ECMO, median heparin infusion rate was 17 [12-21] units/Kg/hour and median aPTT was 1.67 [1.48-1.96]. R K-TEG was significantly correlated with aPTT (Spearman's rho = 0.35, p = 0.001). Figure 1 shows the frequency distribution of R parameter (K-TEG).



[Figure 1]

R parameter was arbitrarily cut off at 90 min if longer and defined as "incoagulable". Seven patients (21.9 %) experienced major bleeding while on ECMO (fatal or requiring surgery for bleeding site control) and two patients (6.3 %) developed thrombosis (one popliteal, and one intracardiac).

CONCLUSIONS. R parameter of K-TEG was significantly but weakly correlated with aPTT. Moreover, nearly half of the K-TEG samples was "incoagulable", despite median aPTT was in the target range. K-TEG-driven anticoagulation management could reduce the rate of heparin administration during ECMO.

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0767

AUTOLOGOUS TRANSFUSION TECHNIQUE IN MASSIVE OBSTETRIC HEMORRHAGE

Y. Raspopin¹, A. Kolesnichenko², V. Kolegov², A. Miller², D. Turin²

¹Krasnoyarsk Regional Children Hospital Perinatal Center, Department of Anesthesiology and Intensive Care, Krasnoyarsk, Russian Federation, ²Krasnoyarsk State Medical University, Krasnoyarsk, Russian Federation

INTRODUCTION. Massive obstetric hemorrhage remains major cause of maternal mortality. According to CEMACH 2007 data, 14 cases of maternal death in UK were caused by hemorrhage (1). The safety of cell salvage in obstetrics has been questioned because of risk of the amniotic embolism, infection complications, maternal alloimmunization (2). Otherwise, we shouldn't neglect allogeneic transfusion-related risks (3). The "Cell Saver" technique allows to perform autologous red cell re-transfusion during caesarean section and gives a chance to avoid allogeneic blood transfusion (4). Complete loss of plasma coagulation factors which may increase risk of the coagulopathy is main disadvantage of this technique.

METHODS. We observed 28 cases of the massive obstetric hemorrhage (blood loss 1500-3500 ml) at the time of caesarean section. Patients were divided into two homogeneous groups: 1) allogeneic blood transfusion only, 2) "Cell Saver" technique re-transfusion (Haemonetics Cell Saver 5+) and allogeneic blood transfusion, if needed. All patients were 23-38 years old and healthy, cases of CS were elective and emergency both. We evaluated blood count, coagulation tests, central and peripheral hemodynamics, oxygen-transport blood function during all stages of the blood loss and re-transfusion.

RESULTS. We noted, that in cases of the blood loss less than 1500 ml we didn't transfuse fresh frozen plasma in both groups, circulation volume was replenished by colloids and crystalloids only. Patients from group 1 needed allogeneic blood transfusion in cases of blood loss 1500-3500 ml (30-70 % of the circulating blood volume). Group 2 patients received red cell re-transfusion in cases of the blood loss up to 2500 ml (50 % of the circulating blood volume), also they received prothrombin complex concentrate (Prothromplex) and recombinant activated factor VII (NovoSeven). Group 2 patients needed allogeneic blood transfusion in cases of blood loss 2500-3500 ml (50-70 % of the circulating blood volume). We observed no any adverse reactions following the re-transfusion of processed blood.

CONCLUSIONS. Autotransfusion by cell salvage (Cell Saver technique) is useful method in cases of the massive obstetric hemorrhage, which reduces exposure to allogeneic blood products in cases of blood loss up to 50 % of the circulating blood volume.

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Sepsis clinical management II: 0768–0781

0768

AGREEMENT OF THERAPEUTIC PROPOSALS DERIVED FROM EARLY HEMODYNAMIC ASSESSMENT USING TRANSPULMONARY THERMODILUTION AND TRANSESOPHAGEAL ECHOCARDIOGRAPHY IN SEPTIC SHOCK PATIENTS

B. Riu-Poulenc¹, E. Bégot^{2,3}, A. Mari¹, M. Clavel^{2,3}, L. Chimo⁴, P. Delour⁴, F. Vargas⁵, B. Filloux⁶, D'Vandroux⁷, J. Jabot¹, S. Silva¹, M. Genestal¹, B. François^{2,3,8}, N. Pichon^{2,3}, P. Vignon^{2,3,8}

¹CHU Toulouse, ICU, Toulouse, France, ²CHU Limoges, ICU, Limoges, France, ³CIC 1435, Limoges, France, ⁴CH Périgueux, ICU, Périgueux, France, ⁵CHU Bordeaux, ICU, Bordeaux, France, ⁶CHU Bordeaux, Bordeaux, France, ⁷CHU La Réunion, Saint-Denis, France, ⁸UMR 1092, Limoges, France

INTRODUCTION. Hemodynamic assessment during the initial management of patients with septic shock may rely on various monitoring modalities. Although transpulmonary thermodilution (TD) and transesophageal echocardiography (TEE) are currently widely used, the agreement of derived therapeutic impact has not yet been assessed.

OBJECTIVES. To assess the agreement between therapeutic proposals following hemodynamic assessment using TD and TEE during the initial management of septic shock patients.

METHODS. This prospective descriptive pragmatic study was conducted over 3 years in 5 French ICUs. Eligible patients were sedated and ventilated, in sinus rhythm, and required early hemodynamic assessment for septic shock defined as:

(i) a sustained hypotension despite adequate fluid loading requiring vasopressor support and/or

(ii) clinical signs of hypoperfusion confirmed biologically (lactate > 2 mmol/L, ScvO₂ < 70 %), and

(iii) a systemic inflammatory response syndrome secondary to documented or suspected infection. Patients were treated according to international guidelines and standards of care of participating centers. Hemodynamic assessment was performed independently using TD and TEE by two intensivists who interpreted hemodynamic profiles on-line and proposed a therapy to the attending physician at bedside. The order of hemodynamic assessments (TD vs TEE) was randomized with center stratification and the two investigators had no access to the results and proposals of their counterpart. An algorithm was proposed based on TD and TEE results to standardize therapeutic proposals between centers. Five hemodynamic profiles were distinguished: preload-dependence, cardiac dysfunction, vasoplegia, right heart failure, no therapeutic change or taper dose of vasopressor/inotropes. All cases were adjudicated off-line by two experts. Agreement of therapeutic proposals was assessed with the Cohen's Kappa coefficient and its 95 % confidence intervals (CI).

RESULTS. Out of 141 patients, 137 (4 exclusions for unclear sepsis) were studied (71 males; mean age: 61 ± 15 yrs; SAPSII: 58 ± 18). Therapeutic proposals derived from TD and TEE when independently interpreted at bedside were concordant in 56 % of patients, and agreement was only moderate

(Kappa: 0.46; 95 % CI: 0.35-0.57). Agreement was good (Kappa: 0.60; 95 % CI: 0.49-0.71) and concordance between therapeutic proposals higher after independent adjudication (73 %

of patients). Severe valvulopathy (n = 5), obstructive hypertrophy (n = 2), cardiac output < 1.5 l/min (n = 2) and acute cor pulmonale (n = 7) were found as potential sources of discrepancy in 16 patients (43 %).

CONCLUSIONS. Agreement between therapeutic proposals derived from TD and TEE at bedside was moderate in this population of septic shock patients. Increased agreement after adjudication by experts raises the question of training of intensivists. A substantial proportion of discrepancies may be related to limitations of TD.

GRANT ACKNOWLEDGMENT. French PHRC interregional 2010.

0769

ACCURACY PROGNOSTIC USING PRESEPSIN AND PROADRENOMEDULLIN IN CRITICALLY SEPTIC PATIENTS

M.-V. de la Torre-Prados¹, A. García-de la Torre², R. Escobar-Conesa³, C. Trujillano-Fernández², A. Enguix-Armeda³, J. Perez-Vacas¹, A. Puerto-Morlán¹, E. Camara-Sola¹, A. García-Alcántara¹

¹Hospital Universitario Virgen de la Victoria/IBIMA Institute, Intensive Care Medicine, Málaga, Spain, ²Hospital Universitario Puerto Real, Clinical Chemistry Department, Cádiz, Spain, ³Hospital Universitario Virgen de la Victoria/IBIMA Institute, Clinical Chemistry Department, Málaga, Spain

INTRODUCTION. Measurement of biomarkers is a potential approach to early prediction of mortality in septic patients.

OBJECTIVES. The purpose of this study was to assess the prognostic value of proadrenomedullin (pADM) and presepsin with others routine biomarkers and severity scores in adult patients with severe sepsis or septic shock.

METHODS. A single-centre prospective observational study was conducted in an adult intensive care unit from January 2012 to June 2013. APACHE II and SOFA scores, C-reactive protein (CRP), procalcitonin (PCT), lactate, presepsin and pADM levels, after the onset of severe sepsis or septic shock, were collected. Descriptive and comparative statistical analysis was performed using statistical software packages SPSS v.15

RESULTS. We analyzed 188 consecutive episodes of severe sepsis (28.3 %) or septic shock (71.7 %). The median age of the patients was 65 (inter-quartile range, 53-74) years old; 58.4 % were men. The main sources of infection were: respiratory tract (38.2 %) and intra-abdomen (32 %). The 28-day mortality was 26.6 %. The profile of death patients had a significantly higher average age (68.5 vs. 64 years; p = 0.01), as well as clinical severity scores, APACHE II (27 vs. 23; p < 0.001) and SOFA (11 vs 9; p < 0.001); areas under the curve (AUCs) were 0.7 and 0.71 for APACHEII and SOFA. Biomarkers were increased in PCT (11.41 vs. 5.13 ng/ml; p = 0.09), CPR (217.8 vs. 162.3 mg/dl; p = ns) and presepsin (3195 vs. 2045 pg/ml; p = 0.188); however pADM (2.84 vs. 1.59 nmol/L; p < 0.001) and lactate (2.91 vs. 1.73 mmol/L; p = 0.001) showed significantly higher values, AUCs were 0.7 and 0.68 respectively.

CONCLUSIONS. The protein pADM is an important prognostic biomarker of survival when measured on admission of septic patients to the ICU, however presepsin as new biomarkers has not been demonstrated to be useful in this study. Lactate and pADM prognostic accuracy were as good as severity scores, APACHE II and SOFA

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0770

PROGNOSTIC EVALUATION OF SEVERE SEPSIS AND SEPTIC SHOCK. PROCALCITONIN CLEARANCE VERSUS DELTA SOFA

J.R. Azevedo¹, O. Malafaia², O.J. Torres³

¹Hospital Sao Domingos, Intensive Care Unit, Sao Luis, Brazil, ²Evangelic Faculty of Parana, Curitiba, Brazil, ³Hospital Sao Domingos, Sao Luis, Brazil

INTRODUCTION. In patients with severe sepsis and septic shock, besides the early institution of therapeutic interventions, it is important that after 24 to 48 h of the treatment, one can assess the possible outcome. Studies that evaluated sequential measurements of SOFA correlated these measures with outcome.

Recently, procalcitonin (PCT) has been used as a biological marker of prognosis in severe sepsis and septic shock. Most studies indicate that the predictive value of individual determinations of PCT on mortality is poor. Some studies have shown that serial determinations of PCT correlates with outcome

OBJECTIVES. To compare the clearance of procalcitonin (PCT-c) in the first 24 and 48 h of treatment of severe sepsis and septic shock with another early prognostic marker represented by the Δ SOFA 48 h.

METHODS. Prospective, observational cohort study conducted in a general intensive care unit including patients with severe sepsis and septic shock. Serum procalcitonin was determined on arrival and after 24 and 48 h. SOFA score was determined on arrival and after 48 h. PCT-c was calculated using the following formula: initial PCT minus PCT at 24 or 48 h, divided by the initial PCT and then multiplied by 100. The Δ SOFA 48 h was represented by the difference between the initial and 48 h SOFA score.

RESULTS. One hundred and thirty adult patients with severe sepsis and septic shock were studied in an 18 months period. The initial PCT concentration was not significantly different between survivors and non-survivors groups, but the PCT-c 24 h and 48 h were significantly higher in survivors (p < 0.0001). The initial SOFA was significantly higher and the Δ SOFA 48 h significantly smaller in non-survivors (p = 0.01). The AUROC was 0.68 (95 % CI, 0.56 - 0.79, p = 0.004) for Δ SOFA; 0.76 (95 % CI, 0.66 - 0.86, p < 0.0001) for PCT-c 24 h and 0.76 (95 % CI, 0.66-0.86, p < 0.0001) for PCT-c 48 h.

CONCLUSIONS. This study showed that both the Δ SOFA score 48 h and the clearance of PCT 24 and 48 h are useful markers of prognosis in patients with severe sepsis and septic shock. A decrease in PCT-c in the first 24 h of treatment should alert to reassessment of the appropriateness and adequacy of treatment.

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0771

PROGNOSTIC VALUE OF ENDOCAN IN SEPTIC SHOCK

A. Bouglé^{1,2}, L. Kerdjane³, N. Belaidou³, C. Rousseau³, G. Geri^{1,2}, A. Cariou^{1,2}, J. Charpentier¹, R. Porcher¹, J.-P. Mira^{1,2,3}

¹Medical Intensive Care Unit, Cochin - Broca - Hôtel-Dieu University Hospital, Assistance Publique - Hôpitaux de Paris, Paris, France, ²Paris Descartes University, Paris, France, ³Cochin Institute, INSERM U1016/CNRS UMR8104, Paris, France, ⁴Centre d'Epidémiologie Clinique, INSERM U738, Centre Cochrane Français, Cochin - Broca - Hôtel-Dieu University Hospital, Assistance Publique - Hôpitaux de Paris, Paris, France

INTRODUCTION. Endocan (ESM-1, endothelial cell specific molecule -1) is a protein preferentially expressed by the endothelium. The expression of ESM-1 is modulated by inflammatory cytokines. In studies with small numbers of patients, plasma endocan measured at admission seems to be associated with prognosis of sepsis patients, and with respiratory failure.

OBJECTIVES. To determine whether serum levels of endocan at admission were associated with hospital mortality in a large cohort of well-defined patients with septic shock, to analyze whether serum levels of endocan were associated with specific organ failures, including respiratory or renal failure and to test the influence of albumin on endocan levels.

METHODS. Patients included in the study are those who participated at the multicenter randomized EARSS study (Early Albumin Resuscitation during Septic Shock), evaluating the effects of albumin perfusion in the management of septic shock between July 2006 and April 2010. Serum endocan levels were measured at the admission of the patient and at Day 2.

RESULTS. Between July 2006 and March 2010, 777 patients were included. The Day 28 - mortality was 25.1 %. Origin of sepsis was lung in 47.0 % of cases, abdominal in 20.4 % of cases, urinary in 10.8 % and 21.8 % in other cases. At the admission, the serum level of endocan was significantly different between non-survivors (7.8 ng/ml (3.0;13.7)) and survivors (4.3 ng/ml (2.1;9.6)), P < 0.0001. This difference between patients who died or survive was also found 48 h after ICU admission, respectively 4.5 ng/ml (1.6;13.7) vs. 1.9 ng/ml (1.2;4.3), P < 0.0001. Endocan level at baseline was correlated with baseline lactate level (r = 0.36 [95 %CI 0.29;0.42], with SAPSII (r = 0.16 [0.09;0.22]) and SOFA (r = 0.20 [0.13;0.27]). However, baseline endocan was not different according to the severity of respiratory failure. Finally, endocan levels were significantly lower at Day 2 in the albumin group, P = 0.019.

CONCLUSIONS. In a large population of well-characterized patients with septic shock, admission level of endocan predicts survival at Day 28 and sepsis-induced acute kidney injury. Albumin is associated with a significant decrease of this potential marker of endothelial dysfunction. The usefulness of this marker as a therapeutic target remains to be studied.

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0772

RESULTS OF IMPLEMENTATION OF AUTOMATIC ELECTRONIC ALERT PROGRAM FOR EARLY DETECTION OF SEVERE SEPSIS PATIENTS IN AN HOSPITAL WITH SEPSIS UNIT

R. Zaragoza¹, C. Hurtado¹, D. Estellés², S. Sancho¹, S. Pastor², A. Dominguez², B. Bonet³, V. Céspedes³, S. Borrás¹, R. González³, J.J. Camarena³

¹Hospital Universitario Dr. Peset, Sepsis Unit/Intensive Care Unit, Valencia, Spain,

²Hospital Universitario Dr. Peset, Sepsis Unit/Informatic Department, Valencia, Spain,

³Hospital Universitario Dr. Peset, Sepsis Unit/Microbiology Department, Valencia, Spain

INTRODUCTION. Sepsis is a time-dependent process that must be early detected and treated. Automatic alerts may play an important role in prompt detection.

OBJECTIVES. To describe the clinical and epidemiological characteristics of patients with severe sepsis and septic shock detected by a sepsis unit in ED of a tertiary hospital and to analyse the influence of the IMPLEMENTATION OF AUTOMATIC ELECTRONIC ALERT PROGRAM (AEAP) on process indicators, length of stay and outcome of these patients

METHODS. During an eighteen months period, severe sepsis and septic shock patients detected at ED in a teaching hospital were prospectively evaluated. Clinical and microbiological variables and process indicators such as delay of lactate extraction and antibiotic administration were recorded. Two different periods were analysed in order to analyse the possible differences in process indicators, mortality rates and length of stay. Period A: From 1-October-2012 to 15-June-2013 when a manual electronic check list to guide the detection of these patients was applied and Period B: From 16-June-2013 to 31-March 2014 when AEAP was implemented. A univariate analysis was performed to define the possible differences between to periods using SPSS package (15.0). Statistical significance was considered when p value < 0.05.

RESULTS. 606 cases of severe sepsis and septic shock were detected (30.9 % septic shock). Mean age was 73.25 ± 14.51 years, APACHE II and SOFA score were 17.63 ± 6.48 and 4.67 ± 2.93 respectively. The primary focus of infection was the respiratory (49.2 %), followed by urinary (24.3 %) and abdominal (16.2 %). The global mortality was 19.3 %. The distribution of APACHE II and SOFA was the same in the two periods. Antibiotic administration was performed at 160.47 ± 179.2 min. in period A and 157.61 ± 159.6 min. at period B (p = 0.25). No differences in delay of lactate extraction were found (95.3 ± 163.1 min vs 80.3 ± 127.1 min, p = 0.82). The number of activations was higher in period B (171 vs. 435 episodes). The global mortality rate was lower in period B without statistical significance (20.4 % vs. 18.8 %; p = 0.24) whereas the length of stay dramatically diminished in a significant way (11.1 ± 13 vs 6.79 ± 7 days, p = 0.03). Statistically significant differences were also observed for the rate of appropriate empirical antibiotic therapy between two periods (87.1 % vs. 92.1 %, p = 0.01).

CONCLUSIONS. These preliminary results showed an clearly benefit of AEAP in terms of detection, and length of stay showing a non significant decrease of mortality without any changes in process indicators. A significant reduction of inappropriate empirical antibiotic therapy may be the cause of these improved results.

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0773

ADEQUATE ANTIBIOTIC THERAPY PRIOR TO ICU ADMISSION IN PATIENTS WITH SEVERE SEPSIS AND SEPTIC SHOCK REDUCES HOSPITAL MORTALITY

E. Fernández-Delgado¹, A.M. Escobresca-Ortega¹, A. Gutiérrez-Pizarra², Y. Corcia-Palomo¹, J. Garnacho-Montero¹

¹Virgen del Rocío University Hospital, Intensive Care Unit, Critical Care and Emergency Department, Seville, Spain, ²Virgen del Rocío University Hospital, Spanish Network for Research in Infectious Diseases, Seville, Spain

The international guidelines for management of severe sepsis and septic shock recommend the early administration of effective initial anti-infective therapy within the first hours from recognition of severe sepsis or septic shock. In the present study we analyze the impact on mortality of adequate antimicrobial therapy initiated before ICU admission compared to patients treated correctly after ICU admission.

METHODS. This prospective cohort study analyzed all patients with severe sepsis or septic shock admitted to ICU at Hospital Universitario Virgen del Rocío from January 2008 to July 2013. Adequate empirical antibiotic was defined as empiric treatment with at least one effective drug according to penetrability, dose and the sensitivity of the microbiological isolation. The primary end-point was the in-hospital mortality. We also analyzed clinical characteristics, sepsis source, severity of the illness at admission (APACHE II) failure of organs (SOFA score), presence of bacteremia and type of pathogen. We considered two groups for comparisons: patients who received adequate antibiotic treatment before or after the admission to the ICU. We used Student's T test, Mann-Whitney U test or Chi square (as appropriate) to compare the variables. A multivariate analysis was also performed to control for confounding variables.

RESULTS. A total of 913 septic patients were admitted to ICU. Of these, only 568 (69.54 %) had available microbiological isolation: 395 (69.54 %) received adequate empirical antimicrobial treatment prior to ICU admission and 173 (30.45 %) after admission to the Unit. No statistically significant differences were found between the groups in clinic characteristics, sepsis source, positive blood cultures or the severity illness (SOFA an APACHE). Global hospital mortality in patients that received treatment before ICU admission, during the first 24 h and after 24 h since ICU admission was 32.1, 48.6 and 48.4 % respectively ($p < 0.001$). The multivariate analysis showed that female sex (OR 0.64; 0.43-0.95) and adequate treatment prior to ICU admission (OR 0.51; 0.34-0.77) were protective factors whereas APACHE II score (OR 1.09; 1.6-1.12), presence of septic shock (OR 2.23; 1.40-3.55) and respiratory source (OR 1.79; 1.09-2.96) were predictors of hospital mortality ($p < 0.001$ for all factors).

CONCLUSIONS. The administration of adequate antimicrobial therapy before ICU admission is decisive for the survival of patients with severe sepsis and septic shock. Our findings should endorse organizational changes to assure a correct management of septic patients before ICU admission.

0774

THE MORTALITY IN SEPSIS IS NOT DECREASING OVER YEARS IN SWEDEN

C. Agvald-Öhman¹, S. Walther², P. Hederström³

¹Karolinska University Hospital Huddinge, Anaesthesiology and Intensive Care, Stockholm, Sweden, ²Swedish Intensive Care Registry, Linköping, Sweden, ³Swedish Intensive Care Registry, Uddevalla, Sweden

INTRODUCTION. During ISECCEM in Brussels 2014, a study from New Zealand and Australia (JAMA 14 th March 2014) was presented where the authors could show an decreasing mortality rate in sepsis (severe sepsis and septic shock) during 2000-2012 when analyzing the data from their national quality registry.

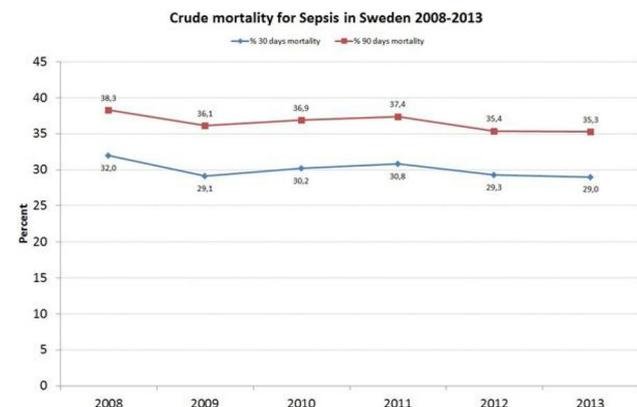
OBJECTIVE. To analyze the data from our national quality registry, The Swedish Intensive Care Registry (SIR) and compare our results with the JAMA study.

METHODS. SIR has data from 2005-2013. However, the quality of data in our database is not so solid between 2005-2007 so we only included data between 2008-2013. The coverage of the registry is 92 % since several years. Severe sepsis and septic shock are two out of four ("key diagnoses) in the registry, which means that they are especially interesting from a National perspective and therefore underlined as extra important to register in SIR in the instructions to the ICUs. We analyzed all ICU admissions between 2008-2013 with the diagnose severe sepsis or septic shock. (n = 20 517). The patients are risk adjusted according either to APACHE II or SAPS3. From 2012 SAPS3 is only monitored in Sweden and reported to the registry.

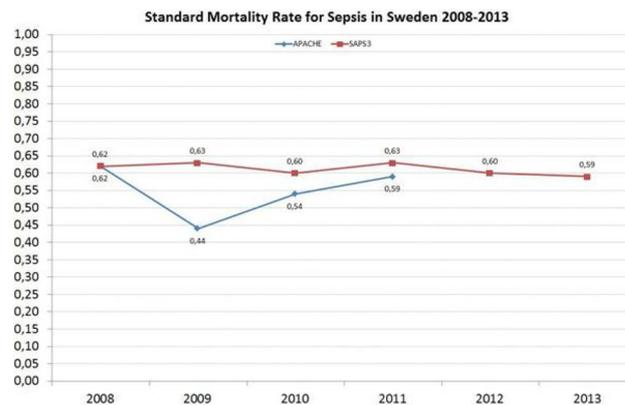
RESULTS. Altogether there were 20 517 ICU admissions that are risk adjusted to either SAPS3 (n = 17087) or APACHE II (n = 3209). Since SIR follows mortality for all patients on a weekly basis up to 180 days, we could see that crude mortality in 30- and 90-days mortality respectively has not changed in significant way during 2008-2013.(See Fig 1). We have also analyzed the 30 days risk adjusted mortality with no significant changes. (See Fig 2).We could also see that LOS (length of stay) in days varied a little over these years. Median range LOS during 2008 - 2013 was 2,04-3,4 and average range LOS 5,93-8,07 days.

DISCUSSION. The results from SIR differ from the JAMA study. The coverage of the two registries is similar > 90 %. It is unclear for the authors how the national registries in Australia and NZ validate their data before they are included in the database. In SIR there is a three-level data validation program that all admissions must pass before they are included in the database. The validation of the data is evidently very important to the solidity of the data analyzed. Furthermore, one explanation could be that in the JAMA study only hospital mortality was followed while SIR are able to follow both risk adjusted mortality, 30 and 90 days mortality. Another factor could be that we have different risk adjusted models (SAPS3 compared to adjustment for co-morbidity or not, plus APACHE score).

CONCLUSION. The decrease in mortality that the JAMA study showed in Australia and NZ is not reflecting the situation in Sweden when it comes to mortality in severe sepsis and septic shock. In contrast, the mortality is stable at the same levels during the period studied. Further evaluations of the data are needed to explore the differences between our countries in this matter.



[Fig 1. Crude mortality in sepsis]



[Fig 2. Standard mortality rate in sepsis]

0775

ADHERENCE TO SURVIVING SEPSIS CAMPAIGN RECOMMENDATIONS IN PATIENTS ADMITTED TO ICU. 2013 ENVIN-HELICS REGISTRY DATA

X. Nuvials¹, M. Palomar¹, F. Alvarez-Lerma², P. Olaechea³, M. Catalán⁴, R. Gimeno⁵, M. Martínez⁶, C. Aragón⁷, E. Andreu⁸, R. Alcaraz⁹, ENVIN-HELICS

¹Hospital Arnau de Vilanova, Intensive Care Medicine, Lleida, Spain, ²Hospital del Mar, Intensive Care Medicine, Barcelona, Spain, ³Hospital de Galdakao, Galdakao, Spain, ⁴Hospital 12 de Octubre, Madrid, Spain, ⁵Hospital La Fe, Valencia, Spain, ⁶IRB Lleida, Lleida, Spain, ⁷Hospital Carlos Haya, Malaga, Spain, ⁸Hospital Arrixaca, Murcia, Spain, ⁹Hospital Vall d'Hebron, Barcelona, Spain

INTRODUCTION. The Surviving Sepsis Campaign (SSC) recommends the implementation of bundles of measures in order to improve the outcome of patients with severe sepsis (SS) and septic shock (SX).

OBJECTIVES. To study the compliance of SSC bundles measures in the management of patients with SS and SX admitted to ICU.

METHODS. Prospective, observational, multicenter and voluntary enrollment study (Spanish registry ENVIN-HELICS)*. All patients admitted in ICU for a period > 24 h from April 1st to June 30th 2013 were included. All episodes of infection were recorded during the follow-up. Systemic inflammatory response (SIR) to infection was defined according to consensus criteria **. Compliance to the 3 and 6 h measures recommended on the SSC bundles*** were recorded. The site of infection acquisition was categorized as either: community, ICU or hospital acquired. An univariate analysis (Chi square test) was done in order to compare bundles compliance according to the site of infection acquisition. A p value < 0.05 was considered statistical significant.

RESULTS. During the study period 8,789 infections were recorded. 2,075 (23 %) developed SX, 1,136 (13 %) SS, 4,099 (47 %) sepsis and 1,479 (17 %) had not inflammatory response. 30 % of infections were acquired in the community, 49 % in ICU and 21 % in hospital. The risk to develop SS or SX was higher in community 48.5 % IC95 % [46.8 %-50.3 %], and hospital 45.9 % IC95 % [43.7 %-48.0 %] acquired infections than on the ICU acquired, 19.3 % IC95 % [18.0 %-20.6 %]. Table 1. shows the compliance of measures according to the site of infection acquisition.

	Community (n = 1573)	ICU (n = 652)	Hospital (n = 934)	Global (n = 3211)	p value
Crystalloids	71.6 %	64.9 %	73.8 %	70.7 %	<0.05
Antibiotics	81.2 %	79.6 %	83.2 %	81.5 %	0.18
Blood cultures	74.7 %	73.0 %	70.4 %	72.9 %	0.06
Lactate	59.4 %	62.9 %	62.7 %	60.9 %	0.16
CVP	59.4 %	68.1 %	68.1 %	36.5 %	<0.05
SvcO2	32.1 %	37.0 %	35.9 %	34.3 %	<0.05
Vasopressors	67.1 %	73.9 %	71.3 %	69.8 %	<0.05

[Compliance of measures]

CONCLUSIONS. SS and SX were present in 36 % of infections in patients admitted to ICU. Patients with ICU-acquired infections were less likely to develop SS or SX. The best implemented measure was the early administration of antibiotic treatment. The use of vasopressors and CPV measurement was significantly higher in hospital acquired infections. **REFERENCE(S).** *<http://hws.vhebron.net/envin-helics/> ** Levy MM, et al. SCCM/ESICM/ACCP/ATS/SIS international sepsis definitions conference. *Intensive Care Med.* 2003;29:530-538. ***Dellinger RP, Levy MM, Rhodes A, et al.: Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012. *Crit Care Med* 2013; 41:580-637.

0776

PERIPHERAL NIRS VARIABLES ARE ALTERED EARLIER THAN OTHER PERFUSION VARIABLES AT THE ONSET OF SEPTIC SHOCK

D. Orbeago Cortes¹, S. Fuhong¹, X. Keljiang¹, L. Rahmania¹, F.S. Taccone¹, D. De Backer¹, J.-L. Vincent¹, J. Creteur¹

¹Erasme Hospital, Dept of Intensive Care, Brussels, Belgium

INTRODUCTION. Peripheral perfusion is altered early during shock states in order to preserve flow to vital organs like the brain and heart. Non-invasive evaluation of muscle perfusion using near infrared spectroscopy (NIRS) coupled with a vascular occlusion test (VOT) may provide an early marker of this phenomenon.

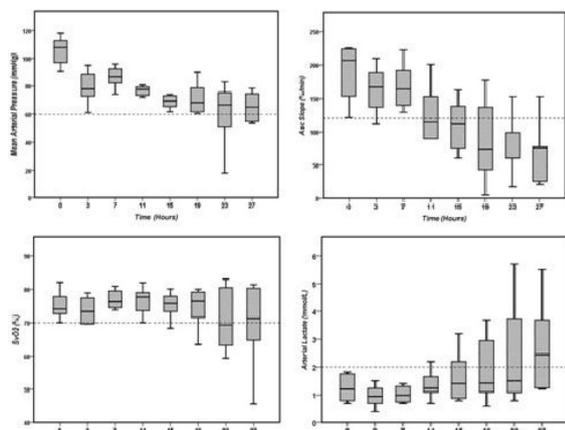
OBJECTIVES. To compare the time-course of NIRS-derived variables with those of commonly used perfusion variables in an experiment model of peritonitis.

METHODS. Eight anesthetized (midazolam, ketamine, morphine) adult sheep (24-34 kg) were mechanically ventilated and invasively monitored. Abdominal sepsis was induced by injecting autologous feces into the peritoneal cavity. Animals were followed until death or for a maximum of 30 h. NIRS was performed on the right rear leg and arterial VOTs were performed by intermittent balloon inflation above the aortic bifurcation. We calculated the times taken for the mean arterial pressure to decrease below 60 mmHg (SHOCKTIME), the urine output to below 0.5 cc/Kg/hour (OLIGURIATIME), the mixed venous oxygen saturation to below 70 % (SVO2TIME), the muscle tissue oxygen saturation to below 60 % (STO2TIME), the NIRS ascending slope to below 120 %/min (ASCLOPETIME), and the arterial lactate to increase above 2 mmol/L (LACTIME). Data were compared in SPSS 19 (IBM, USA) using a time-to-event analysis with a p Log rank test taking the ASCLOPETIME as reference.

RESULTS. The NIRS ascending slope was the first variable to be altered during sepsis.

	HOURS	p Log Rank
ASCLOPETIME	13 (11-22)	—
STO2TIME	19 (7-30)	0.224
SHOCKTIME	28 (23-30)	0.002
LACTIME	27 (12-30)	0.047
OLIGURIATIME	27 (19-30)	0.012
SVO2TIME	28 (20-30)	0.014

[Time to event analysis of different parameters]



[Time evolution of different parameters]

CONCLUSIONS. In this sheep model of abdominal sepsis, the NIRS ascending slope was altered earlier than other commonly used measures of perfusion. NIRS ascending slope may represent a valuable guide for early resuscitation before septic shock is recognized.

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0777

CIRCULATING MITOCHONDRIAL DNA PREDICTS MORTALITY IN CRITICALLY ILL PATIENTS

K.A. Krychtiuk^{1,2}, S. Ruhittel¹, P.J. Hohensinner¹, C. Kaun¹, M. Lenz¹, J. Wojta^{1,2,3}, G. Heinz², W.S. Speidl¹

¹Medical University of Vienna, Department of Internal Medicine II, Vienna, Austria, ²Ludwig Boltzmann Cluster for Cardiovascular Research, Vienna, Austria, ³Medical University of Vienna, Core Facilities, Vienna, Austria

INTRODUCTION. Despite the fact that underlying pathologies leading to ICU admittance are heterogeneous, many patients develop a systemic inflammatory response syndrome (SIRS) often in the absence of microbial pathogens. So-called pattern recognition receptors on innate immune cells such as toll-like receptors (TLRs) recognize microbial pathogen-associated molecular patterns (PAMPs) inducing an inflammatory response. According to the endosymbiont theory, mitochondria are evolutionary bacteria that entered into unicellular anaerobes more than a billion years ago. After tissue damage, mitochondria may be released from cells to the circulation. Pre-clinical evidence suggests mitochondrial DNA (mtDNA) activates TLR-9 on immune cells, which may contribute to the development of SIRS.

OBJECTIVES. To analyze whether levels of mitochondrial DNA (mtDNA) are associated with 30-day survival in ICU.

METHODS. In this prospective, observational cohort study, 233 consecutive patients admitted to a medical ICU at a tertiary care center were enrolled. Blood was taken at admission to the ICU and after 72 h. Levels of circulating mtDNA in platelet free plasma were quantified by real-time PCR using the three mitochondrial genes cytochrome C oxidase subunit III (COX III), cytochrome B (cyt B) and NADH dehydrogenase (NADH). TLR-9 expression on monocytes was analyzed by flow-cytometry.

RESULTS. Mean Apache II score was 19.8 ± 8.6 and 30-day mortality was 26.1 %. mtDNA plasma levels as quantified by all three mitochondrial genes showed a good correlation ($R > 0.88$; $p < 0.000001$), respectively. mtDNA levels at day 0 were significantly higher in non-survivors as compared to survivors: COX III 22.9 (8.9 - 56.4) vs. 17.7 (8.1 - 32.9) ng/mL, $p < 0.05$; cyt B 28.7 (12.1 - 73.5) vs. 22.2 (10.1 - 41.2) ng/mL, $p < 0.05$; NADH 24.7 (8.9 - 60.2) vs. 17.5 (8.4 - 32.8) ng/mL, $p < 0.05$; mean mtDNA 26.9 (11.2 - 60.6) vs. 19.7 (9.5 - 34.8) ng/mL, $p < 0.05$. mtDNA levels at day 3 were not associated with mortality. Patients with mtDNA levels in the highest quartile showed a 2.4 (1.4-4.1)-fold risk of death as compared to patients in the lower quartiles ($p = 0.001$). This increased risk of death was

independent of age, gender and APACHE II score. Stratification of patients according to high or low expression of TLR-9 demonstrated that only patients with high expression of TLR-9 showed an increased risk associated with increased mtDNA levels (OR 2.7; $p = 0.008$) whereas circulating mtDNA was not associated with mortality in patients with TLR-9 expression below the median (OR 1.1; $p = 0.98$).

CONCLUSIONS. Circulating levels of mtDNA at ICU admission predict mortality in critically ill patients. This association was in particular present in patients with high levels of TLR-9.

0778

MICROVASCULAR DYSFUNCTION AND MICROCIRCULATORY IMPACT OF THE TREATMENT IN PATIENTS WITH COMMUNITY ACQUIRED PNEUMONIA. A PILOT STUDY

J. Marin-Corral¹, L. Claverias¹, V. Blazquez¹, I. Leache¹, G. Moreno¹, M. Llauroad¹, M. Bodi^{1,2}, S. Pascual^{2,3}, J. Gea^{2,3}, A. Rodriguez^{1,2}

¹University Hospital Joan XXIII - IISPV-URV, Critical Care Department, Tarragona, Spain, ²CIBERES (CIBER Enfermedades Respiratorias), ISC III, Bunyola, Palma de Mallorca, Spain, ³Hospital del Mar - IMIM. Dept CEXS, UPF, Respiratory Department, Barcelona, Spain

INTRODUCTION. Community acquired pneumonia (CAP) is an important cause of sepsis in the ICU (Intensive Care Unit). Septic patients have a microvascular dysfunction that can be early detected by the tissue oxygen saturation index (rSO₂) and other VOT-derived (Vascular occlusion Test) variables measured by Near Infrared Spectroscopy (NIRS). These parameters could be good predictors of the sepsis seriousness and might be useful to evaluate the microcirculatory response to treatment.

OBJECTIVES.

1) To determine, using NIRS and VOT, the microvascular dysfunction in the brachioradialis muscle in patients with recent diagnostic of CAP in the emergency department (ED) and in healthy control subjects,

2) To determine the ability of these variables to distinguish between the patients who will be admitted in the ICU or in the conventional unit, and

3) To evaluate, in the ICU admitted patients, the evolution of these variables in the firsts 24 h of treatment.

METHODS. rSO₂ was measured by NIRS in the brachioradialis muscle during a VOT of the brachial artery using a cuff inflated to 200 mmHg for a period of three minutes or until the 50 % decrease of baseline rSO₂. We determined in all groups baseline, minimum and maximum rSO₂ values, as well as the deoxygenation rate (DeOx), the slope of increase (ReOx) and the difference between the maximum and baseline rSO₂ (delta). In the ICU admitted patients the same procedure was done at admission, 6 h and 24 h. In this group of patients clinical parameters were also evaluated. Differences between groups were assessed using Students t-test. We considered $p < 0.05$ to be significant.

RESULTS. A total of 21 patients with CAP (age 56 ± 13 , 71.4 % males) and 15 healthy control subjects (age 52 ± 7 , 53.3 % males) were included. Among CAP patients, 7 were admitted to ICU (age 59 ± 12 , 71.4 % males, SOFA 5 ± 2). ICU admitted patients had lower baseline rSO₂ (61.7 ± 5.7 vs. 68.2 ± 6.9 , $p = 0.037$), slower ReOx (3.6% /seg ± 2.3 vs. 7.2 ± 3.7 , $p = 0.015$) and lower delta (5.28 ± 4.30 vs. 10.5 ± 5.4 , $p = 0.029$) when compared to ICU non-admitted patients. ICU admitted patients showed a significant improve of ReOx during the firsts 24 h of treatment (ED 3.6% /seg ± 2.3 , ICU 3.4% /seg ± 2.4 , 6H 4.4% /seg ± 2.2 and 24H 9.0% /seg ± 5.7 , $p = 0.049$) in the same way that cardiac rate. Mean arterial pressure, base deficit or lactate did not show significant improvement in the first 24 h of treatment.

CONCLUSIONS. CAP patients admitted in the ICU present an important alteration of microcirculation that can be early evaluated by NIRS in the ED. rSO₂ and the VOT-derived parameters can early distinguish the patients who needs an ICU support. NIRS variables could evaluate the microcirculatory response to treatment being more sensitive than other macrohemodynamical parameters.

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GRANT ACKNOWLEDGMENT. Partially funded by PI13/02011, 264/2012.

0779

PATIENT AND SITE CHARACTERISTICS AND VOLUMES OF RESUSCITATION FLUIDS IN SEVERE SEPSIS - A POST HOC ANALYSIS OF A RANDOMISED CLINICAL TRIAL

P.B. Hjortrup¹, N. Haase¹, J.B. Wetterslev², A. Perner¹

¹Copenhagen University Hospital, Rigshospitalet, Dept. of Intensive Care 4131, Copenhagen, Denmark, ²Copenhagen University Hospital, Rigshospitalet, Copenhagen Trial Unit, Centre for Clinical Intervention Research, Copenhagen, Denmark

INTRODUCTION. Fluid resuscitation is a key intervention in patients with sepsis and circulatory impairment, but it is less clear if higher or lower volumes should be given. Beyond the first six hours of resuscitation the recommendations are vague and ungraded¹, and the lack of firm evidence may result in differences in clinical practice.

OBJECTIVES. Our aim was to evaluate associations between patient and site characteristics and volumes of resuscitation fluids in a multicentre randomised clinical trial (RCT).

METHODS. This was a retrospective observational study using data from the 6S trial - a multicentre RCT where patients were randomised to resuscitation with hydroxyethyl starch (HES) 130/0.42 or Ringer's acetate². We defined volume of resuscitation fluids as crystalloids and colloids administered from 24 h prior to randomisation until day 3 post-randomisation. We used multiple linear regression analyses with baseline characteristics as covariates. The site characteristics Danish hospital (\pm), university hospital (\pm) and individual sites with at least 25 randomised patients were separately added as covariates to the model. If missing baseline values were $> 5 \%$ multiple imputations technique was performed.

RESULTS. Of the trial cohort of 798 patients, we included the patients 655 who had fluid volumes registered from day 0 to 3 (88 had died, 52 were discharged and 3 had missing fluid data). Baseline characteristics are presented in table 1. Mean volume of resuscitation fluids was 7900 ml (SD 4000) and only SAPS II (25 % missing) needed multiple imputation. Effects of patient baseline characteristics on fluid volumes are presented in table 2, excl. SOFA coagulation and liver (both $p > 0.9$). Patients admitted to a university hospital received significantly less fluid ($p = 0.049$) after adjusting for baseline variables, whereas patients admitted to Danish sites did not ($p = 0.56$). Individual sites administered significantly different volumes of resuscitation fluids after adjusting for baseline variables ($p < 0.001$); in this model weight became significantly associated with increased volumes of

resuscitation fluids ($p = 0.03$), whereas SOFA renal score did not ($p = 0.16$). Performing complete case analyses did not change results noticeably.

CONCLUSIONS. Site characteristics adjusted for patient baseline values were associated with differences in volumes of resuscitation fluids given in the first 3 days of severe sepsis. The data indicate variations in clinical practice not explained by patient characteristics emphasizing the need for RCTs of fluid volumes given during resuscitation.

Age (years)	66 (IQR 57-75)
SAPS II	50 (40-60)
Weight (kg)	78 (65-89)
Lactate (mmol/l)	2.1 (1.4-3.4)
HES group	330 (50 %)
Surgery performed	233 (36 %)
SOFA score (excl.GCS)	7 (5-9)
Danish hospital	583 (89 %)
University hospital	322 (49 %)
Randomised on site with at least 25 patients randomised (12 of 26 trial sites)	542 (83 %)

[Table 1. Baseline and site characteristics]

Parameter	Estimate (ml)	Standard Error	95 % Confidence limits (ml)	p-value
Age (years)	-5	14	-32 - 23	0.73
SAPS II	4	13	-20 - 30	0.73
Weight (kg)	15	8	-1 - 32	0.069
Lactate (mmol/l)	202	70	64 - 339	0.0041
No Surgery vs. Surgery	-1266	325	-1904 - -627	0.0001
HES vs. Ringer's	-270	302	-863 - 324	0.37
SOFA cardiovascular	411	104	206 - 615	<.0001
SOFA renal	300	136	32 - 567	0.028
SOFA respiration	-428	170	-763 - -94	0.01

[Table 2. Parameter estimates. Intercept 6965 ml]

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0780

THE EFFECTS OF THE QINGRE JIEDU TONGFU RECIPE 清热解毒通腑方 ON ADJUNCT THERAPY IN SEPTIC SHOCK PATIENTS FROM ICU - A MULTICENTER PERSPECTIVE RANDOMIZED CONTROLLED STUDY

C. Guo-Long¹, H. Cai-Bao¹, T. Hong-Jie²

¹Zhejiang Hospital, Hangzhou, China, ²The Second Clinical Medical School of Zhejiang Chinese Medical University, Hangzhou, China

INTRODUCTION. Septic shock is traditionally viewed as an excessive systemic inflammatory reaction to invasive microbial pathogens, the optimization of drug therapy and support treatment, the mortality have decreased, but the overall mortality is still high. The major reason is that the pathogenesis of septic shock is so complex that has not yet been fully understood. There are so many literatures show that Chinese Traditional Medicine (TCM) has an adjunctive effects on septic shock patients.

OBJECTIVES. To investigate the effects on clinical outcomes and cellular immune function of the Qingre Jiedu Tongfu Recipes(QJTR) in septic patients.

METHODS. 133 patients with septic shock in five intensive care units(ICU) were enrolled and randomized assigned to two groups. Sixty-four patients in the control group were treated with western medicine alone, sixty-nine patients in the therapy group were treated with western medicine combined with QJTR. The levels of inflammatory cytokines (TNF α and IL1 β) and CD + 14/HLA-DR and APACHEII score before and after treatment in the 3th, 7th and 14th day were recorded, meanwhile, the duration of mechanical ventilation, ICU stay days and 28-day mortality were compared.

RESULTS. Compared with the control group, levels of TNF α and IL1 β were significantly lower in the therapy group after therapy in the 7th and 14th day ($P < 0.05$); levels of CD + 14 monocytes HLADR in the therapy group increased significantly in the 7th and 14th day ($P < 0.05$). Duration of mechanical ventilation in QJTR group was decreased dramatically than that of the control group (14.41 ± 6.29 vs 9.52 ± 5.87 , $p = 0.027$); ICU stay days in QJTR group was also decreased significantly than that of the control group (20.41 ± 6.93 vs 15.44 ± 8.17 , $p = 0.036$); APACHEII score in QJTR group were declined obviously than that of the control group in 7th (20.32 ± 5.79 vs 17.69 ± 3.84 , $p = 0.005$) and 14th day (18.31 ± 6.32 vs 15.89 ± 4.73 , $p = 0.041$). The 28-day mortality of QJTR group is obviously lower than that of the control group (13 % vs 28.2 %, $P = 0.034$).

CONCLUSIONS. QJTR combined with western medicine can regulate the immunologic function and improve the outcomes of septic patients from ICU.

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SEPSIS TEAM IN THE ER

A. Araujo¹, N. Catorze¹, A. Real², G. Girthari², P. Cunha², S. Gonçalves², N. Lopes¹

¹Centro Hospitalar Médio Tejo, Intensive Care Unit, Abrantes, Portugal, ²Centro Hospitalar Médio Tejo, Internal Medicine, Abrantes, Portugal

INTRODUCTION. Sepsis is still under diagnosed in the emergency service, besides the guidelines and professional education and mortality is high specially with the treatment delay. The authors tried to characterise this population in their hospital, to increase the diagnosis sensibility and to create a "sepsis team".

METHODS. We performed a retrospective study in a cohort of patients admitted to our Intensive Care Unit (ICU), with diagnosis of septic shock between 2012 and 2013 to characterise this population. In addition to the common epidemiological variables, severity indexes were calculated and evolution/outcome of the patients was analysed.

RESULTS. Our sample included 186 patients. From these, 52 % were male and the mean age was 72 years (± 13.15). The patients came from the emergency room (37.6 %), operating room (30 %) and other wards (21.5 %), with a average APACHE II 25.55 (± 12.13) and SAPS II 49.81 (± 24.67). Regarding infectious focus, 40.3 % had abdominal starting point, 31.2 % respiratory and 15 % urinary. 63.4 % of sepsis was community-acquired and 32.7 % associated with health care. All patients collected biological products and in 41 % of them all microbiological tests were negative. 76.88 % (146) of patients were ventilated (128 invasive ventilation, 10 noninvasive ventilation and 5 the two modalities). Besides the treatment the overall mortality was 46.8 % associated in most cases to a multiple organ disfunction. Ventilator associated pneumonia incidence was 5.37 %. Enterobacteriaceae were the most prevalent agent in abdominal infections, *Pneumococcus* for community acquired pneumoniae, *Pseudomonas* for nosocomial pneumonia and *E.Coli* in the urinary infections.

CONCLUSIONS. The mortality for septic shock is very high despite the provided education in this area. Our data suggest a late referral to the intensive care and a absence of compliance with the sepsis bundles treatment. With this data, the authors want to create a "sepsis team" with an increase sensibility for this patients and improve a more specific and specialised approach for this patients, improving the pre ICU treatment.

Cardiac arrest: Prognosis & outcomes: 0782-0795

0782

LOW SERUM SUPAR CONCENTRATION PREDICTS 90-DAY SURVIVAL AFTER OUT-OF-HOSPITAL CARDIAC ARREST

V. Jalkanen¹, R. Yang¹, J. Vaahersalo², J. Kurolo³, E. Ruokonen³, H. Huhtala⁴, A. Kuitunen¹, V. Pettilä², J. Tenhunen^{1,5}, FINNRESUSCI-Study Group

¹Tampere University Hospital, Tampere, Finland, ²Helsinki University Hospital, Helsinki, Finland, ³Kuopio University Hospital, Kuopio, Finland, ⁴University of Tampere, Tampere, Finland, ⁵Uppsala University Hospital, Uppsala, Sweden

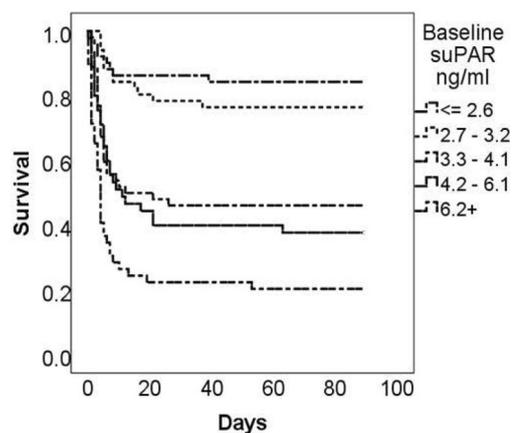
INTRODUCTION. Prognostic decision making after out-of-hospital cardiac arrest (OHCA) and cardiopulmonary resuscitation (CPR) remains difficult with available biomarkers. Therapeutic hypothermia to improve post cardiac arrest neurologic survival has further deteriorated their prognostic accuracy. Hypoxia and ischemia induce urokinase-type plasminogen activator receptor (uPAR) expression in brain¹ and in the fibrin matrix of endothelial cells². We hypothesized that ischemia-reperfusion during OHCA leads to increased levels of soluble uPAR (suPAR) in serum. We further hypothesized that high serum (s) suPAR concentrations are prognostic for 90-days mortality after OHCA.

OBJECTIVES. To evaluate the predictive value of s-suPAR regarding 90-day mortality in OHCA-patients admitted to Finnish ICUs.

METHODS. A predetermined sub-study of the observational, prospective FINNRESUSCI-cohort³. Patients were enrolled between March 2010 and February 2011. Following consent from the next-of-kin, samples were drawn at selected time points. One blinded investigator (RY) analyzed suPAR concentrations (suPARnostic[®], ViroGates, Birkerød, Denmark).

The data are presented as median(quarters). Receiver operating characteristics (ROC) with areas under curve (AUC) and 95 % confidence intervals (CI) were calculated. The patient cohort was divided into suPAR concentration quintiles to test the associations to 90-days survival. Kaplan-Meier (K-M) curves and positive likelihood ratios (LR + with 95 % CIs) according the Youden index (Sensitivity-[1-Specificity]) are presented.

RESULTS. From the total of 248 patients, aged 63(56-72) years, with available serum samples, 65 % had a shockable initial rhythm. Return of spontaneous circulation (ROSC) was achieved in 20(13-28) minutes. K-M analysis at the ICU admission revealed 15.7 % and 79.6 % mortalities in the lowest (< 2.61 ng/ml) and the highest quintiles (> 6.19 ng/ml) (Figure). The predictive accuracy of s-suPAR for 90-day mortality (ROC AUC) was 0.78 (0.72-0.84) with the LR + 2.9 (2.1-3.9) at the cut-off 3.9 ng/ml.



[K-M suPAR baseline]

CONCLUSIONS. S-suPAR higher than 6.2 nG/mL at the ICU admission predicts 80 % risk of death at day-90 after OHCA. S-SuPAR at day-2 lower than 2.6 nG/mL suggests 84 % probability for survival (with current clinical decision-making). Thus, low s-suPAR is highly predictive for 90-day survival. A RCT is needed to evaluate the value of admission-SuPAR based clinical decision making in these patients.

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0783

RISK ADJUSTED OUTCOMES FOLLOWING IN-HOSPITAL CARDIAC ARREST: DAY VERSUS NIGHT AND WEEKEND

E.J. Robinson¹, G.S. Power¹, G.B. Smith², J.P. Nolan³, National Cardiac Arrest Audit

¹ICNARC, London, United Kingdom, ²Bournemouth University, School of Health & Social Care, Bournemouth, United Kingdom, ³Royal United Hospital, Bath, United Kingdom

INTRODUCTION. The United Kingdom (UK) National Cardiac Arrest Audit (NCAA) has reported that in-hospital cardiac arrest (IHCA) occurs with similar frequency during day and night and on weekdays and weekends. ¹Crude hospital survival is lower following IHCA at night (versus day) and at weekends (versus weekdays). ⁰Accurate risk adjustment is required to interpret these results.

OBJECTIVES. To test the hypothesis that risk adjusted outcomes (return of spontaneous circulation greater than 20 min (ROSC >20 min) and survival to hospital discharge) following IHCA at night (20:00–07:59) or at weekends (Saturday–Sunday, 08:00–19:59) are significantly lower than on weekdays (Monday–Friday, 08:00–19:59).

METHODS. NCAA is the UK national clinical audit of patients (excluding neonates) that receive chest compressions and/or defibrillation following IHCA and are attended by the hospital-based resuscitation team (or equivalent) in response to an emergency call. Relevant data from 1 April 2011 to 30 September 2013 were extracted. Patients having pre-hospital cardiac arrests, having a second or subsequent IHCA, still in hospital and/or missing important data for the analysis (day/time of IHCA, risk factor and outcome) were excluded. Outcomes (ROSC >20 min and survival to hospital discharge) were compared for weekdays, night and weekends in multilevel logistic regression models both before and after risk adjustment for individual risk factors in the validated NCAA risk models. ²The effect of day/time on outcomes following IHCA was compared in subgroups for age, location of arrest and presenting/first documented rhythm.

RESULTS. Overall, 27,731 patients from 146 hospitals were included. Crude outcomes were significantly worse at night and weekends compared with weekdays, for both ROSC >20 min and survival to hospital discharge (Table). These results remained significant following risk adjustment. The effect of night and weekend was stronger for non-shockable than for shockable presenting/first documented rhythms (P < 0.001). No significant interaction existed for age or location of arrest.

	Weekday	Night	Weekend
IHCA N (%)	10,125 (36.5)	13,777 (49.7)	3,829 (13.8)
ROSC >20 min (%) [95 % CI]	5,249 (51.8) [50.9, 52.8]	5,383 (39.1) [38.3, 39.9]	1,789 (46.7) [45.1, 48.3]
ROSC >20 min—adjusted odds ratio [95 % CI]	1	0.72 [0.68, 0.76]	0.88 [0.81, 0.95]
Hospital survival (%) [95 % CI]	2,574 (25.5) [24.6, 26.3]	1,895 (13.8) [13.2, 14.4]	708 (18.5) [17.3, 19.8]
Hospital survival—adjusted odds ratio [95 % CI]	1	0.58 [0.54, 0.63]	0.72 [0.64, 0.80]

[Crude/risk-adjusted outcomes by day/time of IHCA]

CONCLUSIONS. IHCA attended by the hospital-based resuscitation team at night or at weekends have significantly poorer risk-adjusted outcome than those on weekdays. This effect is stronger for non-shockable than for shockable presenting/first documented rhythms.

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0784

THE POTENTIAL ROLE OF AUDITORY EVOKED POTENTIALS TO ASSESS PROGNOSIS IN COMATOSE SURVIVORS FROM CARDIAC ARREST

I. Lamanna¹, N. Mavroudikis², B. Legros², K. Donadello¹, J.-L. Vincent¹, F.S. Taccone¹

¹Erasme Hospital, Intensive Care, Bruxelles, Belgium, ²Erasme Hospital, Neurology, Bruxelles, Belgium

INTRODUCTION. The use of a multimodal approach is mandatory to assess prognosis among comatose survivors from cardiac arrest (CA). Few data are available on the role of auditory evoked potentials (AEPs) in combination with other electrophysiological tools in this setting.

OBJECTIVES. To assess the role of AEPs in outcome prediction after CA.

METHODS. Retrospective analysis of an institutional database including all adult patients (>18 years of age) admitted to the intensive care unit (ICU) after CA from January 2007 to January 2013, in whom AEPs were performed. We collected variables related to cardiac arrest, as well as data on electroencephalography (EEG);

a. presence of reactivity to painful stimuli or
b. presence of a malignant pattern, i.e. burst-suppression, flat tracing or electroencephalographic status epilepticus, ESE) performed at normothermia and cortical evoked potentials (N20, defined as malignant N20 if absent bilaterally) performed at day 2 or 3 after CA. AEPs were assessed concomitantly to cortical potentials.

We recorded for AEPs the presence of I, III and/or V waves; we defined as “malignant” AEP the bilateral absence of at least one of the different waves. Outcome was assessed at 3 months using the cerebral performance categories (3–5 = poor recovery; 1–2 = good recovery).

RESULTS. Sixty-five patients were studied, 48 (74 %) of them having poor outcome. The bilateral absence of at least one of the AEP waves was found in 31 patients, 5 with good and 26 with poor outcome. Only one patient with good outcome had a malignant EEG pattern (i.e. ESE) but did not present malignant N20 or AEP patterns; EEG reactivity was not tested.

In the 5 patients with malignant AEPs pattern and good outcome, EEG reactivity was present in all. Among patients with poor outcome, 18 had bilateral absence of N20; of the 30 remaining, 25 had a malignant EEG pattern, with 11 showing a malignant AEP finding and 14 not (8 had an unreactive EEG and 2 a reactive EEG). The last five patients with non-malignant EEG and N20 findings had in four cases a bilateral absence of at least one AEP wave and in one case an unreactive EEG.

CONCLUSIONS. Combination of electrophysiological tests, including EEG, N20 and AEPs, allowed a classification of neurological outcome in 59/65 (91 %) of comatose post-CA patients. Further prospective studies are needed to better evaluate the prognostic value of this combination.

0785

THE PREDICTIVE VALUE OF TISSUE OXYGEN SATURATION AND PERIPHERAL CIRCULATION PARAMETERS DURING HYPOTHERMIA IN OUT-OF-HOSPITAL CARDIAC ARREST PATIENTS

A. Lima¹, T.K. van der Arend², J. van Bommel², J. Bakker²

¹Erasmus MC University Medical Centre, Rotterdam, Netherlands, ²Erasmus MC University Medical Center, Department of Intensive Care, Rotterdam, Netherlands

INTRODUCTION. In a recent study in out-of-hospital cardiac arrest (OHCA) patients (ref), the post-cardiac arrest phase was characterized by profound alterations in the peripheral perfusion parameters. These alterations were aggravated by the induced hypothermia and disappear after rewarming, which increased subsequently in survivors but not in the non-survivors. Tissue oxygen saturation (StO₂) has been shown to be strongly associated with abnormal peripheral perfusion. Studies have suggested that resting StO₂ values measured in association with peripheral perfusion parameters can more adequately predict tissue hypoperfusion and subsequent organ dysfunction than StO₂ itself. It is not known, however, if this association persists during hypothermia and the clinical impact is of this association in predicting unfavourable outcome.

OBJECTIVES. This prospective observational study was conducted to investigate the association between peripheral perfusion, StO₂ and outcome during the induced hypothermia in OHCA patients. We hypothesize that the subjective evaluation of peripheral perfusion associated with StO₂ monitoring can more adequately predict ICU complications than StO₂ itself.

METHODS. Fifty-two patients (62 ± 15 years; 43 males) admitted to an intensive cardiac care unit after a OHCA were included. All patients were treated with mild therapeutic hypothermia induced within 6 h after the start of resuscitation to a target temperature of 33 °C. After 24 h, patients were passively rewarmed to normothermia. Peripheral perfusion parameters included physical examination of capillary refill time (CRT), peripheral perfusion index (PPI), and forearm-to-finger temperature difference (T_{skin-diff}). In addition, StO₂ was continuously obtained from the thenar using an InSpectra Model 650 (Hutchinson Technology, Hutchinson) with a 15-mm probe placed over the thenar eminence.

RESULTS. Out of a total of 52 patients, 28 (54 %) survived. No differences were found in the heart rate (66 ± 15 vs. 72 ± 15.4 bpm) or mean arterial pressure (76 ± 9 vs. 71 ± 17 mmHg) between survivors and nonsurvivors. Table 1 shows the peripheral perfusion parameters stratified by survivors and nonsurvivors during the state of hypothermia. No differences were found between survivors and nonsurvivors in the peripheral perfusion variables. However, a significant difference with higher StO₂ values in nonsurvivors compared with survivors was found. Table 2 shows patients with StO₂ above and below 80 % stratified by mortality and systemic hypoperfusion. In survivors, 13 % with a StO₂ <80 % had systemic hypoperfusion. In contrast, 57 % of the nonsurvivors with a StO₂ >80 % did had systemic hypoperfusion.

	Survivors (S)	Nonsurvivors (NS)
CRT (s)	8 ± 2	9 ± 4
PPI (%)	0.8 ± 0.9	1.2 ± 1.3
T _{skin-diff} (°C)	3.0 ± 1.3	2.8 ± 1.4
StO ₂ (%)	79 ± 6	86 ± 5*

* P < 0.05 vs. Survivor

[Peripheral perfusion parameters in S vs. NS]

	Survivors (N = 28)		Nonsurvivors (N = 24)	
	StO ₂ <80 %	StO ₂ ≥80 %	StO ₂ <80 %	StO ₂ ≥80 %
No systemic hypoperfusion (N = 31)	13 (87 %)	7 (54 %)*	2 (67 %)	9 (43 %)*
Systemic Hypoperfusion (N = 21)	2 (13 %)	6 (46 %)	1 (33 %)	12 (57 %)

Systemic hypoperfusion defined as lactate >2 mmol/L and BE <-3 mEq/L.

*P < 0.05 by Chi square test

[StO₂ values stratified by hypoperfusion]

CONCLUSIONS. StO₂ is a valuable adjunct to identify OHCA patients with poor prognosis and tissue hypoperfusion during therapeutic hypothermia.

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0786

IMPACT OF OBESITY ON PROGNOSIS AFTER SUCCESSFULLY RESUSCITATED CARDIAC ARREST: A BICENTRIC RETROSPECTIVE STUDY

G. Geri^{1,2}, G. Savary³, S. Legriel³, F. Dumas², S. Merceron³, J.-P. Mira¹, J.-P. Bedos³, J.-P. Empana², A. Cariou^{1,2}, D. Grimaldi³

¹Hôpital Cochin, Medical ICU, Paris, France, ²INSERM UMR-S970, Paris Cardiovascular Research Center, Paris, France, ³Centre Hospitalier de Versailles, ICU, Le Chesnay, France

INTRODUCTION. Obesity, defined as a BMI >30 kg/m², is a growing major health issue concerning more than 20 % of the European population (1). Whereas obesity is a

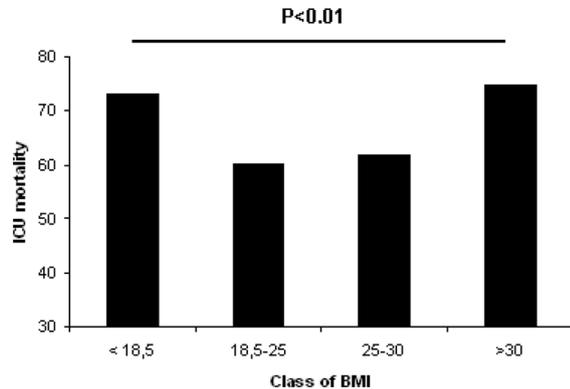
demonstrated risk factor of cardiovascular event including sudden death (2), its impact on the prognosis after out-of-hospital cardiac arrest (CA) remained uncertain.

OBJECTIVES. Our main objective was to analyze the effect of a BMI >30 on the ICU-mortality. Our secondary aim were to describe the differences between obese and non obese patients according to CA characteristics and post-resuscitative care.

METHODS. Retrospective analysis of prospectively collected data according to Utstein style in two ICUs in Paris area. All patients admitted in ICU after successfully resuscitated CA between 2005 and 2012 whose BMI value was available were considered. The variables associated with ICU-mortality (including BMI as a categorical variable <18.5, 18.5–25, 25–30, >30) were analysed using univariate followed by multivariate analyses. The characteristics of patients according to BMI categories were compared.

RESULTS. Among 1,449 patients admitted in the ICU after CA, 503 were excluded because of missing data (weight or height) and 946 were included. Among them, 41 (4.3 %) had a BMI <18.5; 430 (45 %) a BMI 18.5–25; 305 (32.2 %) a BMI 25–30 and 170 (18 %) a BMI >30 kg/m².

The crude ICU-mortality, according to BMI categories, followed a U-shaped curve.



[Figure]

By multivariate analysis, BMI >30 was independently associated with mortality: OR 2.3 (1.33–3.98) as well as age <62 (OR 0.49 [0.41–0.85]), public location of CA (OR 0.54 [0.36–0.79]), VF/VT (OR 0.29 [0.19–0.43]) time from collapse to ROSC <21 min (OR 0.28 [0.20–0.41]) and post-CA shock (OR 2.27 [1.59–3.23]).

Compared to patients with normal weight or overweight, obese patients were significantly older, more frequently female, presented less frequently VF/VT, underwent less frequently coronary angiogram but PCI was performed in similar proportion of patients. Admission temperature and minimal temperature at D1 were higher in obese patients. Of note, CPR duration tended to be longer and post-CA shock more frequent in obese patients.

CONCLUSIONS. Obesity seems to be an independent factor of ICU mortality in patients resuscitated from CA. These results are in line with previous study on intra-hospital cardiac arrest (3). The collection of 1 year survival is ongoing and will bring important results on long term prognosis.

Longer time of CPR, higher incidence of post-CA shock and higher temperature within the first 24 h are the modifiable factors that seem to be associated with the poor prognosis of obese patients. Further studies are needed to evaluate the impact of BMI on PCI realization.

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0787 PROGNOSTIC VALUE OF CEREBRAL OXIMETRY AFTER CARDIAC ARREST: A PROSPECTIVE COHORT STUDY

A. Bouglé^{1,2}, F. Daviaud^{1,2}, W. Bougouin^{1,2,3}, A. Rodrigues¹, G. Geri^{1,2,3}, T. Morichau-Beauchant^{1,2}, F. Dumas^{3,4}, A. Cariou^{1,2,3}

¹Medical Intensive Care Unit, Cochin-BrocaHôtel-Dieu University Hospital, Assistance Publique-Hôpitaux de Paris, Paris, France, ²Paris Descartes University, Paris, France, ³INSERM UMR-S970, Paris Cardiovascular Research Center, Paris, France, ⁴Emergency Department, Cochin-Broca-Hôtel-Dieu University Hospital, Assistance Publique-Hôpitaux de Paris, Paris, France

INTRODUCTION. Out-of-hospital cardiac arrest (OHCA) is associated with high morbidity and mortality and is still a major issue for public health. With the exception of hypothermia, no treatment has demonstrated its ability to reduce the impact of global cerebral ischemia induced by cardiac arrest. Changes in cerebral oxygen extraction and consumption after resuscitation seem to be critical determinants of neurologic recovery after cardiac arrest. Near-infrared spectroscopy (NIRS) has recently proved its usefulness to monitor cerebral oxygenation after severe head injury and cerebral blood flow autoregulation during extracorporeal circulation for cardiac surgery. By analogy, this tool might be particularly useful after cardiac arrest. However, until now, no study was designed to determine if cerebral oximetry could be used to early determine prognosis.

OBJECTIVES. To study the evolution of cerebral oximetry determined by NIRS after OHCA of cardiac origin and to define a threshold value associated with poor neurological prognosis in this population.

METHODS. Our study is a prospective, non-interventional, single center study. All consecutive patients between 18 and 80 years admitted for OHCA of a cardiac origin were included in the study. Cerebral oximetry was recorded using NIRS. The monitoring was started at the admission in the ICU until 48 h after the patient came into the ward. Data were registered in the device and extracted on day 3.

RESULTS. Between February 2012 and January 2013, 43 patients were admitted for OHCA in our ICU. Twenty-two patients (51 %) were discharged with no or minimal neurologic complications (CPC 1–2). Mortality rate in the ICU was 46.5 %. Mean cerebral oximetry during the 48 first hours was not different between patients with good and bad neurologic outcome, respectively 61.8 (5.9) vs. 58.1 (8.8), $P = 0.13$, as during the period of hypothermia. The minimal value of cerebral oximetry during the first 48 h was significantly different between patients with good prognosis and those with bad prognosis, respectively 45.0 (6.8) vs. 31.7 (15.0), $P = 0.0009$. The threshold of 30 was the most powerful to predict neurologic outcome.

CONCLUSIONS. Cerebral oximetry during therapeutic hypothermia after OHCA of cardiac origin is associated with neurologic outcome at ICU discharge. In this cohort, the threshold of 30 was the most accurate to predict neurologic outcome. Assessing cerebral oximetry during therapeutic hypothermia could help to early predict neurologic prognosis of OHCA patients.

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0788 OBSERVATIONAL STUDY OF IN-HOSPITAL CARDIAC ARRESTS OUTCOMES IN OCTOGENARIANS

G. Buzançais¹, P. Burtin¹, J.-Y. Bigeon¹, C. Halchini¹, C. Charpentier¹, M. Barral¹, P. Courant¹

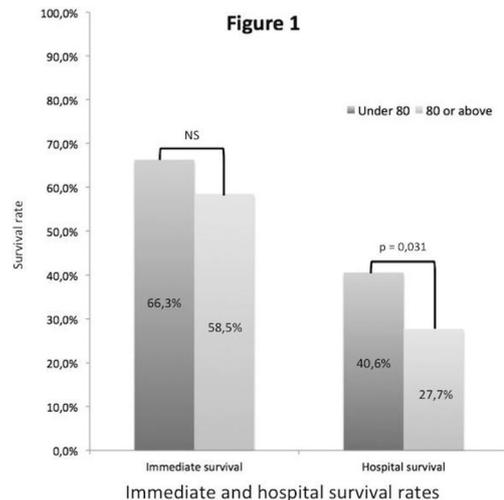
¹Clinique du Millénaire, Anesthésie-Réanimation, Montpellier, France

INTRODUCTION. Improvement in survival rate of In-Hospital Cardiac Arrest (IHCA) patients has been recently demonstrated (1). However, the age influence on survival rate remains as a point of discussion, and wide variations between studies can be noticed (2–5). Moreover, literature on IHCA outcome in advanced age is scarce.

OBJECTIVES. We conducted an observational analysis of all IHCA in our institution in order to assess incidence and prognosis in octogenarians.

METHODS. Inclusion was defined by presence of chest compression and/or external electrical shock (EES). An emergency team triggered by an activation code treated all IHCA. A dedicated form was filled. This document included: demographic data, medical history, location, event time sequence, initial cardiac rhythm, first treatment attempt, number of EES, type of IV treatment, immediate survival rate (ISR). Survivors were followed-up until hospital discharge and SAPS II score, duration of ICU stay, treatment applied and hospital survival rate (HSR) were recorded. Two groups defined by age were compared: under 80 (group 1) and 80 or above (group 2).

RESULTS. 303 IHCA were included and 297 were analysed (102 women) between 01/01/2009 and 01/01/2014. Incidence was 0.3 IHCA/bed/year (5.1 IHCA/1,000 stays) and mean age was 70.9 (95 % CI [69.4–72.4]). ISR was 63.2 % and HSR was 39.4 %. Group 2 patients (n = 94; 31.6 %) had significantly higher rate of non-ischemic cardiomyopathy (41.3 vs 28.3 % p = 0.027) and chronic renal failure (26.4 vs 11.8 % p = 0.002). Group 2 had also a lower rate of cardiac monitoring (70.2 vs 82.3 % p = 0.019) and received less EES (43 vs 56.6 % p = 0.03). Differences between initial rhythms, ISR (Fig. 1), time to return of spontaneous circulation, resuscitation duration were not significant between groups. ICU stay and mechanical ventilation were significantly shorter in Group 2 (p < 0.05). Group 2 HSR was significantly lower (27.7 vs 40.6 % p = 0.031) (Fig. 1).



[Immediate and hospital survival rates]

CONCLUSIONS. This is the first European study on this topic. In our adult-only institution, 1 IHCA out of 3 occurs in patients over 80. Equal ISR between groups does not allow us to limit resuscitation of patients over 80 in our institution. Octogenarians HSR appears to be related to comorbidities and conditions of occurrence of IHCA. Although significantly lower, group 2 HSR is unexpectedly high in comparison to the only series published (4). These results are specific to our case mix and our inclusion criteria. Given the high IHCA incidence of patients over 80, long-term prognosis studies are needed. We believe that age is not a major factor in identifying patients for whom cardiopulmonary resuscitation is futile.

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0789 AN AUDIT OF POST CARDIAC ARREST MANAGEMENT AND INTENSIVE CARE OUTCOMES AT THE ROYAL SUSSEX COUNTY HOSPITAL, BRIGHTON, UK

A. Curtis¹, R. Gray¹, J. Kilic¹

¹Royal Sussex County Hospital, Intensive Care Department, Brighton, United Kingdom

INTRODUCTION. Patients successfully resuscitated post cardiac arrest account for 5.8 % of all UK ICU admissions¹. A previous analysis of the Intensive Care National Audit and Research Centre Case Mix Programme Database (ICNARC CMPD) found that 42.9 % of

mechanically ventilated patients admitted to UK ICUs after cardiac arrest survived to ICU discharge, and 28.6 % survived to hospital discharge. Of the hospital survivors 79.9 % returned directly home¹.

OBJECTIVES. To see if our outcomes in this patient group were comparable to published data and to audit care against the UK Intensive Care Society (ICS) guidelines².

METHODS. Data was collected from our ICU electronic information system, including arrest location (IHCA/OHCA) and initial cardiac rhythm, either Ventricular Fibrillation/Tachycardia (VF/VT) or Asystole/Pulseless Electrical Activity (PEA). We recorded implementation of the ICS Post Cardiac Arrest Care Bundle, comprising: coronary reperfusion, haemodynamic optimisation, control of ventilation, blood glucose, temperature and seizures. Hospital survival and discharge data were collected from the electronic hospital discharge database.

RESULTS. 204 patients were admitted post cardiac arrest between January 2012 and September 2013. There were 65 IHCA, 66 % male (mean 68.0 years) and 34 % female (mean 70.9 years) and 139 OHCA, 73 % male (mean 63.0 years) and 27 % female (mean 63.7 years). Comorbidities included cardiovascular (43 %) and respiratory (33 %) disease and drug/alcohol abuse (16 %).

The predominant rhythm was VF/VT (56 %) in OHCA and Asystole/PEA (86 %) in IHCA. All patients were ventilated and haemodynamically supported. Blood glucose control was achieved in 81 % of patients. Primary PCI was performed in 55 % VF/VT OHCA. Cooling was achieved in 83 % of VF/VT OHCA compared to 44 % of VF/VT IHCA. The complete care bundle was delivered to 55 % of patients. Patients who received the complete ICS bundle were more likely to survive to ICU discharge ($p = 0.0489$) (Table 1).

	Number of patients who did not survive to ICU discharge	Number of patients who survived to ICU discharge	Total number of patients
Incomplete ICS bundle	53	39	92
Complete ICS bundle	49	63	112
Total number of patients	102	102	204

[Table 1]

43 % of all patients survived to hospital discharge, 79 % discharged home (34 % of all patients admitted). The best outcome was seen in VF/VT IHCA and VF/VT OHCA; 67 and 62 % respectively survived to hospital discharge. In VF/VT IHCA 50 % of hospital survivors were discharged home compared to 77 % in VF/VT OHCA. Poorest outcome was observed in PEA/Asystole OHCA; 13 % survived to hospital discharge.

CONCLUSIONS. Survival to hospital discharge in our population was higher than on ICNARC CMPD (43 vs. 28.6 %). Patients who received the complete ICS bundle were more likely to survive to ICU discharge.

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0790

CLINICAL FACTORS AFFECTING GOOD NEUROLOGICAL OUTCOMES AT 1 MONTH IN PATIENTS WITH OUT-OF-HOSPITAL CARDIAC ARREST: A 5-YEAR RETROSPECTIVE OBSERVATIONAL COHORT STUDY

J. Shin¹, S.H. Kim¹, H.J. Lee¹, J.H. Jung¹, K.J. Hong¹, K. Jang¹, C.J. Park², Y.J. Kim²

¹Borame Medical Center, Seoul Metropolitan Government Seoul National University, ER, Seoul, Republic of Korea, ²Borame Medical Center, Seoul Metropolitan Government Seoul National University, Seoul, Republic of Korea

INTRODUCTION. According to recent cardiopulmonary resuscitation (CPR) guidelines, systemic post-cardiac arrest care after return of spontaneous circulation (ROSC)—including therapeutic hypothermia (TH) in patients in a coma state immediately after ROSC—and emergent percutaneous coronary intervention (PCI) in patients with ST-elevation myocardial infarct after ROSC can improve the likelihood of patient survival and lead to a good quality of life. However, controversy remains about whether TH during post-cardiac arrest care improves patient neurological outcomes.

OBJECTIVES. The main objectives of our study were to determine whether TH and PCI could influence patient neurological outcome after care for out-of-hospital cardiac arrest (OHCA).

METHODS. A retrospective-observational registry-based study was conducted on the patients admitted to the emergency department (ED) of a university hospital. All patients who experienced OHCA between January 2009 and January 2014 were registered in our study. Several prehospital, hospital, and laboratory variables were examined for the analysis of good neurological outcome (cerebral performance category 1 or 2) at 1 month; single- and multiple-logistic regression model analyses were performed to estimate the odd ratios (ORs) of the neurological outcomes, with 95 % confidence intervals (CIs). If a variable had a missing value, it was not analyzed in the multiple-logistic regression model.

RESULTS. A total of 819 patients who experienced OHCA were registered in our database. Among them, 344 patients (42 %) had a sustained ROSC after advanced cardiac life support (ACLS). Forty-seven (14 %) patients had a good neurological outcome at 1 month. Finally, no flow time (OR, 0.911; 95 % CI, 0.833–0.997), low flow time (OR, 0.904; 95 % CI, 0.849–0.962), ACLS time (OR, 0.952; 95 % CI, 0.908–0.998), prehospital ROSC (OR, 7.781; 95 % CI, 2.346–25.808), shockable rhythm prior to hospitalization (OR, 3.149; 95 % CI, 1.235–8.032), shockable rhythm at the ED (OR, 5.389; 95 % CI, 1.924–15.090), and TH (OR, 3.329; 95 % CI, 1.285–8.624) were statistically significant variables in the multivariable analysis of good neurological outcomes at 1 month.

CONCLUSIONS. Shorter CPR time, shockable rhythm, and TH were important statistically significant variables of good neurological outcomes after post-cardiac arrest care for OHCA on multivariable analysis.

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0791

SURVIVAL AFTER IN-HOSPITAL CARDIAC ARREST IN A DEVELOPING COUNTRY: RETROSPECTIVE STUDY OVER 4 YEARS PERIOD

N. Tyagi¹, A. Garg¹, V.K. Singh¹, S. Taneja¹, R. Kumar¹, S. Ray¹, B.K. Rao¹, S. Mittal¹, J. Randhawa¹, S. Malik¹, S. Panda¹, D. Dhar¹

¹Sir Ganga Ram Hospital, Delhi, India

INTRODUCTION. In-Hospital Cardiac Arrest (IHCA) is defined as the cessation of cardiac mechanical activity confirmed by the absence of a detectable pulse, unresponsiveness and apnoea (or agonal respirations) that occurs in a hospitalised patient who had a pulse at the time of admission. Despite being a distinct entity, IHCA has not received the same level of focused research as the Out of Hospital Cardiac Arrest (OHCA). There is a wide variation in reported incidence rates of IHCA ranging from 3.8 to 13.1 per 1,000 admissions and there is a paucity of data from developing countries.

OBJECTIVES. We examined the rates of survival to hospital discharge of patients with in-hospital cardiac arrests. We also studied the patient characteristics, first noted rhythm at the time of arrest and the final neurological outcome.

METHODS. This study was carried out over a period of 4 years (from January 2010 to November 2013) at a Tertiary care centre in North India. The hospital has a round the clock rapid action AHA-ACLS provider certified team with adequate post-resuscitation care facilities to deal with cardiac arrest patients.

RESULTS. The total number of Code Blue calls over the period of 4 years was 760. Out of these, 15.26 % (n = 116) were diagnosed as false code blue while the rest 84.74 % (n = 644) were true cardiac arrests. Among 644 patients with an in-hospital cardiac arrest, the overall case survival to discharge (SAD) rate was 26.86 % (n = 173). The overall cardiac arrest incidence rate was 4.8 per 1000 hospital admissions. The initial cardiac-arrest rhythm was asystole or pulseless electrical activity (nonshockable rhythm) in 498 (77.32 %) patients and ventricular fibrillation or pulseless ventricular tachycardia (shockable rhythm) in 146 (22.67 %). There was no difference in the survival rates in the two sub-groups when compared separately. Return of spontaneous circulation (ROSC) was achieved in 64.28 % IHCA victims. Out of these, 104 (16.14 %) expired within the first 24 h of post cardiac arrest care while 141 (21.89 %) expired later in the course of hospital stay statistically significant higher ROSC (68.51 vs 53.15 %) and SAD (38.60 vs 18.21 %) was seen in patients with Shockable initial Rhythm *c.f.* Non Shockable Rhythm.

CONCLUSIONS. We conclude that the survival rates after in hospital cardiac arrest was 26.86 %, which is comparable to that of developed countries. A good neurological outcome defined by Cerebral Performance Category (CPC) Scale of 1–2 was achieved in 32/93 (34.4 %) patients.

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0792

THE IMPACT OF ORGAN FAILURE ON OUTCOME OF PATIENTS AFTER CARDIAC ARREST

L. Nobile¹, F.S. Taccone¹, Y. Sakr², T. Szakmany³, N. Fletcher⁴, S. Jakob⁵, Z. Beardow⁶, J.-L. Vincent¹, on behalf of the ICON Investigators

¹Erasme Hospital, Dpt of Intensive Care, Brussels, Belgium, ²Universitätsklinikum Jena, Dpt of Intensive Care, Jena, Germany, ³Royal Glamorgan Hospital, Dpt of Intensive Care, Pontyclun, United Kingdom, ⁴St Georges Healthcare, Dpt of Intensive Care, London, United Kingdom, ⁵University Hospital Bern, Dpt of Intensive Care, Bern, Switzerland, ⁶Leeds Teaching Hospitals NHS Trust, Dpt of Intensive Care, Leeds, United Kingdom

INTRODUCTION. Brain damage after cardiac arrest (CA) remains a major cause of death and morbidity worldwide. However, few data are available on the prognostic value of extra-cerebral organ failure in this setting.

OBJECTIVES. The aims of the study were to assess the incidence of extra-cerebral organ failure in patients resuscitated from CA and its impact on prognosis.

METHODS. We analyzed data from the Intensive Care Over Nations (ICON) database, which gathered data adult patients admitted to 730 intensive care units (ICUs) in 84 countries between May 8 and 18, 2012. Admissions for routine postoperative surveillance for less than 24 h were excluded. Participation was voluntary. Data were collected daily for a maximum of 28 days in the ICU and patients were followed up for outcome data until death or hospital discharge. Patients with “post-anoxic coma” or “cardiac arrest” listed as the reason for ICU admission were considered to be admitted after CA; data on the initial rhythm, duration of no-flow or drugs received during CPR were not available. Organ failure was defined as a specific SOFA sub-score >2 on admission or during the ICU stay. A univariate analysis was performed with ICU mortality or overall neurological outcome (i.e., favorable outcome defined as a neurological SOFA sub-score of 0–2) as dependent variables. A multivariable analysis was also performed to identify those factors that were independently associated with ICU outcome or neurological outcome.

RESULTS. Among the 469 patients admitted after CA, 210 (45 %) died during the ICU stay and 357 (76 %) had an unfavorable neurological outcome. Out-of-hospital CA occurred in 250 (53 %) patients and hypothermia (HT) was used in 126 (27 %) of cases. Non-survivors had a significantly higher incidence of renal, cardiovascular and respiratory failure on admission (43 vs. 16 %; 56 vs. 45 %; 62 vs. 48 %, respectively—all p values <0.05) or during the ICU stay (71 vs. 50 %; 71 vs. 54 %; 75 vs. 57 %, respectively—all p values <0.05) than survivors. Similar results were found for patients with unfavorable vs. favorable neurological outcome on admission (32 vs. 17 %; 55 vs. 35 %; 59 vs. 41 %, respectively—all p values <0.05) or during the ICU stay (64 vs. 47 %; 67 vs. 43 %; 70 vs. 51 %, respectively—all p values <0.05). In the multivariable analysis, renal failure on admission, SAPS II, maximum lactate levels within the first 24 h after ICU admission and the development of severe sepsis were independent predictors of ICU mortality. Increasing age, high SAPS II and the use of HT were independent predictors of unfavorable neurological outcome. No extra-cerebral organ failure occurring during the ICU stay was independently associated with ICU mortality or neurological outcome.

CONCLUSION. In this multicenter cohort of CA patients, extra-cerebral organ dysfunction is common on admission and during the ICU stay. Although more frequent in those patients with poor outcomes, post-CA renal failure on admission was the only extra-cerebral organ dysfunction identified as an independent predictor of ICU mortality.

0793

INCREASED ADMISSION PENTRAXIN 3 AND ST2 ARE ASSOCIATED WITH EARLY NON-NEUROLOGICAL ORGAN DYSFUNCTION BUT NOT WITH LONG-TERM MORTALITY AFTER OUT-OF-HOSPITAL CARDIAC ARREST

G. Ristagno¹, R. Latini¹, J. Vaahersalo², S. Masson¹, B. Bottazzi³, A. Alekssova⁴, A. Montanelli⁵, R. Bernasconi¹, G. Sinagra⁶, M. Tiainen⁷, J. Kurolova⁸, V. Pettila², T. Varpula², M.B. Skrifvars², FINNRESUSCI Study Group

¹IRCCS-Istituto di Ricerche Farmacologiche ‘Mario Negri’, Milan, Italy, ²Helsinki University Central Hospital, Department of Anaesthesiology and Intensive Care Medicine, Helsinki, Finland, ³Istituto Clinico Humanitas, Rozzano, Italy, ⁴Ospedale Riuniti and University of Trieste, Trieste, Italy, ⁵Helsinki University Hospital, Department of Neurology, Helsinki, Finland, ⁶Centre for Prehospital Emergency Care, Kuopio University Hospital, Kuopio, Finland

INTRODUCTION. After cardiac arrest an inflammatory response similar to sepsis is seen. **OBJECTIVES.** We studied two novel inflammatory markers, pentraxin 3 (PTX3) and ST2, and compared them to high sensitivity C-reactive protein (CRP) for prediction of subsequent organ dysfunction and long term outcome after out-of-hospital cardiac arrest.

METHODS. A 12-month prospective observational multicenter study was conducted in 21 Finnish intensive care units in 2011 (1). Pentraxin 3 (ng/ml), ST2 (ng/ml), hs-CRP (mg/l) were measured with an automatic immune analyzer and an enzyme-linked immunosorbent assay at ICU admission, 0–6 h after return of spontaneous circulation (ROSC). We defined early non-neurological organ dysfunction as the sequential organ failure assessment (SOFA) score measured during the first 24 h, excluding the neurology score. The SOFA score was divided into tertiles, low (0–5), median (6–7), and high (8–15) and into two groups, higher (7–15) and lower (0–6) than median. Associations with time to ROSC, non-neuro SOFA scores and 12-month cerebral performance category (CPC) were tested for using statistical methods.

RESULTS. A total of 246 OHCA patients had blood samples measured on ICU admission and were included in the study. Among them, 115 (47 %) survived with good neurologic outcome (CPC 1–2) at 12 months after cardiac arrest. Plasma concentrations of PTX3 (p = 0.002) and hsCRP (p = 0.009), but not ST2 (p = 0.434) were higher with prolonged time to ROSC. Levels of PTX3 (p < 0.001) and ST2 (p < 0.001), but not hsCRP (p = 0.758), on ICU admission were associated with subsequent 24 h non-cerebral organ dysfunction (Figure 1). The area under the curve were 0.67 for PTX3, 0.60 for ST2 and 0.5 for hsCRP for prediction of organ dysfunction, and respectively 0.65, 0.62 and 0.56, for 12-month outcome. With multivariate logistic regression including known predictors of OHCA outcome none of the studied markers independently predicted 12 month outcome.

CONCLUSION. Admission ST2 and PTX3 but not hsCRP are associated with subsequent organ dysfunction but do not independently predict long term outcome.

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0794

POSITIVE TRENDS IN ADMISSION AND OUTCOME MEASURES FOLLOWING OUT OF HOSPITAL CARDIAC ARREST: EVIDENCE FOR OPTIMISM IN CRITICAL CARE CULTURE?

A.J. Gardner¹, R.M. Battleday¹, J. Griffiths², S. Mckechnie²

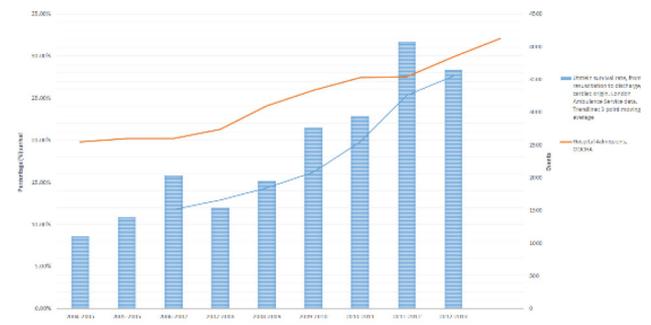
¹University of Oxford, Medical School, Oxford, United Kingdom, ²Oxford University Hospitals Trust, Department of Intensive Care, Oxford, United Kingdom

INTRODUCTION. Traditionally, the prognosis of out of hospital cardiac arrest (OOHCA) patients has been regarded as poor, with ~40 % of admitted patients surviving with good neurological status. This situation, along with a lack of specific therapeutic interventions, has been felt to perpetuate a nihilistic attitude to the prognostication and admission of OOHCA patients. Recently, the availability and implementation of critical care interventions for these patients have steadily improved, accompanied by refinements in care pathways. These advances are likely to have increased the number of patients admitted to critical care following OOHCA and improved overall prognosis.

OBJECTIVES. In this study, we hypothesise that the increasing availability and use of key interventions has driven an increase in the proportion of OOHCA patients admitted to hospital. Furthermore, we expect outcome measures to have increased in parallel.

METHODS. We review OOHCA admission and outcome data from the London Ambulance Service (LAS) and Hospital Episode Statistics (England) databases from 2000 to 2012 (inclusive).

RESULTS. From 2000 to 2012, the number of OOHCA patients being admitted in England increased by 158 %. Despite this, the number of patients dying in hospital has at a significantly lower rate. The number of admissions rose most rapidly between 2005 and 2010, the period when several key clinical guidelines were updated. Data from the LAS indicate that the incidence of attended OOHCA has remained roughly constant. In contrast, the proportion of resuscitated patients who survive to hospital discharge has increased, from 8.6 % in 2004 to 28.4 % in 2012 (Ustein survival rates).



[Admission and Survival Data]

CONCLUSION. From these data, it is clear that the proportion of OOHCA survivors admitted to hospital has increased over the last decade, accompanied by significant

improvements in survival measures. We posit that these data reflect an optimistic cultural shift in resuscitation and admission practice, which has in turn positively affected outcome measures. Likely drivers of such a change include improvement in pre-hospital measures, the increased repertoire and availability of therapeutic techniques, and faith in more developed care pathways. In this regard, the results of the recent TTM trial (1) are particularly interesting, as they suggest that the intervention of cooling itself is less efficacious than previously thought. Moreover, examination of the control group from this trial reveals a 15 % increase in the proportion of OOHCA survivors compared to a similar trial conducted a decade earlier (1, 2). As novel techniques and evidence emerge, critical care culture must adapt to embrace them: this study highlights the positive influence that an optimistic shift can have on the mortality and morbidity associated with a disease.

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0795

COAGULATION FACTOR AND PROGNOSIS IN PATIENTS AFTER CARDIOPULMONARY RESUSCITATION WITH THERAPEUTIC HYPOTHERMIA

L. Doo Hyo¹, O. Joo Suk²

¹The Catholic University of Korea, Seoul St. Mary’s Hospital, Emergency Medicine, Seoul, Republic of Korea, ²Catholic University, Uijeongbu St. Mary’s Hospital, Emergency Medicine, Gyeonggi-do, Republic of Korea

INTRODUCTION. Marked activation of blood coagulation and fibrin formation after cardiac arrest is well known. In a recent study, hyperfibrinolysis occurs at the same time in reaction to this phenomenon. Empirically, prolonged CPR also elevates coagulation factors such as serum D-dimer, FDP, fibrinogen, PT, aPTT and is associated with higher mortality rate. So, we assessed the hypothesis that the plasma level of coagulation factors can be used to predict prognosis in patient who were treated with TH after CPR. And they can be compared with the existing prognostic biomarkers such as serum NSE, S-100.

OBJECTIVES. The purpose of this study is to clarify the clinical significance of coagulation factor as a prognostic tool in patients with cardiac arrest treated with therapeutic hypothermia(TH).

METHODS. We designed a retrospective case review study in one university hospital. All adult patients who suffered cardiac arrest from December 2011 to February 2014 were considered for inclusion in the study. Patients who did not perform TH were excluded from the analysis. Patients with pregnancy, DVT and hematologic disorder were also excluded. All patients were divided into two groups, the good and the poor outcome group depending on the final cerebral performance category (CPC). The CPC was used as the outcome measure; a CPC of 1–2 was regarded as a good outcome, and a CPC of 3–5 a poor outcome. Serum D-dimer, FDP, PT, aPTT, anti-thrombin III, fibrinogen, NSE and S-100 were taken within one hour after ROSC. Logistic regression was used for multivariable analysis.

RESULTS. 92 patients were included (22 in the good outcome group, 70 in the poor outcome group). The median serum PT, aPTT, FDP, fibrinogen and D-dimer levels were grossly elevated in poor outcome group. Only serum PT, D-dimer level were significantly associated with poor outcome (PT: OR = 1.577; 95 % CI = 1.08–17.49, D-dimer: OR = 1.577; 95 % CI = 1.06–2.33). The area under the receiver operating characteristic (AUC) of PT, D-dimer and S-100 for prediction of poor outcome was 0.822 (95 % CI = 0.72–0.89), 0.68 (95 % CI = 0.57–0.77), 0.811 (95 % CI = 0.70–0.89), respectively. Other factors were not associated with prognosis.

Table 1
Patient characteristics stratified according to prognosis

	Good outcome (CPC 1,2) n = 22	Poor outcome (CPC 3,4,5) n = 70	p
Demographic data			
Sex, male, no. (%)	17 (18.5)	42 (45.7)	0.203
Age, years, mean (SD)	50 (17.40)	60.38 (14.44)	<0.05
Cardiac arrest in public location, no. (%)	17 (18.5)	57 (62)	0.759
Witnessed cardiac arrest, no. (%)	20 (21.7)	46 (50)	<0.05
Bystander chest compression, no. (%)	15 (16.3)	26 (28.3)	<0.05
Non-shockable initial rhythm, no. (%)	11 (12)	60 (65.2)	<0.05
Total anoxic time, min, median (IQR)	15 (10–27)	31 (19–40.75)	<0.05
Absolute anoxic time, min, median (IQR)	4.09 (0–5.25)	5.5 (0–9.25)	0.483
Coagulation factor			
PT, seconds, median (IQR)	12 (10.95–12.92)	14.35 (12.90–18.92)	0.059
aPTT, seconds, median (IQR)	26.4 (23–32.1)	35.1 (26.5–51)	<0.05
Fibrinogen, mg/dL, median (IQR)	183.1 (159.3–296.7)	229.65 (172.4–306.6)	0.721
D-dimer, ug/mL, median (IQR)	5.88 (4.35–14.13)	26.88 (7.58–35.2)	<0.05
FDP, ug/mL, median(IQR)	19.65 (12.3–32.5)	60.3 (27–80)	<0.05
Anti-thrombin III, ug/L, median (IQR)	88.1 (77.2–98.3)	76.25 (62.1–92.7)	<0.05
Platelet, 10 ³ /L, median (IQR)	221.5 (192–264)	203 (135–245)	0.059
Prognostic marker			
NSE, ng/mL, median (IQR)	18.26 (14.02–26.85)	22.43 (16.23–26.92)	0.253
S-100, ug/L, median (IQR)	0.36 (0.1–1.77)	2.34 (1.19–4.98)	<0.05

SD, standard deviation; IQR, interquartile range; PT, prothrombin time; aPTT, activated partial thromboplastin time; FDP, fibrin degradation product; CPC, cerebral performance category.

* D-dimer level higher than 35.20 ug/mL was reported as ‘35.20 ug/mL’ in study hospital.

Table 2

Stepwise multivariate logistic regression model analysis of the relationship between poor outcome and various potential prognostic factors.

	Odds ratio	p
Non-shockable initial rhythm, no.	4.361 (1.08–17.49)	0.038
PT, seconds	1.577 (1.06–2.33)	0.023
D-dimer, ug/mL	1.053 (0.99–1.11)	0.064

PT, Prothrombin time.

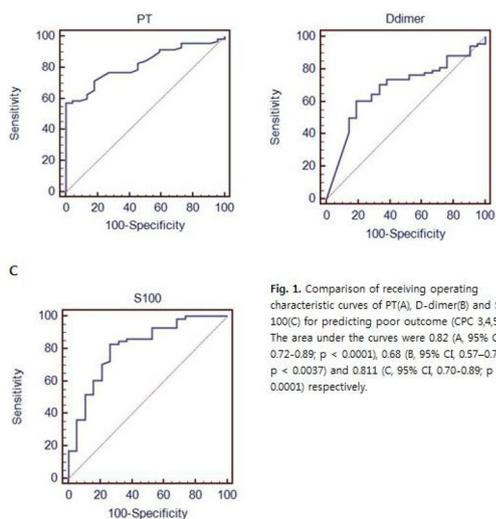


Fig. 1. Comparison of receiving operating characteristic curves for PT (A), D-dimer (B) and S-100 (C) for predicting poor outcome (CPC 3,4,5). The area under the curves were 0.82 (A, 95% CI, 0.72–0.89; $p < 0.0001$), 0.68 (B, 95% CI, 0.57–0.77; $p < 0.0037$) and 0.811 (C, 95% CI, 0.70–0.89; $p < 0.0001$) respectively.

[Figure]

CONCLUSIONS. Increased PT and D-dimer levels are significantly associated with poor prognosis.

PT and d-dimer values have a potential to be used as new prognostic predictors along with the current prognostic factor, S-100 protein.

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Acute respiratory failure: from intubation to weaning attempts: 0796–0809

0796

TREATMENT OF POST-INTUBATION HEMODYNAMIC INSTABILITY IN CRITICALLY ILL INTENSIVE CARE UNIT PATIENTS: A MULTICENTER STUDY

R.S. Green¹, A.F. Turgeon², L.A. McIntyre³, A. Fox-Robichaud⁴, D.A. Fergusson⁵, M.B. Butler⁶, M. Erdogan⁷

¹Nova Scotia Trauma Program, QEII Health Sciences Centre, Dalhousie University, Departments of Emergency Medicine and Anesthesia, Division of Critical Care Medicine, Halifax, Canada, ²CHU de Québec Research Center, Hôpital de L'Enfant-Jésus, Université Laval, Department of Anesthesiology, Division of Critical Care Medicine, Québec, Canada, ³University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Critical Care Medicine, Ottawa, Canada, ⁴McMaster University Medical Centre, Department of Medicine, Hamilton, Canada, ⁵University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Clinical Epidemiology, Ottawa, Canada, ⁶Dalhousie University, Department of Anesthesia, Division of Critical Care Medicine, Halifax, Canada, ⁷Nova Scotia Trauma Program, Halifax, Canada

INTRODUCTION. Post-intubation hemodynamic instability (PIHI) is an adverse event that may occur during emergent endotracheal intubation (EETI) of critically ill patients (1). Despite the commonly held tenet that EETI is a life-saving procedure, it is possible that the development of PIHI in patients requiring EETI may result in less than optimal outcomes (2).

OBJECTIVES. To determine the incidence of post-intubation hemodynamic instability and its association with outcomes in critically ill patients requiring emergent endotracheal intubation.

METHODS. Four tertiary care hospitals participated in this retrospective multicenter case series study between October 2006 and July 2010: Queen Elizabeth II Health Sciences Centre (Halifax, NS), Hôpital de L'Enfant-Jésus (Québec City, QC), The Ottawa Hospital (Ottawa, ON), and Hamilton General Hospital (Hamilton, ON). Patients over age 16 who required intubation under the direction of the intensive care unit (ICU) service were eligible. Medical records were accessed for consecutive patients admitted to the ICU at each site. Overall, 479 patients requiring intubation were included for analysis. Data extracted from medical records included vital signs, intravenous fluid administration, and vasopressor medication use in the peri-intubation phase (30 min before and after intubation). Our primary outcome was the incidence of PIHI. Secondary outcomes included mortality, length of stay, hemodialysis requirement, vasopressor requirement, and a composite endpoint of mortality, length of stay, and vasopressor requirement.

RESULTS. Overall, the incidence of PIHI among ICU patients requiring intubation was 45.5% (218 of 479 patients). Patients who developed PIHI had increased ICU mortality (36.9% PIHI, 28.4% no-PIHI), overall mortality (39% PIHI, 30.3% no-PIHI), vasopressor requirement (48.2% PIHI, 32.9% no-PIHI), and the composite endpoint (70.6% PIHI, 52.5% no-PIHI). On multivariate analysis, PIHI was associated with the composite endpoint (OR = 1.91; 95% CI: [1.13–3.22], $P = 0.0154$) but was not associated with increased patient mortality.

CONCLUSIONS. Our results demonstrate PIHI is a common adverse event in ICU patients requiring emergency airway control and associated with poor patient outcomes. Further investigation is required to delineate the importance of PIHI in EETI.

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0797

TREATMENT OF POST-INTUBATION HEMODYNAMIC INSTABILITY BY CANADIAN EMERGENCY MEDICINE AND CRITICAL CARE MEDICINE PHYSICIANS

R.S. Green¹, D.A. Fergusson², A.F. Turgeon³, L.A. McIntyre⁴, G. Kovacs⁵, D. Griesdale⁶, M.B. Butler⁷

¹Nova Scotia Trauma Program, QEII Health Sciences Centre, Dalhousie University, Departments of Emergency Medicine and Anesthesia, Division of Critical Care Medicine, Halifax, Canada, ²University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Clinical Epidemiology, Ottawa, Canada, ³CHU de Québec Research Center, Hôpital de L'Enfant-Jésus, Université Laval, Department of Anesthesiology, Division of Critical Care Medicine, Québec, Canada, ⁴University of Ottawa, Ottawa Hospital Research Institute, Department of Medicine, Division of Critical Care Medicine, Ottawa, Canada, ⁵Dalhousie University, Department of Emergency Medicine, Halifax, Canada, ⁶Vancouver General Hospital, University of British Columbia, Department of Anesthesia, Pharmacology and Therapeutics, Department of Medicine, Division of Critical Care Medicine, Vancouver, Canada, ⁷Dalhousie University, Department of Anesthesia, Division of Critical Care Medicine, Halifax, Canada

INTRODUCTION. Post-intubation hemodynamic instability (PIHI) is an adverse event that is common in the emergency medicine (EM) and critical care medicine (CCM) patient populations, and may be associated with poor patient outcomes. Despite this, little is known about how physicians respond to PIHI in practice.

OBJECTIVES. To determine the clinical thresholds for initiating treatment of PIHI by Canadian EM and CCM physicians.

METHODS. A survey exploring physician preferences of clinical thresholds to treat hemodynamic instability in three clinical scenarios was developed by the investigative team, and distributed nationally to Canadian physicians that specialize in emergency medicine and critical care. Respondents answered questions that ranged on a 5- or 6- point Likert scale. Comparisons were performed using an ordinal logistic regression model where the response was ordinal, and using Fisher's test where the response was dichotomous.

RESULTS. A total of 1,758 physicians were contacted, and 882 (50.2%) completed the survey. Of these 882, 711 (80.6%) were emergency medicine physicians and 171 (19.4%) were critical care practitioners. The most common thresholds for physicians to treat PIHI were a systolic blood pressure (SBP) of 90 mmHg (53.9% of respondents) and a mean arterial pressure (MAP) of 60 mmHg (56.7% of respondents). Overall, the majority of physicians indicated that they would treat PIHI within 1–2 min (79.7%), with 57.1% choosing to treat "immediately". 8.9% of respondents indicated they would only intervene after 4 min of hypotension.

Of the three clinical scenarios assessed, clinicians indicated that they would accept a lower SBP threshold in the congestive heart failure (CHF) scenario compared to either the trauma scenario (OR = 1.38; CI: [1.14, 1.15], $P < 0.001$) or the sepsis scenario (OR = 1.41; CI: [1.15, 1.74]; $P < 0.001$), yet there was no difference in the MAP threshold. In addition, clinicians were more likely to rapidly treat PIHI in both the sepsis (OR = 1.27; CI: [1.04, 1.53]; $P < 0.001$) and the trauma scenarios (OR = 1.88; CI: [1.52, 2.32]; $P < 0.001$) compared to the CHF scenario. When assessed by specialty, critical care physicians were more likely to treat PIHI immediately (OR = 1.35; CI: [1.10, 1.67]; $P = 0.005$) yet tolerate a lower SBP (SBP treatment threshold 80 mmHg, OR = 0.679; CI: [0.54, 0.85], $P = 0.001$) and MAP (MAP treatment threshold 60 mmHg, OR = 0.282; CI: [0.21, 0.37], $P < 0.001$).

CONCLUSIONS. The results of this survey suggest that the PIHI thresholds for intervention in Canadian resuscitation practice are a SBP of 90 mmHg or a MAP of 60 mmHg, and that most physicians would treat PIHI immediately. However, both patient illness and physician specialty are important variables.

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0798

PEEP-DEPENDENT END-EXPIRATORY LUNG VOLUME CHANGES IN MORBIDLY OBESE PATIENTS AFTER INITIATION OF MECHANICAL VENTILATION

C. Nestler¹, P. Simon¹, S. Hammermüller¹, I. Zimmermann¹, A. Jardim-Neto², A. Giannella-Neto², A. Beda³, A. Dietrich^{4,5}, U.X. Kaisers^{1,5}, A.W. Reske¹, H. Wrigge^{1,5}

¹University Hospital Leipzig, Department of Anesthesiology and Intensive Care Medicine, Leipzig, Germany, ²Federal University of Rio de Janeiro, Biomedical Engineering Program, Rio de Janeiro, Brazil, ³Federal University of Minas Gerais, Department of Electronic Engineering, Belo Horizonte, Brazil, ⁴University Hospital Leipzig, Department of Surgery, Leipzig, Germany, ⁵University Hospital Leipzig, Integrated Research and Treatment Center (IFB) Adiposity Diseases, Leipzig, Germany

INTRODUCTION. End-expiratory lung volume (EELV) in obese patients decreases during initiation of mechanical ventilation (MV). Ventilation at low EELV may promote lung injury even in patients with normal lungs. Lung recruitment followed by ventilation with adequate PEEP can reduce atelectasis formation². Little is known about the amount of EELV reduction after initiation of MV and the level of PEEP required to prevent it. Tidal recruitment and ventilation inhomogeneity may be individually minimized by PEEP-titration based on the Electrical Impedance Tomography (EIT)-derived regional ventilation delay (RVD) index³.

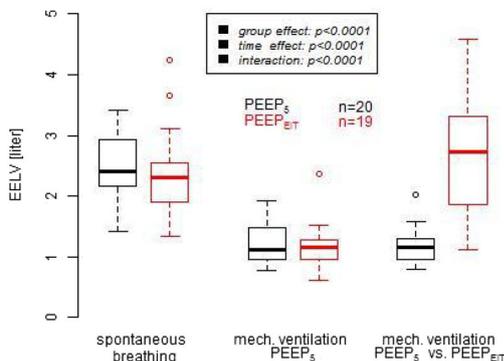
OBJECTIVES. To study (1) the extent of EELV-decrease during initiation of MV in healthy obese patients, (2) the hypothesis that EELV drop can be reversed and EELV can be stabilized over time by a recruitment maneuver followed by individualized PEEP using EIT (PEEP_{EIT}).

METHODS. Obese patients without lung disease scheduled for bariatric laparoscopic surgery were randomized to receive either conventional PEEP of 5 cmH₂O (PEEP₅) or PEEP_{EIT}. After induction of anaesthesia, constant flow volume-controlled ventilation ($V_T = 8$ ml/kg PBW, I:E ratio 1:2, RR 12/min) was started and baseline measurements were performed at PEEP₅. In the PEEP_{EIT} group recruitment maneuvers (50 cmH₂O) preceded EIT measurements (PulmoVista™, Draeger, Germany) during decremental PEEP-trials (range 26–4 cmH₂O, steps of 2 cmH₂O). Minimal RVD index³ calculated from impedance time curves of each pixel during a low flow inflation maneuver on each PEEP level defined PEEP_{EIT}.

EELV was measured by multiple breath nitrogen washout with a mass spectrometer (AMIS 2000, Odense, Denmark) in both groups before ("spontaneous breathing", supine position), directly after initiation of MV at PEEP₅ (supine position, no capnoperitoneum), and after PEEP_{ET} titration during surgery (antitrendelenburg position, with capnoperitoneum, intra-abdominal pressure 12 (12–14) cm H₂O).

Data are given as median (range). Repeated measures ANOVA statistics were used. **RESULTS.** Time course of EELV in 39 patients (20 PEEP₅ vs. 19 PEEP_{ET}) with a BMI of 50 (38–70) kg/m² is given in Figure 1. Initiation of MV with PEEP₅ decreased EELV by more than 50 %. PEEP_{ET} amounted 18 (10–26) cm H₂O and restored EELV comparable to values during spontaneous breathing. EELV at PEEP₅ in supine position equaled those with capnoperitoneum in antitrendelenburg position.

Figure 1: PEEP dependent EELV changes



CONCLUSIONS. Our preliminary clinical data suggest that significant EELV drop after initiation of MV can be reversed by a recruitment maneuver followed by individualized PEEP ventilation requiring PEEP values higher than currently used.

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0799

A RANDOMIZED CONTROLLED TRIAL COMPARING THE VENTILATION DURATION BETWEEN ADAPTIVE SUPPORT VENTILATION AND CONVENTIONAL MODES IN MEDICAL ICU PATIENTS

C. Kirakli¹, I. Naz¹, O. Ediboglu¹, D. Tatar¹, E. Tellioglu¹, F. Tuksavul¹

¹Izmir Chest Diseases and Surgery Training Hospital, Intensive Care Unit, Izmir, Turkey **INTRODUCTION.** There are some studies suggesting that adaptive support ventilation (ASV), a closed loop ventilation mode, shortens the weaning duration in some patient groups.

OBJECTIVES. We aimed to investigate the effect of ASV on total duration of mechanical ventilation (MV), weaning and intensive care unit (ICU) stay when compared to pressure controlled ventilation (PCV), a conventional mode.

METHODS. Patients who were mechanically ventilated longer than 24 h were randomized into ASV and PCV. Demographic data and total duration of MV, weaning and ICU stay, total number of manipulations, need for sedation and self-extubation rates were compared.

RESULTS. 229 medical ICU patients were enrolled between December 2011 and December 2013. Mean total duration of mechanical ventilation was 5 ± 4 and days in ASV and 6 ± 5 days in PCV (p = 0.008). Mean duration of weaning was 22 ± 52 h in ASV and 44 ± 64 h in PCV (p = 0.017). Median total number of manual settings to achieve the desired minute ventilation and PaCO₂ levels were 2 (1–3) in ASV and 3 (2–5) in PCV (p < 0.001). ICU length of stay, need for sedation, self extubation and mortality rates were comparable between the two groups.

CONCLUSIONS. ASV seems to decrease the total duration of mechanical ventilation and weaning and staff's workload when performed from intubation until extubation.

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0800

A RANDOMIZED CONTROLLED TRIAL OF TWO ALGORITHMS FOR WEANING CARDIAC SURGICAL PATIENTS RECEIVING ADAPTIVE SUPPORT VENTILATION

P. Tam¹, C.D. Gomersall¹, Q. Tian¹, S.K. Ng¹, T.A. Buckley², M.J. Underwood³

¹The Chinese University of Hong Kong, Dept of Anaesthesia and Intensive Care, Shatin, Hong Kong, China. ²Princess Margaret Hospital, Intensive Care Unit, Lai Chi Kok, Hong Kong, China. ³The Chinese University of Hong Kong, Dept of Surgery, Shatin, Hong Kong, China

INTRODUCTION. Adaptive support ventilation (ASV) is an effective mode to wean fast-track cardiac surgical patients [1, 2]. Trials comparing ASV (using different algorithms) with Synchronised Intermittent Mandatory Ventilation (SIMV) suggest that an ASV

algorithm that incorporates a progressive decrease in target minute ventilation might result in more rapid weaning [2, 3].

OBJECTIVES. To determine whether an algorithm incorporating a decremental target minute ventilation results in more rapid weaning of patients ventilated in Adaptive Support Ventilation mode following cardiac surgery compared to an algorithm incorporating a constant target minute ventilation.

METHODS. Randomized controlled unblinded study of 54 adults ventilated in Adaptive Support Ventilation mode following elective coronary artery bypass grafting.

The anaesthetic and surgical technique was standardized. Patients were randomized to one of two algorithms for mechanical ventilation with ASV: an algorithm incorporating a decremental target minute ventilation or an algorithm in which target minute ventilation was constant. The target minute ventilation was reduced to 50 % and then 25 % of predicted target minute ventilation (based on height and sex) in the decremental group if the patient was making spontaneous breathing efforts and there were no signs of weaning intolerance. Reductions were made by bedside nurses. Target minute ventilation was maintained at 100 % of predicted in the constant target minute ventilation group. Patients were considered to have failed the weaning protocols if they were still ventilated at 8 h. Sedation was stopped on arrival in the ICU in both groups. All other management, including analgesia, followed standard unit guidelines.

RESULTS. Median duration of mechanical ventilation was significantly shorter in the decremental target minute ventilation group (145 vs 309 min) as was the duration of intubation (225 vs 423 min). The incidence of adverse effects (42 vs 46 %) and mortality (0 vs 0 %) and the duration of ICU stay (21 vs 22 h) were not significantly different between the two groups. Patients in the decremental target minute ventilation group required more manual ventilator changes (2.5 vs 0.6) but fewer patients in this group required assessment by a physician as a result of weaning protocol failure (0 vs 5).

CONCLUSIONS. Adaptive support ventilation has previously been demonstrated to be an effective method of weaning patients following fast-track cardiac surgery. Data from this study indicate that the speed of liberation from the ventilator can be further enhanced by progressive reduction in the target minute ventilation without an increase in adverse effects. However, this does require an average of two additional ventilator changes per patient.

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0801

24-H PRETREATMENT VERSUS 6-H PRETREATMENT WITH DEXAMETHASONE FOR PREVENTION OF POSTEXTUBATION AIRWAY OBSTRUCTION IN CHILDREN: A RANDOMIZED DOUBLE-BLIND TRIAL

A.K. Baranwal¹, J.P. Meena², S.C. Singhi², J. Murlidharan²

¹All India Institute of Medical Sciences, Department of Pediatrics, Patna, India,

²Postgraduate Institute of Medical Education and Research, Department of Pediatrics, Chandigarh, India

INTRODUCTION. Post-extubation airway obstruction (PEAO) is common in pediatric critical care practice. Multi-dose steroid reduces its incidence among adults, controversy however continues among children.

OBJECTIVES. To evaluate effect of 24 h pretreatment with dexamethasone (24 hPD) on incidence of PEAO and reintubation in children intubated for ≥48 h compared to 6 h pretreatment (24 hPD).

METHODS. • **DESIGN.** Prospective, randomized, placebo-controlled, double-blind trial. • **SETTING.** 12-bed PICU at an urban tertiary care teaching hospital in a developing economy.

• **PATIENTS.** 124 children (3 months–12 years) intubated for ≥48 h and anticipated to have their first planned extubation during next 24 h. Patients with pre-existing upper airway conditions, chronic respiratory diseases, steroid therapy in last 7 days, gastrointestinal bleeding, hypertension, hyperglycemia and those likely to have poor airway reflexes were excluded.

• **INTERVENTION.** Patients were randomized to receive 24-h pretreatment with dexamethasone (0.5 mg/Kg/dose, q6 h, total of 6 doses; n = 66) or 6-h pretreatment (total of 3 doses; n = 58).

RESULTS. Two groups had similar baseline characteristics. 24 hPD significantly reduced incidence of PEAO (43/66 vs 48/58; p = 0.027) with absolute risk reduction of 17 %. It also reduced incidence of reintubation by half, however it was statistically not significant (5/61 vs 9/58; RR, 1.09; 95 %CI; 0.96–1.25). Time to recovery from PEAO among non-reintubated patients was significantly lesser among 24 hPD patients (Log-rank test, p = 0.016). No adverse event was noted with dexamethasone use. Not receiving 24 h pretreatment with Dexamethasone, Intubation duration >7 days and cuffed tracheal tubes were found to be independent-risk factors for PEAO (OR, 2.6, 6.0 and 3.1 respectively).

CONCLUSIONS. 24 h pretreatment with multi-dose dexamethasone had reduced incidence of PEAO, as well as time to recover from it. 24 hPD should be considered for high risk children intubated for >48 h in the study setting. Further studies on larger sample size from different socio-economic background are desirable to validate these findings.

0802

NURSE-DRIVEN SEDATION PROTOCOL WITH SEDATION VACATION AND INCIDENCE OF UNPLANNED EXTUBATIONS

T. Joannon¹, A.-S. Debue¹, A. Marincamp¹, S. Ben Abdallah¹, J. Charpentier¹, F. Daviaud¹, J.-D. Chiche¹, Groupe de travail sur la ventilation

¹Hôpital Cochin-APHP, Service de Réanimation Médicale Polyvalente, Paris, France

INTRODUCTION. Unplanned extubation (UE) is a common complication of mechanical ventilation (MV). High incidence of UE is increasingly used as a marker of poor quality of care. Risk factors of UE depend upon the care setting (case mix, nurse to patient ratio, presence of respiratory therapists, open/closed ICUs, ...) or the existence of defined care protocols aiming to reduce the duration of MV. Among those, the use of sedation and agitation scales to adjust infusion of sedatives, sedation vacation and weaning protocols may influence the incidence of UE¹.

OBJECTIVES. Evaluate the incidence and risk factors of UE before/after the introduction of RASS-targeted sedation and weaning protocols, including daily sedation stops.

PATIENTS AND METHODS. Monocentre, retrospective study conducted in the 24-bed medical ICU of Cochin University hospital. Informed consent was waived by our IRB for this observational study. Since 11/2006, all patients data are continuously recorded in a clinical information management system (Clinisoft[®], GE Healthcare). Characteristics of each episode of UE (circumstances, staffing pattern, use of physical restraints, ...) are prospectively documented and reviewed during morbidity and mortality rounds. In 2009, we

introduced a sedation vacation and nurse-driven, RASS-targeted sedation protocol. We retrospectively reviewed all cases of UE over a 6-year period to assess the incidence, characteristics and risk factors of UE before and after implementation of the protocol. Data are presented as medians and interquartile ranges. A P value <0.05 was considered significant for all statistical tests performed.

RESULTS. Between 11/2006 and 11/2012, 4029 pts were mechanically ventilated for 3 [2, 8] days. Among them, we identified 199 patients (age 51 [36, 64], 132 M/67F, SAPS2 52 [39, 62], SOFA 6 [4, 9]) with 199 episodes of UE (incidence 7.5/1,000 MV days). Reason for intubation in the UE group were coma (97 pts), acute respiratory failure (61 pts), cardiac arrest (27 pts), shock (14 pts). There was a significant difference in the incidence of UE and characteristics of UE episodes before and after implementation of the RASS-targeted sedation protocols, weaning protocols, and sedation vacation (5.65/1,000 MV days vs 8.38/1,000 MV days, P < 0.05). Of note, no UE occurred during a sedation stop.

CONCLUSIONS. A nurse-driven sedation protocol with sedation vacation appear to increase the incidence of unplanned extubations. These data warrant a specific analysis of risk factors for UE during both periods.

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0803

CLINICAL AND ECHOCARDIOGRAPHIC CHARACTERISTICS OF CRITICALLY ILL PATIENTS ACCORDING TO WEANING CATEGORIES FROM MECHANICAL VENTILATION

P.A. Lopez-Garzon¹, J.C. Suarez-Montero¹, J. Mancebo Cortes¹, L. Zapata¹

¹Hospital de la Santa Creia i Sant Pau, Intensive Care Department, Barcelona, Spain

OBJECTIVE. To define clinical data, echocardiographic parameters and outcome of mechanical ventilated (MV) patients according to weaning categories.

METHODS. Three months prospective observational study in a university hospital. We included patients admitted to the intensive care unit (ICU) under MV for more than 48 h. Patients with limited echocardiographic window and those who did not start a spontaneous breathing trial (SBT) were excluded. A complete two-dimensional and Doppler echocardiography was performed within the first 48 h under volume-controlled MV. Demographic data at admission and daily clinical data (including fluid balance) were recorded. Patients were divided into three weaning groups simple, difficult and prolonged (1).

RESULTS. We screened 71 patients and 28 were excluded (5 died before a first SBT, 3 unplanned extubation, 5 tracheostomy and 15 with poor ecocardiography window). We thus analysed 43 patients (67.5 % male), mean age 62 ± 15 years. The SAPS II (Simplified Acute Physiology Score) was 47.2 ± 15.7. The distribution according to weaning categories was: 20 (46.5 %) simple, 10 (25.2 %) difficult and 12 (27.9 %) prolonged. Clinical and echocardiographic baseline data in relationship with the weaning outcome are described in Table 1. Prolonged weaning patients showed more days under MV and higher ICU mortality. Difficult group had significant negative fluid balance between first SBT to successful extubation (p = 0.007).

Table 1	Simple	Difficult	Prolonged	p
Patient (N:43)	21 (49%)	10 (23%)	12 (28%)	-
Age	62 ± 16	59 ± 14	64 ± 15	0.671
SAPS II	43.3 ± 14.9	47.7 ± 9.1	53.8 ± 19.5	0.184
Comorbidities				
COPD (N:3)	14%	10%	42%	0.11
CHF (N:5)	14%	10%	8%	0.86
Fluid balance (ml/day)				
First 48 hours	-37.3 ± 2090	765 ± 954	541 ± 2240	0.585
At first SBT	-921 ± 520	155 ± 1391	-617 ± 684	0.010
From first SBT to success extubation		1387 ± 1148	1123 ± 749	0.631
Echocardiographic data				
Left ventricular ejection fraction (%)	60 ± 17	62 ± 12.8	57 ± 18	0.819
Ea	11 ± 5.5	11.5 ± 5.36	11.7 ± 5.03	0.972
Ff/a	9.3 ± 3.46	7.4 ± 7.79	8.22 ± 7.74	0.437
Diastolic dysfunction	50%	50%	80%	0.89
Reintubation rate	0%	10%	25%	0.059
ICU mortality	0%	10%	25%	<0.05
Days of MV	8.5 ± 5	9 ± 3.3	22 ± 12.7	<0.000

Ea: early diastolic mitral annular velocities; E: time course of active left ventricular relaxation; COPD: Chronic Obstructive Pulmonary Disease; CHF: congestive heart failure. Results are expressed as mean ± standard deviation and percentages.

CONCLUSIONS. Prolonged weaning is frequent and associated with poor outcomes. Diastolic dysfunction is a common abnormality in mechanically ventilated patients; which together, with fluid balance may influence in the weaning outcome.

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0804

ATTENTION TO WEANING FROM MECHANICAL VENTILATION PROTOCOL: AN EDUCATIONAL CHALLENGE

R.P. Oliveira^{1,2}, C. Teixeira^{1,2}, A. Savi¹, J.G. Maccari¹, L.G.A. Borges¹, J.M. Silva¹, S.G. Ibrahim¹, N.B.D. Silva², S.R.R. Vieira³

¹Moinhos de Vento Hospital, Adult ICU, Porto Alegre, Brazil, ²Universidade Federal de Ciências da Saúde de Porto Alegre, Clínica Médica, Porto Alegre, Brazil, ³Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

INTRODUCTION. The implementation of a weaning protocol is referred to an earlier removal from mechanical ventilation (MV), reduction of extubation failure and intensive care unit (ICU) costs. Moreover, it is known that a new approach, proven by literature, may take several years to become standard of care in daily practice.

OBJECTIVE. Access the different specialties physician adherence rates to the weaning protocol.

METHODS. In a prospective cohort study we investigated all consecutive patients MV-dependent for more than 24 h admitted from Jan-2004 to Dec-2010 in a medical-surgical ICU. Data of age, gender, cause of ventilatory failure, APACHE II score, weaning outcome, and physician adherence weaning protocol were collected in all patients.

RESULTS. We enrolled 2,469 patients over 7 years, with 1,943 patients (78.7 %) of weaning success. The patients physician-adherence full to the weaning protocol changed during the study (38–86 %, p < 0.01). When evaluated weaning protocol step-by-step, we found high adherence for noninvasive ventilation (NIV) use (95 %), and for weaning predictor measurement (91 %); and lower adherence for control of fluid balance (57 %), and for daily interruption of sedation (24 %). The weaning success (WS) was superior patients that undergone weaning protocol compared to patients that undergone weaning based in clinical practice (85.6 vs. 67.7 %, p < 0.001). The patient's attending physician responsible about weaning decisions was distributed between neurosurgeon (10 %), neurologists (5.3 %), cardiologists (22.6 %), pulmonologists (17.2 %), internal medicine physicians (IMP) (14.2 %), and intensivists (30.7 %). The WS was higher when the attendant physician was intensivist comparing with other medical specialties (p = 0.03).

CONCLUSIONS. The adherence of physicians to a weaning protocol changed during the study years, as well as implementing the different steps of the protocol in the medical specialties. This may have occurred by different levels of knowledge of medical specialties and education offered by the ICU staff about the weaning protocol during the period of the study.

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0805

DOES EARLY USE OF BILEVEL POSITIVE AIRWAY PRESSURE (BIPAP) IN CARDIOTHORACIC INTENSIVE CARE UNIT PREVENT REINTUBATION?

G. Sagioglu¹, A. Baysal², E. Çapuroğlu³, Y.G. Gül⁴, Y.A. Karamustafaoğlu³, M. Dogukan⁵

¹Trakya University, Anesthesiology and Reanimation, Edirne, Turkey, ²Kartal Kosuyolu High Speciality Research and Training Hospital, Anesthesiology and Reanimation, Istanbul, Turkey, ³Trakya University Faculty of Medicine, Edirne, Turkey, ⁴Arnavutkoy State Hospital, Istanbul, Turkey, ⁵Adiyaman University, Anesthesiology and Reanimation, Adiyaman, Turkey

INTRODUCTION. Non-invasive ventilation (NIV) is a preferred treatment in the care of acute respiratory failure in the early postoperative period care of patients undergoing cardiothoracic operations however, the published literature providing evidence for the use of NIV to avoid postextubation respiratory failure and reintubation is limited.

OBJECTIVES. Our aim is to investigate the success of early use of bilevel positive airway pressure (BIPAP) after cardiac or thoracic surgeries to prevent reintubation.

METHODS. In a prospective randomized study, 273 patients with normal preoperative spirometric study (Forced expiratory volume in one second (FEV1) values between 80 and 120 % of the average value) were evaluated and 254 patients were divided into two groups depending on the time period between extubation and the application of BIPAP. In Group 1 of 126 patients, BIPAP was applied after extubation within 48 h after surgery following fulfilling of acute respiratory failure criterias whereas, in Group 2 of 128 patients, BIPAP was applied after extubation at a 20 min duration of two episodes and 2 h apart without an acute respiratory failure episode. Patients who required immediate reintubation within 12 h after extubation were excluded. BIPAP was applied with expiratory positive airway pressure (EPAP) of 4 cm H2O and inspiratory positive airway pressure (IPAP) of 8 cm H2O in a spontaneous mode. Arterial blood gas values (pH, paO2, paCO2) at first and fourth hour after BIPAP were collected. All patients received a standard therapy protocol including diuretics and inhaled beta-agonists. Intravenous theophylline and the use of other bronchodilators were not included into the study. The primary end-point was to prevent reintubation. Other adverse events (pneumothorax, aspiration, pulmonary edema, transient ischemic attack, stroke, bronchospasm) were recorded.

RESULTS. There was no significant difference between demographic data (p > 0.05). In comparison between groups, no significant differences were observed for arterial blood gas values of pH and PCO2 at baseline, 1 and 4 h after BIPAP (p > 0.05) however, the PO2 values at 1 and 4 h after BIPAP were significantly better in Group 1 an comparison to Group 2 (p < 0.001, p < 0.001; respectively). Reintubation rate was 14 patients (11 % in Group 1 and 7 patients (5.5 %) in Group 2 (p = 0.103).

CONCLUSIONS. The early and prophylactic use of BIPAP without acute respiratory failure in the early postoperative period after extubation did not show an improvement in the rates of postoperative adverse events such as reintubation.

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0806

LOOKING AT THE TRACHEA DURING PERCUTANEOUS TRACHEOSTOMY: IS IT SAFE?

A. Florêncio¹, J. Morais¹, S. Castro¹, J. Moreno¹, L. Flores¹

¹Hospital de Faro, Intensive Care Unit, Emergency and Intensive Care Department, Faro, Portugal

INTRODUCTION. The percutaneous dilatational tracheostomy (PDT) is an available procedure that can be done at the bedside in the intensive care unit. It is less invasive, and associated to a lower degree of complications.

OBJECTIVES. To describe the results of PDT performed without fiber optic bronchoscopy and with a technique that includes direct visualization of the trachea and to access the safety of this procedure.

METHODS. Observational and retrospective study, on patients admitted between January 2013 and March 2014 at intensive care unit (ICU) of a Portuguese tertiary hospital. All patients older than 16 year old and under mechanical ventilation were included. Collected variables included demographic variables, ICU variables (admission diagnosis, APACHE II, length of ICU stay, duration of mechanical ventilation before PDT, PDT variables (reasons for performing PDT, complications associated with PDT). Indications for PDT at our ICU

are as follows: prolonged ventilation, prolonged weaning, neurological and neuromuscular conditions imposing the need for airway protection and/or mechanical ventilation.

RESULTS. 39 patients were submitted to PDT, mean age was 65.3 years, 32 were male, mean length of stay was 33.25 days, mean APACHE II was 23.66, main admission diagnosis neurologic lesion mainly secondary to trauma, followed by septic shock. Mean days of ventilation before PDT was 20.17. The main reasons for PDT was prolonged ventilation followed by neurological condition. The following complications were observed: five episodes of mild bleeding, three episodes of partial atelectasis. Severe complication was recorded in one patient with pneumomediastinum and subcutaneous emphysema. All the complications were solved.

CONCLUSIONS. PDT performed without fiber optic bronchoscopy and with direct visualization of trachea appears to be safe.

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0807

TITULO: EFFECTIVENESS OF HUMIDIFICATION WITH HME-BOOSTER IN TRACHEOSTOMIZED PATIENTS

M.I. Gonzalez Perez¹, J. Valdivia Ruiz¹, A.M. Esquinas²

¹Complejo Asistencial Universitario de León, Intensive Care Unit, León, Spain, ²Hospital Morales Meseguer, Intensive Care Unit, Murcia, Spain

INTRODUCTION. Invasive and non-invasive mechanical ventilation modifies the physiological humidification and inhaled gas heating process. Under humidification results in airway plugging, difficulty in oxygenation and damage to ciliary transport. Excessive humidification can lead to profuse secretions (1). Different devices for the humidification of respiratory gases can reduce the risk of under-humidification of airways. HME Booster (Medisize), is a new concept in humidification (2) which increases the water content of inspired gases. In addition to a HMEF a small “booster” is placed between the HMEF and the patient. Figure 1.



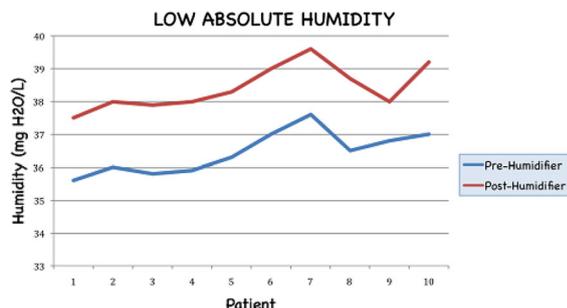
[Figure1]

It has a small electrical heater covered by a membrane which sits in the breathing circuit. Water is fed into the space between the heater and the membrane. The membrane is made of Gore-Tex™, which only allows water vapour through. The amount of water vapour that passes through depends on the humidity gradient from one side to the other. This feature makes the amount of water added to the inspired air self regulating. (3)

OBJECTIVES. Determine whether the use of HME-Booster increases the humidity in the inspired air in tracheostomized patients.

METHODS. The study was carried out on ten critically ill patients. They were ventilated via Servo i (Maquet), Evita 4 and Evita XL (Dräger); and all of them were tracheostomized due to difficult weaning. Measurements were calculated according to hygrometry (using Hygrometry PCS10 Medisize), comprising a temperature sensor and a humidity sensor attached via circuit situated between the patient and the humidifier. We have measured the temperature and the humidity before placing the HME-Booster and after an hour with the humidifier. We choose to measure the minimum absolute humidity before and after humidification. All the patients were normothermic. Data were analyzed using the computer program PC lab 200 SE provided from Medisize.

RESULTS. In all patients HME-Booster provides humidification superior 37 mg H₂O/L. In ten patients studied there was an increase in the inspired air humidity after 1 h with the humidifier. In no case we observed obstruction of tracheostomy tube while the HME-Booster was used. Grafic 1.



[Low Absolute Humidity]

CONCLUSIONS.

1. HME-Booster seems to be an effective and easy system to apply.
2. It's effective in increasing the humidity in the inspired air in tracheostomized patients.
3. During the use, airway obstruction was not observed.

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0808

LARYNGOSCOPIC EVALUATION OF POSTEXTUBATION HOARSENESS

H. Okamoto¹, T. Fujiwara², A. Oka², T. Fukuoka¹

¹Kurashiki Central Hospital, Department of Emergency Medicine, Kurashiki, Japan.

²Kurashiki Central Hospital, Department of Otorhinolaryngology Head and Neck Surgery, Kurashiki, Japan

INTRODUCTION. Post-extubation hoarseness is an important clinical sign of laryngeal injury or vocal fold immobility. These can be the cause of ICU acquired swallowing disorder leading to aspiration, reintubation, pneumonia, and a prolonged hospital length of stay¹.

OBJECTIVES. The aim of this study is to describe the characteristic of postextubation hoarseness (PEH) after prolonged intubation.

METHODS. We conducted a prospective registration study of PEH from January 2012 to October 2013. All patients presenting hoarseness after more than 24 h of intubation were included. Age <18 years, previous history of vocal fold immobility, post thyroidectomy and cardiac surgery were excluded. Patients were examined using flexible nasolaryngoscopy within 24 h after extubation. The laryngeal pathologies were categorized into four groups (immobility, edema, ulceration, granulation) and assessed by two reviewers (one emergency physician and one otolaryngologist) using recorded data.

RESULTS. A total of 32 patients were included. All patients had some kind of laryngeal pathologies. Median age was 67(61–79), half of the patients were female. Median APACHE-II score was 17(12–21). Nasolaryngoscopic evaluation revealed laryngeal edema 53 %, ulceration 34 % and abnormal mobility 41 % in these patients, respectively. Left-side vocal fold immobility occurred more frequently than right-side. Post-extubation stridor were seen in 10 patients and 5 patients were reintubated within 48 h. Median duration of intubation was 6 days and ICU length of stay 10 days.

CONCLUSIONS. Although vocal cord edema was common cause of PEH, other anatomical and functional abnormality contributed the findings. Clinical importance of these differences need further evaluation. Further investigation about risk factors and long-term outcomes were needed.

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0809

MULTIDISCIPLINARY TEAM MANAGEMENT OF TRACHEOSTOMIZED PATIENTS AFTER ICU DISCHARGE

J. Cabrera-Arocha¹, H. Marrero-González², I. Paz-Cruz³, S. Ruíz-Santana¹

¹Hospital Universitario de Gran Canaria Doctor Negrin, Intensive Care, Las Palmas de Gran Canaria, Spain, ²Hospital Universitario de Gran Canaria Doctor Negrin, Nursing Department, Las Palmas de Gran Canaria, Spain, ³Servicio de Urgencias Canario, Critical Care Air Transport, Las Palmas de Gran Canaria, Spain

INTRODUCTION. Tracheostomy is required in approximately 10 % of patients receiving mechanical ventilation and allows the patient to move to a step-down unit or long-term care hospital (1). There are scarce data assessing management of tracheostomized patients in the ward by a multidisciplinary team, after ICU discharge.

OBJECTIVES. To investigate decannulation, reasons for ICU readmissions and mortality rates of tracheostomized patients after ICU discharge managed by a multidisciplinary team.

METHODS. Longitudinal, prospective study in a medical-surgical ICU performed from January 2004 up to December 2012. All adult consecutive tracheostomized ICU patients discharged to ward and managed by the multidisciplinary tracheostomy control team, were included in the study. The multidisciplinary Tracheostomy Ward was created in 2003 and it is formed by an *Intensivist*, a Bronchoscopist, a Thoracic Surgeon, a Laryngologist, a Nurse and Physical Therapists. The team goals were tracheostomy handle training of the ward staff, minimize artificial airway accidents, ICU readmission control, decannulation as soon as possible after ICU discharge and reduction of hospital stay. We designed a tracheostomized patient ward visit planning and collected demographic data, ICU readmission reasons and decannulation and mortality rates. Categorical variables are expressed as frequencies and percentages, and continuous variables as mean and SD (SD) when data followed a normal distribution, or as medians and interquartile (25th–75th percentile) range when distribution departed from normality.

RESULTS. Eight hundred and fifty patients were studied. After the Tracheostomy Ward Team was created the decannulations rates increased over 10 % along the study period. We decannulated 436 patients (51.29 %). A total of 96 (11.29 %) patients required ICU readmission and the main reason for it was airway obstruction due to increased amount of bronchial secretions. Finally, 112 of the studied patients died (13.2 %).

CONCLUSIONS. Management outcomes of a multidisciplinary Tracheostomy Ward Team after ICU discharge were fifty percent decannulation, eleven percent of ICU readmissions mainly by increased bronchial secretions and 13 % of global mortality rates.

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Diagnosis & management of AKI: 0810–0823

0810

CONTRAST-ENHANCED ULTRASOUND TO EVALUATE CHANGES IN RENAL CORTICAL PERFUSION INDUCED BY NORADRENALINE INFUSION: A PILOT STUDY

A.G. Schneider^{1,2}, M.D. Goodwin³, A. Schelleman³, M. Bailey², R. Bellomo^{2,4}

¹Centre Hospitalier Universitaire Vaudois, Service de Médecine Intensive Adulte,

Lausanne, Switzerland, ²Monash University, Australian and New Zealand Intensive Care

Research Centre, Melbourne, Australia, ³Austin Health, Radiology Dpt, Heidelberg, Australia, ⁴Austin Health, Intensive Care Unit, Heidelberg, Australia

INTRODUCTION. The ideal mean arterial pressure (MAP) target in critical illness is unknown and is likely to vary from one patient to another [1]. Contrast-enhanced ultrasound (CEUS) is a novel imaging modality which enables the estimation of organ perfusion at the bedside [2–3].

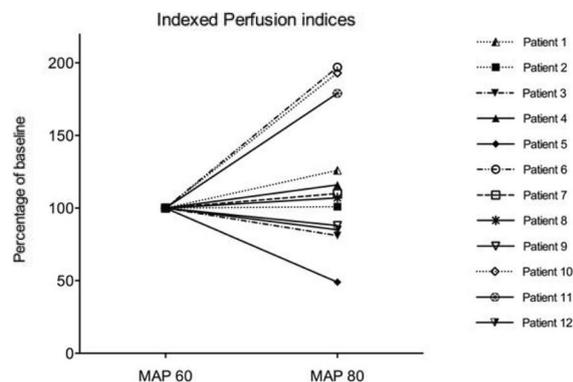
OBJECTIVES. We used CEUS to estimate the effect of an increase in MAP induced by noradrenaline infusion on renal cortical perfusion in critically ill patients.

METHODS. Twelve patients admitted to the intensive care unit of a tertiary adult intensive care unit for <48 h and requiring a noradrenaline infusion to maintain a MAP >60 mmHg were included in the study. Renal CEUS scans with destruction-replenishment sequences using Sonovue® (Bracco, Milano Italy) as a contrast agent, were performed at baseline (MAP 60–65 mmHg) and after a noradrenaline-induced increase in MAP to 80–85 mmHg. Video sequences were exported and analysed offline using VueBox® (Bracco, Geneva Switzerland) software. A perfusion index (PI) proportional to renal cortical microcirculation was then derived from the CEUS scans at each time point for each patient.

RESULTS. There was no adverse effect associated with ultrasound contrast agent administration or increase in noradrenaline infusion rate. Adequate images were obtained in all patients at all study times. To reach the higher MAP target, median noradrenaline infusion rate was increased from 10 to 14 µg/min.

Noradrenaline-induced increase in MAP was not associated with a significant change in overall CEUS derived PI (median PI 3056 arbitrary units at baseline [IQR 2646–5701] vs 4101 [IQR 3231–5928] arbitrary units after MAP increase, $p = 0.38$). At the patient level (Figure 1), however, we observed important heterogeneity in PI responses (range –51 to 97 % changes from baseline).

CONCLUSIONS. A noradrenaline-induced increase in MAP was not associated with an overall increase in renal cortical perfusion as estimated by CEUS. However, on a patient level, the PI response was heterogeneous and unpredictable suggesting great variability in pressure responsiveness within a cohort with a similar clinical phenotype.



[Figure 1]

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0811 PLASMA IOHEXOL CLEARANCE AS A SURROGATE OF GLOMERULAR FILTRATION RATE IN CRITICALLY ILL PATIENTS WITH UNSTABLE KIDNEY FUNCTION

C. Salmon-Gandonnière¹, I. Benz-de-Bretagne^{2,3}, E. Mercier¹, C. Lhomme¹, A. Joret¹, J.-M. Halimi^{2,3}, C. Le Guellec^{2,3}, S. Ehrmann¹

¹CHRU de Tours, Réanimation Polyvalente, Tours, France, ²CHRU de Tours, Biochimie et Biologie Moléculaire, Tours, France, ³Université François Rabelais de Tours, EA4245, Cellules Dendritiques, Immunomodulation et Greffes, Tours, France, ⁴CHRU de Tours, Néphrologie, Transplantation Rénale et Hémodialyse, Tours, France, ⁵Université François Rabelais de Tours, Centre d'Étude des Pathologies Respiratoires, Inserm U 1100/EA 6305, Tours, France

INTRODUCTION. Acute kidney injury (AKI) is associated with significant morbidity and mortality, particularly in unstable patients admitted to the intensive care unit (ICU). Early and accurate diagnosis of AKI may be of great value to trigger aggressive resuscitation. In stable patients, glomerular filtration rate (GFR), the best overall index of kidney function, can be estimated measuring the plasma clearance of an exogenous tracer such as iohexol. Iohecol clearance has, so far, never been evaluated as a surrogate of GFR in critically ill ICU patients with unstable kidney function.

OBJECTIVES. To evaluate the feasibility of measuring plasma iohecol clearance as a surrogate of GFR in ICU patients at the initial phase of acute circulatory failure.

METHODS. Patients suffering acute circulatory failure were included within 12 h of ICU admission and were administered intravenously a non-toxic dose of iohecol (5 mL, 300 mg/mL) followed by collection of 9 arterial blood samples for iohecol plasma concentration determination (5 and 30 min, 1, 3, 6, 9, 12, 18 and 24 h). Iohecol concentrations were determined using high performance liquid chromatography. A two-compartment pharmacokinetic model was applied to obtain individual iohecol clearance in each patient.

RESULTS. Here, we present results of the 8 first patients included: mean SAPSII: 47 [range 35–59]; mean age 58 years [45–73]; mean serum creatinine concentration at inclusion: 151 µmol/L [61–245]. At inclusion, 1, 2 and 5 patients respectively were suffering from cardiogenic shock, severe sepsis and septic shock. The pharmacokinetic model adequately fitted plasma iohecol concentrations as shown by standard model diagnostic tools based on observed versus predicted values (mean bias and precision of 0.7 and 11.4 % respectively). No erratic concentrations were observed in any patient. Individual iohecol clearance ranged from 11 to 72 mL/min/1.73 m². Common equations tended to overestimate GFR as compared to iohecol clearance (mean bias toward iohecol clearance of 12.8 and 33.1 mL/min for the MDRD and Cockcroft and Gault equations, respectively).

CONCLUSIONS. Despite unstable kidney function in critically ill patients, a two-compartment linear model, usually applied in stable patients, appeared suitable to estimate iohecol clearance within the first hours of ICU admission. This method may thus be a better tool than common equations to precisely evaluate GFR in unstable critically ill patients at risk of AKI.

0812 BALANCED VERSUS UNBALANCED: DOES A SMALL VOLUME OF STEROFUNDIN VERSUS NA CL 0.9 % MAKE A DIFFERENCE?

F. Viaene¹, M. Bourgeois², J. Decruyenaere³, E. Hoste³

¹UZ Ghent, Intensive Care, Ghent, Belgium, ²AZ Sint Jan Brugge, Brugge, Belgium, ³UZ Ghent, Ghent, Belgium

INTRODUCTION. A crystalloid fluid bolus is one of the most frequently administered therapies in ICU patients. At present NaCl 0.9 % is the most commonly used crystalloid in ICU patients. It is considered an unbalanced crystalloid solution, because of the high concentration of Na and Cl. Infusion of large volumes of NaCl 0.9 % may cause hyperchloremic metabolic acidosis and observational studies showed an association with acute kidney injury and other worse clinical outcomes. Balanced crystalloid solutions that contain a lower concentration of Na⁺ and Cl⁻, such as Sterofundin (Na⁺=145 mmol/L, Cl⁻=127 mmol/L, acetate and malate as negative anions), may prevent development of HCMA, and so improve outcomes. It is uncertain if a balanced solution is also beneficial compared to an unbalanced solution when smaller volumes are administered. In this trial we evaluate the impact of a 1 L fluid bolus NaCl 0.9 % versus Sterofundin (UNBAL vs. BAL), on the acid-base and electrolyte status of severely ill patients.

OBJECTIVES. Evaluate and compare the impact of a fluid bolus of 1 L Sterofundin versus 1 L NaCl 0.9 % on electrolyte and acid-base status.

METHODS. Prospective randomized single blinded study in 59 severely ill patients who were prescribed a 1 L fluid bolus of either NaCl 0.9 % (UNBAL) or Sterofundin (BAL) over 60 min. We measured the arterial pH, electrolytes, albumin and lactate before infusion, and 1 and 4 h after start of infusion. From these we calculated the anion gap (AG; Na⁺+K⁺-Cl⁻-HCO₃⁻), the AG albumin corrected (AGalb; AG + 4.4-albumin/25), the apparent strong ion difference (SIDa; = Na⁺+K⁺+Ca⁺⁺+Mg⁺⁺-Cl⁻-lactate) and the strong ion gap (SIG; SIDa-SID_{effective}).

RESULTS. 28 patients were randomized to UNBAL and 31 to BAL. UNBAL patients were older (69 y vs. 62, $p = 0.027$), had similar gender, body weight and length. At baseline UNBAL patients had a lower albumin concentration (30.3 g/dL vs. 32.8, $p = 0.02$). However, electrolytes, Hb, pH, PCO₂, BE, lactate, and the calculated values AG, AGalb and SIDa were similar. At 1-h we found a decrease of pH in UNBAL patients (-0.016; $p = 0.022$), while in BAL patients pH remained stable (0.002; $p = 0.57$). At 4-h pH was again comparable to baseline in both groups. In addition, we observed a more important increase of Cl⁻ in UNBAL compared to BAL patients (+2.5; $p = 0.042$ vs. +1; $p = 0.01$), and decrease of BE (-0.9; $p = 0.001$ vs. -0.1, $p = 0.975$) and SIDa (-1.9, $p = 0.036$ vs. -0.8, $p = 0.20$). Na⁺, AG, and AGalb did not change in both groups. SIG remained stable in both groups, suggesting no effect of unidentified anions (i.e. malate and acetate) in BAL patients.

CONCLUSIONS. In an adult ICU cohort, the infusion of a limited fluid bolus of 1 L NaCl 0.9 % led to a temporal, small decrease of pH. This could be explained by an increase of Cl⁻. The use of the balanced crystalloid was not associated with these effects. These data do not allow to conclude if these findings also translate to relevant clinical outcomes.

0813 ASSOCIATION OF ACUTE AND CHRONIC RENAL FAILURE (ARF; CRF) TO GLOBAL END-DIASTOLIC VOLUME INDEX (GEDVI), FRACTIONAL EXCRETION OF SODIUM (FES) AND FRACTIONAL EXCRETION UREA (FEU)

W. Huber¹, D. Stadler¹, V. Phillip¹, B. Saugel¹, C. Schultheiss¹, S. Mair¹, B. Henschel¹, R.M. Schmid¹

¹Technical University of Munich, Klinikum rechts der Isar, II. Medizinische Klinik, Munich, Germany

INTRODUCTION. ARF is frequent in ICU patients and significantly increases mortality. Diagnosis of pre-renal ARF is frequently based on medical history, clinical signs of volume depletion and decrease in urinary indices such as FES and urea FEU. Transpulmonary thermodilution (TPTD)-derived preload marker GEDVI and its changes over time might be useful tool to clarify etiology and to guide therapy of ARF.

OBJECTIVES. Therefore, we prospectively analyzed the association of ARF to GEDVI, FES and FEU in 36 patients with TPTD-monitoring.

METHODS. All patients were equipped with TPTD-monitoring (Pulsion Medical Systems, Germany). TPTD, FES, FEU, serum creatinine and BUN were measured on admission and after 12, 24 and 36 h. Diagnosis of ARF, CRF and normal renal function was made according to AKIN-criteria by a physician not involved in the study.

Statistics: Spearman correlation, Wilcoxon-test, SPSS 21.

RESULTS. 15/36 (42 %) female, 21/36 (58 %) male. ARF, CRF and no renal failure were diagnosed in 20/36 (56 %), 12/36 (33 %) and 4/36 (11 %).

Comparison of FES, FEU and GEDVI:

In the totality of patients, neither baseline FES nor FEU were associated to any hemodynamic parameter (CI, SVI, GEDVI, EVLWI, CVP) with the only exception of a correlation of FEU to MAP ($r = 0.443$; $p = 0.007$) and SVRI ($r = 0.387$; $p = 0.022$). In the totality of patients, sensitivity, specificity and accuracy of decreases in FEU (69; 15; 39 %) or FES (63; 20; 39 %) were low regarding a decreased GEDVI. Similarly, decreases in GEDVI had low sensitivity, specificity and accuracy regarding decreased FEU (39; 38; 39 %) or FES (38; 40; 39 %).

Comparison of ARF and CRF:

On admission, FEU (18.0 ± 9.9 vs. 39.1 ± 16.3 %; $p < 0.001$), MAP (77 ± 15 vs. 91 ± 16 mmHg; $p = 0.019$) and SVRI (1412 ± 654 vs. 2241 ± 1366 dyn/cm⁵/m²; $p = 0.023$) were significantly lower in patients with ARF compared to CRF. Serum creatinine, BUN, CI, SVI, GEDVI, EVLWI and CVP were not significantly different.

20/20 (100 %) and 17/20 (85 %) of patients with AKI had decreased FEU and decreased FES, respectively. However, only 9/20 (45 %) had decreased GEDVI. 6/20 (30 %) had normal GEDVI and 5/20 (25 %) had elevated GEDVI.

Time course of FES, FEU, GEDVI and serum creatinine:

In the totality of patients as well in the patients with AKI, changes in FEU were the only predictor of changes in serum creatinine within 36 h ($r = -0.573$; $p = 0.003$ and

$r = -0.508$; $p = 0.044$), whereas changes in FNE were not associated to changes in serum creatinine.

CONCLUSIONS. 1. Decreases in GEDVI and decreases in FEU or FNS are not interchangeable. 2. Changes in FEU were significantly associated to changes in serum creatinine. 3. Our findings that all patients with ARF had decreased FEU, but only 45 % had decreased preload according to GEDVI, suggest that FEU might rather be a marker of ARF than of general volume depletion. Interpretation of decreased FEU as marker of general volume depletion might be misleading.

0814

CONTRAST-ASSOCIATED ACUTE KIDNEY INJURY ACCORDING TO THE TYPE OF CONTRAST-ENHANCED RADIOGRAPHIC EXAMINATION. PRELIMINARY RESULTS OF THE NEFROCON STUDY

C. Gómez-González¹, S. Mas-Font², D. Herrera-Rojas³, M.A. Alcalá-Llorente⁴, F. Sánchez-Moran⁵, M.A. García-García⁶, A. Tizón-Varela⁷, Nefrocon Investigators

¹Hospital Infanta Luisa, Seville, Spain, ²Hospital General de Castellón, Castellón, Spain, ³Hospital Universitario Valme, Seville, Spain, ⁴Fundación Jiménez Díaz, Madrid, Spain, ⁵Hospital La Plana Villarreal, Castellón, Spain, ⁶Hospital de Sagunto, Valencia, Spain, ⁷Complejo Hospitalario de Ourense, Ourense, Spain

OBJECTIVES. To evaluate the incidence of contrast associated acute kidney injury (CA-AKI) according to the type of iodinated contrast used and radiographic examination.

METHODS. We performed a prospective multi-center study, in 34 Spanish ICU, covering the period 15 December 2012 to 15 March 2013. During this study period, we included all patients undergoing a radiography examination or a coronary angiography with intravenous or intra-arterial administration of iodinated contrast media. Statistical analysis was performed with the program R version 2.9.0. The qualitative variables were expressed as percentages and the quantitative ones as average, standard deviation and median values. Data analysis included univariate and multivariate analysis of patients with and without CA-AKI.

RESULTS. A total of 1,037 patients were included in the study. The majority of the patients were admitted to the cardiac ICU (45 %), 36 % to the medical ICU, and 19 % to the surgical ICU. Median age of the patients was 65, APACHE II score was 13 ± 8 . 65 % of the patients had comorbidities (55 % HTA, 27 % DM, 58 % chronic kidney disease (CKD), 1 and 2 CKD: 53 %. Contrast was administered for a coronary angiography in 46 % of the patients, for a contrast-enhanced CT in 36 % and for a CT-angiography in 10 % of the patients. Iso-osmolar contrast was the most frequently used (53 % of cases). The average volume (ml) used was 149 ± 82 (median 180). The incidence of CA-AKI was: 4 % (coronary angiography), 12 % (contrast-enhanced CT) and 3 % (CT-angiography), $p < 0.005$. The incidence is higher if we use KDIGO definition: 8 % (coronary angiography), 16 % (contrast-enhanced CT) and 8.5 % (CT-angiography), $p < 0.005$. Preventive measures were undertaken in 28 % of patients undergoing coronary angiography, 53 % of patients undergoing a contrast-enhanced CT, and 12 % of patients undergoing CT-angiography. Volume loading with isotonic saline was the preventive measure most commonly used ($p < 0.005$).

CONCLUSIONS. CA-AKI is more common in patients undergoing a contrast-enhanced CT, regardless the definition we use. Preventive measures are used more frequently in this group of patients.

0815

ACUTE KIDNEY INJURY IN THE INTENSIVE CARE UNIT ACCORDING TO RIFLE

A. Bulut¹, O. Demirkiran¹

¹Istanbul University Cerrahpaşa Medical School, Anesthesiology and Intensive Care, Istanbul, Turkey

INTRODUCTION. In 2004, the Acute Quality Initiative workgroup proposed a classification system by the acronym RIFLE (Risk, Injury, Failure, Loss of kidney function, and End-stage kidney disease) to develop a consensus definition for acute kidney injury (AKI). Several studies have been published aiming to validate its efficacy and apply it in clinical practice. In this study, we aimed to investigate the incidence, etiology and effects on outcomes of AKI by using RIFLE criteria.

METHODS. After ethics committee approval, 291 patients who admitted to intensive care unit (ICU) between January 2012 and December 2013 were retrospectively evaluated. We interrogated the recordings for all adult (>18 years) ICU admissions for a duration ≥ 24 h. Patients with end-stage kidney disease were excluded. RIFLE stages were reported in the first day of ICU admission. Age, gender, duration of ICU stay and clinical data included primary diagnosis, comorbid factors, need for mechanical ventilation were retrieved. Use of vasopressor/inotropic agent and blood product transfusion, APACHE II scores and outcomes were recorded. All these information were analyzed statistically in AKI patients and non-AKI patients classified according to RIFLE criteria.

RESULTS. A total of 244 patients (mean age, 62.40 ± 18.19 years; 107 females, 137 males) were evaluated. Sepsis and acute respiratory failure were the most common primary admission diagnostic categories (30.3 vs 30.7 %). Acute kidney injury occurred in 27 % within 24 h of ICU admission with a RIFLE category Risk in 4.1 %, Injury 8.2 %, Failure 14.3 %, Loss of kidney function 0.8 %. Length of stay in ICU was significantly higher for AKI defined by RIFLE criteria ($p < 0.01$). The incidence of sepsis was significantly higher in AKI patients ($p < 0.05$). It was 4.46 times higher in AKI patients. A more advanced RIFLE category was associated with higher use of vasopressor/inotropic agents and blood product transfusion ($p < 0.01$), but there was no statistically significant difference in duration of mechanical ventilation ($p > 0.05$). AKI was associated with a significant increase in ICU mortality (25.9 vs 64.2 %, $p < 0.01$). A higher RIFLE category was associated with greater severity of illness measured by APACHE II scores and it was correlated with mortality.

CONCLUSIONS. In our study, acute kidney injury (AKI) was detected in considerable percentage of the patients according to RIFLE classification on the first day of intensive care stay, it's noted that in this percentage of mortality was significantly higher when compared to the patients having no AKI again according to RIFLE classification. We concluded that being conscious of the factors that cause kidney injury and staying this harm according to RIFLE classification increases the awareness about kidney injury and so makes contribution to decrease mortality.

0817

FACTORS DETERMINING NEPHROTOXICITY AND MORTALITY IN CRITICAL CARE PATIENTS RECEIVING COLISTIN

A. Ciftci¹, S. Izdes², N.D. Altintas³

¹Ataturk Training and Research Hospital, Anesthesiology, Ankara, Turkey, ²Yildirim Beyazıt University, Ataturk Training and Research Hospital, Anesthesiology, Ankara, Turkey, ³Ankara University Faculty of Medicine, Department of Intensive Care (Internal Medicine), Ankara, Turkey

INTRODUCTION. Multi-drug resistant gram negative infections are a delicate matter in the intensive care units and colistin use has recently gained popularity against them.

OBJECTIVES. We aimed to determine the risk factors for nephrotoxicity and mortality in patients who received colistin for infections caused by multidrug resistant microorganisms.

METHODS. Critical care patients who received colistin via intravenous injection or inhalation between the years 2010 and 2012 in a mixed intensive care unit were enrolled in the study. Exclusion criteria were as follows: age below 18 years, pregnancy, a basal creatinine level of greater than 2 mg/dl, colistin use for less than 48 h, and previous renal replacement therapy. The KDIGO stages for all patients were determined according to the creatinine levels, and they were grouped into two as those with no acute kidney injury (Group 1, KDIGO-O) and those with acute kidney injury (Group 2, KDIGO 1,2,3). Demographic data, laboratory values and patient outcomes were compared. Statistical analysis was performed by using SPSS11.5 software.

RESULTS. A total of 91 patients matching the inclusion criteria were included in the study. Demographic data were similar between the two groups. However, those who developed nephrotoxicity were more frequently surgical patients and they had a significantly higher APACHE-II score at the time of intensive care admission ($p < 0.05$). Death rate increased with increasing SOFA level ($p < 0.001$), presence of chronic obstructive lung disease, ($p < 0.05$), lower initial colistin dosing, increasing number of nephrotoxic agents received with colistin ($p < 0.05$), need for vasopressors, and concomitant culture positivity for Acinetobacter in blood and tracheal aspirate cultures. Kaplan-Meier cumulative survival analysis revealed that hypoalbuminemia and hyperbilirubinemia are associated with high mortality rates.

CONCLUSIONS. When colistin use is considered, correcting preventable factors such as hypovolemia or hypoalbuminemia and reducing the number of nephrotoxic agents used along with colistin will reduce the rate of death associated with colistin use.

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0818

PRIMARY INJURIES, SECONDARY ORGAN FAILURES AND NEW DEFINITIONS OF ACUTE KIDNEY INJURY IN TRAUMA PATIENTS TREATED WITH CONTINUOUS RENAL REPLACEMENT THERAPY

S. Beitland^{1,2}, I. Os^{1,2}, K. Sunde^{1,2}

¹University of Oslo, Oslo, Norway, ²Oslo University Hospital, Oslo, Norway

INTRODUCTION. Acute kidney injury (AKI) treated with continuous renal replacement therapy (CRRT) is a severe complication in trauma patients associated with a several-fold increase in patient mortality.

OBJECTIVES. The aim of this study was to describe posttraumatic AKI treated with CRRT in adult traumatized patients focusing upon the primary injuries and secondary organ failures. Further, we wanted to apply the new definitions of AKI in a trauma population.

METHODS. Adult trauma patients (>18 years) admitted to the trauma centre at Oslo University Hospital, between January 1 1997 and December 31 2006, were retrospectively reviewed. All traumatized patients that developed AKI and need of CRRT during their hospital stay were included. Patients with chronic renal failure and those receiving CRRT for other reasons than AKI were excluded. Injury Severity Score (ISS) was used to assess severity of injury, and Sequential Organ Failure Assessment (SOFA) score to measure the organ failures at the initiation of CRRT. AKI was defined at the time of initiation of CRRT according to the RIFLE (Risk, Injury, Failure, Loss of Kidney Function, and End-stage Kidney Disease), AKIN (Acute Kidney Injury Network) and KDIGO (Kidney Disease: Improving Global Outcomes) criteria.

RESULTS. Among the 506 trauma patients admitted to the ICU, 42 (8 %) with AKI and need of CRRT were included. They had a median [interquartile range (IQR)] ISS score 36 (27-49). Blunt trauma was the injury mechanism in 40 (95 %) of the patients, mainly traffic accidents. Patients had primary organ injuries in several body regions simultaneously, most frequent in thorax ($n = 30$, 71 %) and abdomen ($n = 27$, 64 %). Time from trauma to initiation of CRRT was median (IQR) five (3-11) days. The most frequent organ malfunctions were respiratory and cardiovascular failure, affecting 33 (75 %) and 30 (71 %) of the patients, assessed by SOFA score 3 or 4, respectively. Additionally, 29 (69 %) had kidney failure assessed by SOFA score 3 or 4, whereas failure of the central nervous, liver and/or coagulation systems were infrequent. Following RIFLE, one (2 %) patient had no AKI, one (2 %) risk, four (10 %) injury, 33 (79 %) failure and three (7 %) loss, respectively. In the AKIN and KDIGO scoring systems all 42 patients had stage 3 because renal replacement therapy is part of the diagnostic criteria.

CONCLUSIONS. Trauma patients with AKI undergoing CRRT often had severe primary organ injuries, and secondary multiple organ failure. The RIFLE criteria underestimated the severity of AKI in some trauma victims.

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0819

VALIDITY OF CALCIUM INDEX FOR MONITORING OF REGIONAL CITRATE ANTICOAGULATION

M. Zakharchenko¹, P. Leden¹, J. Rulisek¹, M. Otahal¹, H. Brodská², M. Balik¹

¹1st Medical Faculty, Charles University, Anaesthesia and Intensive Care, Prague, Czech Republic, ²1st Medical Faculty, Charles University, Clinical Biochemistry, Prague, Czech Republic

INTRODUCTION. An index of Ca_{ion}/Ca^{2+} has been tested as superior surrogate marker of citrate accumulation and also as a marker of prognosis of critically ill treated with regional citrate anticoagulation (RCA) for continuous renal replacement therapy (CRRT).

OBJECTIVES. The relationships between citratemia and Ca_{ion}/Ca^{2+} (uncorrected and corrected for albumin) were compared to other clinical indices of citrate accumulation.

METHODS. The relationships between plasmatic citratemia and $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$, dosage of noradrenaline, pH, natremia, liver function tests were prospectively tested in patients on RCA and CRRT. Patients were divided into subgroups with normal $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$ and above 2.5, those with arterial $\text{Ca}^{2+} < 0.9$ mmol/l were excluded. All were treated with CVVH or CVVHDF, Baxter Aquarius, polysulfone filters Aquamax 1.9 m². Blood flow was set between 100–150 ml/min, associated 4 % trisodium citrate to reach postfilter $\text{Ca}^{2+} < 0.4$ mmol/l, dosage of CRRT was between 2,000–3,000 ml/h. Citrate levels were measured with capillary zone electrophoresis.

RESULTS. Altogether 138 mechanically ventilated patients with renal failure (APACHE II 27.5 ± 7 , SOFA 11.8 ± 3) were included providing 268 sets of measurements. Median $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$ was 2.00 (IQR 0.30) and 2.40 (IQR 0.32) after correction for albumin, citratemia was 0.60 (IQR 0.47) mmol/l. A correlation between citratemia and $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$ was found ($r = 0.24$, $p < 0.01$, and 0.25 , $p < 0.01$ after correction for albumin). Altogether 18 patients (13 %) had $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$ elevated above 2.5 [median 2.72 (IQR 0.23) and 3.04 (IQR 0.24) after correction]. The citratemias were significantly higher in this subgroup [1.25 (IQR 0.47) mmol/l, $p < 0.01$] however, the dosage of noradrenaline [0.05 (IQR 0.20) vs 0.07 (IQR 0.27) $\mu\text{g}/\text{kg}\cdot\text{min}$], pH 7.40 (IQR 0.05) vs 7.39 (IQR 0.09), sodium 146 (IQR 6.3) vs 144 (IQR 5) mmol/l, bilirubin 20 (IQR 55) vs 21 (IQR 27) $\mu\text{mol}/\text{l}$ and INR as well as other liver function tests did not differ compared to the patients with normal $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$. The ICU and 28-day mortality of patients with $\text{Ca}_{\text{tot}}/\text{Ca}^{2+} > 2.5$ (44 and 50 %, respectively) was higher compared to patients with normal $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$ (34 and 43 %, respectively). Those with high calcium index who died had higher noradrenaline dosage [0.25 (IQR 0.26) vs 0.03 (IQR 0.05) $\mu\text{g}/\text{kg}\cdot\text{min}$, $p < 0.05$] and not significantly different other parameters compared to 56–50 % survivors with high calcium index.

CONCLUSIONS. The $\text{Ca}_{\text{tot}}/\text{Ca}^{2+}$ correlates weakly with citrate levels even after correction for albumin and does not correlate with other homeostatic or hemodynamic parameters. Patients with $\text{Ca}_{\text{tot}}/\text{Ca}^{2+} > 2.5$ have only slightly worse mortality than those with normal calcium index. To improve its predictive value it should be interpreted as part of larger set of parameters, preferably with hemodynamic data.

0820

A PROPENSITY SCORE ANALYSIS: RELATION BETWEEN PREOPERATIVE USE OF DIURETICS AND RENAL REPLACEMENT THERAPY AFTER CARDIAC SURGERY

A. Gordillo-Brenes¹, M.D. Arias-Verdu², E. Curiel-Balsara², J.A. Arboleda-Sánchez², R. Hinojosa-Pérez¹, M. García-Delgado³, R. Rivera-López⁴, R. Rivera-Fernández²

¹Hospital Puerta del Mar, Intensive Care Unit, Cádiz, Spain, ²Hospital Regional Universitario Carlos Haya, Intensive Care Unit, Málaga, Spain, ³Hospital Regional Universitario Virgen del Rocío, Intensive Care Unit, Sevilla, Spain, ⁴Hospital Virgen de las Nieves, Intensive Care Unit, Granada, Spain

OBJECTIVES. To evaluate the relation between preoperative use of diuretics and renal replacement therapy (RRT) in postoperative patients of cardiac surgery.

METHODS. prospective cohort study of adult patients who underwent cardiac surgery in 11 institutions all over the Andalusia community from March 2008 to July 2012 was included in the ARIAM adult cardiac surgery project. Diuretic users prior to the intervention were pair-matched to nonusers on the basis of a propensity score based on demographics, comorbidities, medication and surgical data. We analysed differences in RRT in both groups.

RESULTS. The total cohort was composed of 7,276 patients with 63.91 \pm 12.45 years and 61.1 % male gender. Elective scheduled surgery was done in 85.9 % of patients. Surgical risk assessed by the additive EuroSCORE was 5.86 \pm 3.14 points and predicted mortality by the Logistic EuroSCORE was 8.10 %. Mortality in the ICU was 7.6 % and in-hospital mortality was 10.1 % (8.1 % missing data). Prior to surgery, 10.4 % of patients had a creatinine level between 1.2 and 2 mg/dl, 1.1 % between 2 and 2.3 mg/dl, 0.8 % between 2.3 and 3.5 mg/dl and 0.3 % above 3.5 mg/dl. In the nonmatched cohort, 180 patients (2.5 %) needed RRT. RRT was needed in 3.5 % of 3,771 patients with diuretics and in 1.4 % of 3,505 patients not treated with them ($P < 0.001$); 2.61 (1.87–3.65). After adjusting with logistic regression by additive EuroSCORE, SAPS 3, bypass time exceeding 120 min and prior renal dysfunction, the OR was 1.67 (1.15–2.45). When we analysed 3,426 matched patients according to the propensity score, RRT was needed in 3 % of 1,713 patients with diuretics and in 1.6 % of 1,713 not treated with them ($P < 0.009$), 1.85 (1.16–2.94).

CONCLUSIONS. The use of diuretics before surgery was associated with an increased risk of need for RRT.

0821

TRANSPULMONARY THERMODILUTION (TPTD) AND PULSE CONTOUR ANALYSIS (PC) TO PREDICT FEASIBILITY OF FLUID REMOVAL DURING SUSTAINED LOW EFFICIENCY DIALYSIS (SLED) IN PATIENTS WITH ACUTE KIDNEY INJURY (AKI)

W. Huber¹, S. Fuchs¹, A. Minning¹, B. Saugel¹, M. Messer¹, B. Henschel¹, S. Mair¹, A. Beitz², C. Schwerdtfeger¹, C. Schnappauf¹, S. Rasch¹, R.M. Schmid¹

¹Technical University of Munich, Klinikum rechts der Isar, II. Medizinische Klinik, Munich, Germany

INTRODUCTION. AKI is a common complication in ICU patients frequently necessitating renal replacement therapy (RRT) and increasing mortality. Prolonged periods of RRT—including continuous RRT (CRRT) and SLED—and advanced hemodynamic monitoring are strategies to limit cardiovascular side effects of RRT and fluid withdrawal. However, there is a lack of data investigating the use of TPTD and PC to predict the feasibility of filtration goals.

OBJECTIVES. Therefore, it was the aim of our prospective study to investigate the prediction of feasibility of pre-defined goals of ultrafiltration during SLED.

METHODS. 51 SLED treatments in 32 patients with AKI and PiCCO-monitoring (Pulsion Medical Systems, Germany) were analyzed. Dialysis catheters were inserted to the femoral vein and central venous catheters via the jugular vein, respectively. Heart rate (HR), CVP, Cardiac index (CI), global end-diastolic volume index (GEDVI), stroke volume index (SVI), cardiac power index (CPI) and extravascular lung water index (EVLWI) were measured immediately before connection to SLED (Genius, Fresenius, Germany). Before start of SLED, a physician not involved in the study defined net filtration goal based on clinical and technical data available irrespective of the study. Primary endpoint: prediction of feasibility of the net filtration goal without increases in the vasopressor rate > 10 %. Statistics: Spearman correlation; Wilcoxon-test for unpaired samples; binary regression analysis; SPSS 21.

RESULTS. 22 male, 10 female; APACHE-II 26 ± 8 ; blood flow 147 ± 14 ml/min; filtration goal 1527 ± 891 ml. The primary endpoint was achieved in 22/51 (43 %) of SLED

treatments. In 18/51 (35 %) the filtration goal was not achieved. 16/51 (31 %) required an increase in vasopressors.

In univariate analysis patients fulfilling the primary endpoint had significant higher CI (4.98 ± 1.34 vs. 4.07 ± 1.48 L/min²m²; $p = 0.049$) and higher CPI (0.97 ± 0.33 vs. 0.69 ± 0.26 W/m²; $p = 0.016$). By contrast, CVP, GEDVI, SVI ($p = 0.057$), SVV, EV-LWI, HR, PVPi, MAP and vasopressor dose were not predictive.

Binary regression analysis demonstrated that only CI ($p = 0.043$) and MAP ($p = 0.047$) were independently associated with the primary endpoint. A model including CI, MAP and GEDVI ($p = 0.096$) provided a coefficient of correlation of $R = 0.88$ regarding the primary endpoint. In ROC-analysis, higher values of CPI (AUC 0.712; $p = 0.010$) and CI (AUC 0.662; $p = 0.049$) were significantly associated with the primary endpoint, which was best predicted by the model including CI, MAP and GEDVI (AUC = 0.718; $p = 0.008$). CPI > 0.079 W/m² provided a sensitivity of 68 % and a specificity of 72 % regarding the primary endpoint.

CONCLUSIONS.

1. 43 % of the patients with TPTD and PC monitoring reached the filtration goal without increase in vasopressors.

2. Successful filtration was best predicted by CPI and CI.

3. Prediction was further improved by a model including CI, MAP and GEDVI.

0822

CLINICAL IMPLEMENTATION OF AN ALGORITHM FOR REGIONAL CITRATE-ANTICOAGULATION CONTINUOUS VENO-VENOUS HEMODIAFILTRATION WITH A CONTROLLED EFFLUENT DOSE

C. Lanckohr¹, R. Grigorescu¹, B. Ellger¹

¹University Hospital Muenster, Department of Anaesthesiology, Intensive Care Medicine and Pain Therapy, Münster, Germany

INTRODUCTION. Continuous renal replacement therapy (CRRT) is used to support kidney function in acute kidney injury (AKI). Current guidelines recommend an effluent dose of 20–25 ml/kg/h for CRRT [1]. Regional citrate anticoagulation (RCA) is increasingly used due to its potential to lower bleeding risks and prolong life [2].

OBJECTIVES. An algorithm for RCA-CRRT was developed and implemented in our department using the Gambro “Prismaflex” platform. Patients received continuous venovenous hemodiafiltration (CVVHDF) with a prescribed dose of 30 ml/kg/h for ideal body weight. Standard blood flow was set at 110 ml/min. RCA was achieved with the addition of an 18 mmol/l citrate solution in predilution, doubling as hemofiltration fluid. Targeted extracorporeal calcium levels were 0.25–0.4 mmol/l. We attempted to achieve equal amounts of hemofiltration (flows of predilution citrate solution + postdilution substitution fluid + fluid removal) and hemodialysis (flow of dialysate) within the predefined effluent dose. If metabolic alterations necessitated the change of any fluid rate, a compensatory change of other rates followed to preserve effluent dose.

METHODS. Data was collected on patient characteristics, laboratory values and settings of the CRRT-system. 46 consecutive patients (M/F 35/11) were included in this analysis.

RESULTS. All values are means unless noted. Age of patients was 63.3 years (SD \pm 14.3), weight was 75.3 kg (SD \pm 10.5). APACHE II-scores were 32 (SD \pm 9). At initiation of CVVHDF, SAPS-II was 68 (SD \pm 18), SOFA was 14 (SD \pm 3). Values of creatinine and BUN were 2.46 mg/dL (SD \pm 1.28) and 44.8 mg/dL (SD \pm 20.7) respectively. The prescribed dialysis dose was 30.37 ml/kg/h (SD \pm 1.65). Of a total amount of 5704.5 h of prescribed CVVHDF-therapy, 4433.3 h were delivered (77.7 % of prescribed time). This equals an average delivered dose of 23.3 ml/kg/h. 173 filters were used, with a life-span of 36.1 h (median 30.75 h). 80 filters (46.2 %) were changed due to unplanned reasons. Predominant reasons for unscheduled filter changes were filter clotting in 25 cases (31.3 % of unplanned changes), problems with vascular access in 18 cases (22.5 %) and transport or intervention in 7 cases (8.8 %). RCA worked well with extracorporeal calcium-levels of 0.34 mmol/l (SD \pm 0.03). Total-to-ionized calcium-ratio was 1.9 (SD \pm 0.18).

CONCLUSIONS. The algorithm is well implemented in clinical practice and assures evidence based control of effluent doses. Observed filter life span in our clinical practice was shorter than expected despite proper anticoagulation.

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0823

LACTATE CLEARANCE PREDICTS MORTALITY RATE IN SEPTIC ACUTE KIDNEY INJURY PATIENTS UNDERGOING CONTINUOUS VENOVENOUS HEMODIAFILTRATION (CVVHDF): AN OBSERVATIONAL STUDY

R. Passos^{1,2}, F. Dutra², P. Batista¹, E. Macedo³, L. Correia¹, M. Dutra²

¹Hospital Sao Rafael, Salvador, Brazil, ²Hospital Portugues, Salvador, Brazil, ³Universidade de São Paulo, Sao Paulo, Brazil

INTRODUCTION. In patients with septic acute kidney injury (AKI), the lack of improvement in acidosis on continuous renal replacement therapy (CRRT) and the degree of lactate clearance is associated with mortality rate in patients with severe sepsis and septic shock. In this study, we sought to assess the clinical utility of lactate clearance to predict early and late mortality in patients with septic AKI on continuous venovenous hemodiafiltration (CVVHDF).

METHODS. All consecutive patients with septic AKI requiring CVVHDF admitted in three different intensive care units at a Brazilian tertiary hospital were prospectively studied. Standard demographic, clinical and physiological data were evaluated at start of CVVHDF and 24 h later.

RESULTS. 188 patients were enrolled. Mortality at 48 h was 27 % and at 28 days was 69 %. At the beginning of CVVHDF and 24 h after, lactate levels and lactate clearances were different ($p < 0.01$) between survivors and nonsurvivors. Analysis of lactate 24 h after start of CVVHDF showed that a lactate level higher than 4 mmol/L had the maximum sensitivity and specificity for predicting 48-h and 28-day mortality. Multivariate logistic regression modeling showed that 24 h after CVVHDF initiation, lactate levels higher than 4 mmol/L were associated with 48-h and 28-day mortality ($p < 0.001$ and $p < 0.001$ respectively) and that lactate clearance had an inverse relation to 48-h and 28-day mortality ($p = 0.004$ and $p = 0.006$ respectively).

CONCLUSIONS. Lactate clearance was associated with early and late mortality in septic AKI patients undergoing CVVHDF. These findings suggest lactate clearance is a promising risk-stratification tool.

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0824

QUALITY INDICATORS IN ACUTE CORONARY SYNDROME WITH ST SEGMENT ELEVATED IN THE LAST DECADE

M.-V. de la Torre-Prados¹, E. Camara-Sola¹, A. Vallejo-Báez¹, P. Nuevo-Ortega¹, T. Tsvetanova-Spasova², J. Perez-Vacas³, C. Trujillano-Fernández¹, A. García-Alcántara¹

¹Hospital Universitario Virgen de la Victoria/IBIMA Institute, Intensive Care Medicine, Málaga, Spain

INTRODUCTION. Early diagnosis and therapeutic strategies to reduce morbidity and mortality in ST segment elevated in acute coronary syndrome will have a significant impact on the social and economic burden of coronary heart disease.

OBJECTIVES. To analyze the trend of quality indicators in acute coronary syndrome with ST-segment-elevated and to assess improvement aspects.

METHODS. It is a prospective study of qualitative intervention. From January 2001 to December 2013 a total of 2,907 patients area studied in different health care settings (Pre-Hospital Emergency Care, Emergency Department, Coronary Care Unit and Cardiac Catheterization Laboratory). We analyzed demographic, clinical and pre-hospital and hospital responses from the onset of symptoms to diagnosis and therapeutic interventions, such as Primary Percutaneous Coronary Intervention (PCI), fibrinolytic agent, Rescue PCI, treatment at discharge from Coronary Care Unit (CCU), length of stay and mortality. According to variables nature descriptive and comparative statistical analysis is established, expressing 2001 versus 2013 data, with the program, SPSS-v15.

RESULTS. The overall average age of the sample is 62.2 ± 12 years, p = ns. There was an increase in the use of the health care system, 69 % (2001) vs. 75.3 % (2013) and a significant percentage in Primary PCI (2 %, 2001 vs. 67.2 %, 2013, p = 0.000) with decline of a fibrinolytic agent (74 vs. 34 %, p = 0.005). Fibrinolytic agent in Pre-Hospital Emergency Care shows a significant increase (3.5 vs. 53 %, p = 0.000), as well as within 3 h of the onset of pain (55 vs. 82.3 %, p = 0.001). The percentage of total PCI increases significantly in Coronary Care Unit (43–92 %, p = 0.000) and non coronary reperfusion descends significantly (27–8.1 %, p = 0.000). The variables of time (50th percentile) as onset of symptoms to the total fibrinolytic agent decreases 150–117 min (p = 0.05), hospital door to fibrinolytic agent descends 30–23 min (p = 0.04) as well as opened artery by Primary PCI time 115–80 min, p = 0.01. Significant increase to discharge from CCU of Lipid Lowering medication (34–77 %, p = 0.03), Beta Blocker (63–86 %, p = 0.04) and Angiotensin Converting Enzyme Inhibitors (56 vs. 80 %, p = 0.02). Length of stay and mortality in CCU and hospital also decrease significantly (3.3 vs. 1.9 days, p = 0.000; 6.1 vs. 4.4 days, p = 0.000) and (6.1 vs. 2.2 %, p = 0.02; 7.8 vs. 4.5 %, p = 0.001).

CONCLUSIONS. The improvement of clinical quality indicators in STE-SCA was based on the increase of communication between different setting health care and the degree of coronary reperfusion, which allowed to reduce the percentage of non-coronary reperfusion, average length of stay and mortality.

0825

ADVANTAGES IN THE USE OF PRE-SURGERY INTRA-AORTIC BALLON PUMP IMPLANTATION IN CARDIAC SURGERY: PROPENSITY SCORE IN THE ARIAM CARDIAC SURGERY REGISTER

E. Trujillo-García¹, E. Curiel-Balsera¹, J. Muñoz-Bono¹, H. Molina-Díaz¹, C. Joya-Montosa², J. Mora-Ordoñez¹

¹H. R. U. Carlos Haya, Málaga, Spain

INTRODUCTION. Preoperative use of intra-aortic balloon pump is frequently discussed, and some published meta-analyses and research studies show reduced mortality rate in high risk patients undergoing cardiac surgery. However, these studies showed important variability in surgery type, patient features, and time of implantation. Our objective is confirming whether intra-aortic balloon pump is useful in all types of cardiac surgery patients included in our cardiac surgery Register (ARIAM database).

METHODS. Observational, retrospective and multicentric study of patients undergoing cardiac surgery and included in the ARIAM-Andalucía Register of cardiac surgery from March 2008 to July 2012. Likelihood of pre-surgery intra-aortic balloon pump implantation was calculated by means of a propensity score so as to obtain two homogeneous groups of patients treated either with or without balloon pump according to demographic features, functional capacity, and surgery type. A total number of 77 balloon-pump patients were matched to 77 non-balloon-pump patients according to the closest propensity score. Chi square and Student's t-tests were used, as well as binary logit regression for multivariate analysis so as to avoid confusing variables.

RESULTS. A total number of 8026 patients underwent cardiac surgery in 5 years. Out of these patients, 4.5 % (358) needed intra-aortic balloon pump implantation (65.4 % were males). A propensity score was calculated, matching 77 couples of patients with and without intra-aortic balloon pump according to their (similar) epidemiological features and surgery type, and surgery type, which are shown in the table below:

Age	63 ± 10 years	63 ± 10 years	ns
Gender	Male 61 (84.7 %) Female 11(15.3 %)	Male 61 (84.7 %) Female 11 (15.3 %)	ns
Hypertension	43 (59.7 %)	49 (61.8 %)	ns
Diabetes	23 (31.9 %)	23 (31.9 %)	ns
Dyslipidemia	37 (51.4 %)	35 (48.6 %)	ns
Smoker	30 (41.7 %)	19 (26.4 %)	ns
NYHA > III	29 (40.3 %)	45 (48.6 %)	ns
Renal failure	20 (27.8 %)	13 (18.1 %)	ns
Preoperative NYHA	I 22 (32.4 %) II 5 (7.4 %) III 13 (19.1 %) IV 28 (41.2 %)	I 22(32.4 %) II 5 (7.4 %) III 13 (19.1 %) IV 28 (41.2 %)	ns
Surgery type	Valve 23 (31.9 %) CABG 34 (47.2 %) Both 15 (20.8 %)	Valve 33 (45.8 %) CABG 31 (43.1 %) Both 6 (8.3 %)	ns

[Features (with and without balloon pump)]

Mortality rate analysis by any cause 30 days after surgery showed statistically significant differences, since mortality reached 27 % among patients who had undergone pre-surgery intra-aortic balloon pump implementation, relative to 13.1 % reached among patients who had undergone no balloon pump implementation (p = 0.043). Analysis of mortality causes (prolonged mechanical ventilation, reintervention, mediastinitis, and stroke) 30 days after surgery showed mortality differences between patients with and without balloon pump implementation (58.3 vs. 41.7 %; p = 0.046). No differences between both groups were found when Euroscore, mortality rate and mortality causes were analyzed by multivariate and stratified analysis [p = 0.62, OR 0.75 (0.23–2.35)] and [p = 0.11, OR 0.47 (0.19–1.18)], respectively. Patients who underwent balloon pump implantation showed higher ICU stay (7.7 ± 10.6 vs. 4.6 ± 6.7; p = 0.046), and no differences were observed in global hospital stay (21.8 ± 18.7 vs. 22.08 ± 18.9, ns).

CONCLUSIONS. The use of intra-aortic balloon pump prior to cardiac surgery in high-risk patients proves no improvement in terms of mortality and the effect of mortality causes. Longer ICU stays were found among patients who undergone balloon pump implantation, and no differences were observed in global hospital stay.

0826

THE PROGNOSTIC VALUE OF SERUM 25-HYDROXY VITAMIN D LEVEL IN PATIENTS WITH ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION

S.M. Alawady¹, H. El-Ashrawy², M. Elsayy³, M. Alkomy¹

¹Alexandria University/Alexandria Faculty of Medicine, Critical Care, Alexandria, Egypt,

²Alexandria University/Alexandria Faculty of Medicine, Cardiology, Alexandria, Egypt,

³Alexandria University/Alexandria Faculty of Medicine, Clinical Pathology, Alexandria, Egypt

INTRODUCTION. Vitamin D deficiency traditionally recognized as the cause of musculoskeletal pathology, but links to cardiovascular disease has only recently been suggested¹. Vitamin D suppresses the renin-angiotensin system², affects endothelial function and has anticoagulant effects by upregulating thrombomodulin and downregulating tissue factor³. These effects may have direct relevance to cardiovascular disease⁴.

OBJECTIVES. Assessment of vitamin D status in patients with acute STEMI and its correlation with hospital length of stay, in hospital complication, in hospital mortality and 6 months mortality.

METHODS. In a prospective cohort study, 53 patients with acute ST segment elevation myocardial infarction were included. According to the patients' 25 (OH) D levels (ng/ml) level patients were categorized into two groups one with low 25 (OH) D levels and the other with normal level. Clinical characteristics, laboratory data, in-hospital outcomes and 6 months mortality were recorded.

RESULTS. Almost 70 % of the STEMI group were vitamin D deficient (<30 ng/ml). Patients with history of hypertension had significantly lower vitamin D levels (p < 0.001). Moreover, a significant positive relationship between hospital length of stay and levels of vitamin D (p value < 0.003). In addition, hospital length of stay was significantly higher in patients who undergone primary percutaneous intervention (p < 0.008).

CONCLUSIONS. Vitamin D deficiency is highly prevalent in patients with acute STEMI and in patients with history of hypertension. Vitamin D deficiency is associated with longer length of hospital stay in STEMI patients.

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0827

TIMELY TREATMENT IN ACUTE MYOCARDIAL INFARCT: COORDINATION BETWEEN MEDICAL CARE LEVELS

A.M. de Pablo-Hermida¹, P. Albert-de la Cruz¹, E. García-Sánchez¹, E.M. Hernández-Sánchez¹, M. Cruz-Tejedor¹, S. Zubillaga-Muñoz¹, E. Nevado-Losada¹

¹Hospital Universitario del Sureste, Servicio de Medicina Intensiva, Arganda del Rey, Spain

INTRODUCTION. Treatment delay was associated with mortality and morbidity in patients with both ST elevation (STEMI) and non-ST elevation (NSTEMI) acute myocardial infarction (AMI). Patient-related delay reflects the time since clinical onset to the first contact with the health care system, whereas system-related delay is the time lag between the first contact with the health care system and standard treatment.

OBJECTIVES. Improving time delay between symptoms onset and standard treatment in patients with AMI. Study done at a community hospital serving a wide rural area (1,320 km²), with a scattered distribution of the population (up to 45 min-road isochrones). Area comprises over 180,000 people ascribed to seven Primary Care Centres (PCC).

METHODS. Observational study to compare outcomes before and after a bundle of measures.

Inclusion criteria: A cohort of 325 patients consecutively admitted to a 6-bed Intensive Care Unit (ICU) for AMI.

Exclusion criteria: Patients who were deemed eligible by ICU staff for primary percutaneous coronary intervention and were therefore transferred to a higher-level hospital.

Intervention: Educational programme among PCC and Hospital, from both Emergency Department (ED) and ICU physicians and implementation of a shared clinical guideline to achieve a fast recognition, suitable transportation and timely standard treatment of AMI patients

Standard treatment: For STEMI patients, reperfusion with fibrinolysis therapy. For NSTEMI patients, double platelet antiaggregation plus anticoagulation.

Statistical procedure: Data were expressed as median (interquartile range) and mean (SD) and compared by Mann-Whitney's U test.

RESULTS. We analysed data for a total number of 325 patients from 2008–2013, 67 % were male and mean age was 63 ± 12 years. STEMI was diagnosed in 37 % (n = 121) vs. 63 % (n = 204) of NSTEMI and 225 patients were in the pre-intervention group vs 100 patients to the post-intervention group.

	Pre-intervention	Post-intervention	%
Primary Care C	44	25	21
Emergency system (112)	24	14	12
Hospital Emergency Dept.	157	61	67

[First contact with health care system (n. pts)]

	Pre-intervention	Post-intervention	
Patient-R delay	240 [120–1350]	120 [45–360]	p = 0.028
System-R delay	127 [120–300]	80 [60–150]	p = 0.048

[Time (min) in pts who firstly contact PCC (n=69)]

	Pre-intervention	Post-intervention	
Patient-R delay	145 [60–300]	120 [60–300]	ns
System-R delay: NSTEMI	5 [5–107]	5 [5–60]	p = 0.034
System-R delay: STEMI (door-to-needle)	31 [20–60]	22 [15–30]	p = 0.035

[Time (min) ED-effective std treatment (n=325)]

CONCLUSIONS. Coordination between different medical care levels improves timely treatment in AMI patients. After the intervention implementation, patients initially contacting PCC do so with a lesser delay and get standard treatment earlier. PCC physicians educate patients on alarm symptoms. Patients consulting at the ED also get standard treatment earlier.

0828

TWO-YEAR EVALUATION OF THE A PHARMACO-INVASIVE STRATEGY (PHIS) IN PATIENTS WITH ACUTE ST ELEVATION MYOCARDIUM INFARCTION (STEMI) FROM A SETTING (PUNTA DE EUROPA) UNABLE TO CARRY OUT PRIMARY PERCUTANEOUS CORONARY INTERVENTION (PPCI)

J.C. Rodríguez Yañez¹, M.J. Huertos Ranchal¹, I. Díaz Torres¹, P. Bueno Bustelo¹, A. Foerst¹, C. Ramírez Navarro¹

¹Hospital Universitario Puerto Real, Unidad de Cuidados Intensivos, Cadiz, Spain

INTRODUCTION. (p)PCI is the ideal method of reperfusion for acute STEMI. Although, in some areas it is very difficult to implement pPCI between 2 h, and it is well-known that "Time is myocardium".

OBJECTIVES. To evaluate PHIS in patients with STEMI treated with fibrinolytic therapy (FT) from Punta de Europa and transported to our PCI capable hospital.

METHODS. Retrospective observation-based study. All patients with STEMI treated with FT with bolus tenecteplase and transported to our PCI capable hospital, 120 km away, during the period from 1st January 2012 and 31st December 2013 were included. Global Registry of Acute Coronary Events score (GRACE) and Killip class were registered. The permeability of culprit artery was measured by flow grade system TIMI (Trombolysis in Myocardial Infarction). Grade TIMI III before PCI was considered successful fibrinolysis (SFT). Left Ventricular Ejection Fraction (LVEF) was measured by echocardiography and ventriculography. R-comander statistical pack was used for analyses. All continuous variables are described as their mean values \pm standard deviation and Chi square tests for discrete variables. CI 95 %. $P < 0.05$.

RESULTS. In total, 132 consecutive patients were included, 117 (88.6 %) male and 15 (11.4 %) female, mean age 58.83 ± 11.82 years, minimum 32 years, maximum 87 years. Mean stay in ICU was 1.21 ± 0.9 days. STEMI location was inferior in 55.3 % cases, and anterior in 44.7 %. Killip I (115), II (10), III (3), IV (4). Mean GRACE score 143.82 ± 22.7 . The median delay from symptom onset to FT was 149 min, 75 % of FT were performed in first 2 h. 26.5 % (35) pre-hospital FT. 25 patients were transported for early rescue PCI (rPCI <6 h). After angiography post-FT, 77.3 % SFT(102) TIMI III. 20 rPCI TIMI 0. In 10.6 % (14) patients no significant lesions were found. No statistically significant differences comparing LVEF and PCI delay between <24 h and >24 h were found. 30-day mortality was 1.5 %. No FT-related complications were found. In hospital complications: One patient died of type-A aortic dissection PCI-related and one died of septal rupture, both after cardiovascular intervention. One early stent thrombosis. Two patients required transfusion, one of them femoral thrombosis.

CONCLUSIONS. In Punta Europa district a pharmaco-invasive strategy with early fibrinolytic therapy in patients with acute STEMI represents a safe and effective alternative to primary PCI.

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0829

EVALUATION OF EPIDEMIOLOGY CHANGES IN CARDIOVASCULAR RISK FACTORS IN ACUTE CORONARY SYNDROME IN THE LAST 10 YEARS ACCORDING TO ARIAM DATABASE

M.J. Chaparro Sanchez¹, J. Bono Muñoz², R. Gutierrez Rodríguez³, J.A. Arboleda-Sánchez²

¹Carlos Haya Hospital, Malaga, Spain. ²Carlos Haya University Hospital, Critical Care Unit, Malaga, Spain. ³Carlos Haya University Hospital, Malaga, Spain

OBJECTIVE. observational studies shown important changes in the epidemiology of acute myocardial infarction, such as changes in the prevalence of the different cardiovascular risk factors, earlier appearance and decrease in the incidence of acute coronary syndrome with ST elevation, STEMI. Our objective was to establish whether said change had occurred in the most prevalent risk factors among patients admitted to spanish ICUS for acute coronary syndrome.

MATERIALS AND METHODS. A prospective, descriptive study of patients with ACS, acute coronary syndrome, registered in the Andalusian ARIAM hospital register in the last 11 years. Variables: demographics, percentages of different risk factors, arterial hypertension, diabetes mellitus, smoking, dyslipidemia and morbid obesity. Typical median deviation. Qualitative variables analyzed with $\times 2$, and continuous variables with T student. Significance at $P < 0.005$.

RESULTS. A total of 41,260 patients were studied. Mean age was 65. Men 76 %. ACS with ST elevation 57 % and without ST elevation 42.4 %. Significant differences were observed, $P < 0.05$, in the progressive increase of risk factors such as arterial hypertension, from 52 to 56.4 %. This was more marked in the obesity percentage which went from 72 % in 2010 to almost 23 % in 2012. Similar changes were observed in dyslipidemia, 34.9 vs 45.8 %, ($P < 0.001$). There is also a significant decrease in age from 65 to 63. The percentage of women admitted for ACS decreased from 27 to 23 %, $P < 0.005$. No changes were observed in temporal groups (2002–20012). The percentage of diabetics remained stable at 33 %.

CONCLUSIONS. The risk factors of our age are widely known as are the most appropriate measures for dealing with these. Despite this, this study suggest a progressive increase in the risk factors and that we should consider new strategies for prevention and control.

0830

DIFFERENCES BETWEEN ACUTE CORONARY SYNDROME WITH AND WITHOUT ST ELEVATION THROUGH A METABOLOMIC APPROACH

Á. Algaba Calderón¹, S. Naz², E. González González¹, C. Muñoz de Cabo¹, G. Heras La Calle¹, J. Gallafri¹, M.C. Martín Delgado¹, J.A. Lorente Balanza³, R. Teijeiro Mestre¹, A. García Fernández², C. Barbas², N. Nin Vaeza¹

¹Hospital Universitario de Torrejón, Madrid, Spain, ²CEMBIO, Universidad CEU San Pablo, Madrid, Spain, ³Hospital Universitario de Getafe, Madrid, Spain

INTRODUCTION. Myocardial ischemia is diagnosed through a combination of history, electrocardiographic changes and troponin levels. Patients suffering an acute coronary syndrome (ACS) are categorized as ST-elevated (STEMI) or non ST-elevated myocardial infarction (NSTEMI), with different clinical implications and treatment. However, there is a group of patients with normal results for which therapeutic decision is still difficult. Metabolomic fingerprint can help to find out molecular differences between STEMI and NSTEMI patients.

OBJECTIVES. Search for new diagnostic biomarkers of ACS to differentiate patients with STEMI and NSTEMI; and analyze changes in the metabolomic profile before and after coronary angiography using capillary electrophoresis-time of flight-mass spectrometry (CE-TOF-MS).

METHODS. Prospective observational study in which serum samples from patients who were admitted to a secondary hospital with STEMI (n = 16) and NSTEMI (n = 16) were studied by CE-TOF-MS. Samples were taken in three times: upon admission to the hospital, after opening the vessel responsible for the ACS (primary percutaneous coronary intervention in STEMI group and early catheterization usually within 24 h of admission for NSTEMI group) and the day after catheterization.

Multivariate statistical analysis: Non supervised principal components analysis (PCA) and supervised partial least squares regression-discriminant analysis (PLS-DA) were performed to find metabolic differences between the study groups.

RESULTS. The study revealed metabolic differences between the two groups, with a huge contrast at the time of arrival to hospital, and within the same group before and after revascularization. STEMI group, compared with NSTEMI, showed an increase in amino acids, carnitines and peptides. These changes were still present after coronary revascularization. Acetylmethionine was only found in the STEMI group at the time of admission.

CONCLUSIONS. This study demonstrates that metabolomic fingerprint study conducted by CE-TOF-MS can help us in differentiating STEMI and NSTEMI patients, both at the time of arrival to the hospital and after treatment of coronary lesions. These findings may be useful in making therapeutic decisions.

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0831

POST CARDIAC SURGERY STATINS RELATED MORBIDITY

S.R. Aboulmag^{1,2}, A.S. Omar^{1,3}, A. Mahfouz⁴, H. Ewila^{1,5}, A.K. Tuli¹, R. Singh⁶

¹Hamad Medical Corporation, Cardiothoracic Surgery, ICU, Doha, Qatar, ²Ain Shams University, Anaesthesia and ICU, Cairo, Egypt, ³Beni Seuf University, Critical Care Medicine, Beni Suf, Egypt, ⁴Hamad Medical Corporation, Clinical Pharmacy, Doha, Qatar, ⁵Suez Canal University, Anaesthesia and ICU, Ismailia, Egypt, ⁶Hamad Medical Corporation, Medical Research, Doha, Qatar

INTRODUCTION. The notion of favorable outcome related to continuation of statins in the perioperative cardiac surgery settings had gained wide approbation,¹ but the complications related to statins therapy in this period remains a major concern.

OBJECTIVES. To study whether perioperative treatment with statins could be associated with increased post-operative complications in terms of increased liver enzymes, and rhabdomyolysis with possible associated acute kidney injury (AKI).

METHODS. Retrospective, observational study with purposive sampling where we analyzed morbidity after cardiac surgery as well as outcome related to statins therapy in 202 consecutive patients over a period of 1 year. We collected perioperative individual data including age, gender, race, Euro score, cardiopulmonary bypass time (CPB), aortic cross clamp time (ACC), length of ventilation, length of stay in intensive care unit (ICU), and association of elevation of liver enzymes, rhabdomyolysis, AKI, post-operative atrial fibrillation (POAF), nosocomial infections and post-operative cardiac enzymes. Patients were divided into two groups; group I was statins users and group II was non users. The groups were compared by t test, or Mann-Whitney U test, as appropriate for interval variables and Chi square tests were used for categorical variables. Data was expressed as mean \pm SD or proportions/percentages for interval and categorical variables respectively. $P < 0.05$ (two tailed) was considered the statistical significant level.

RESULTS. Both groups were matched regarding the age, gender, body mass index, Euro score, preoperative liver enzymes, creatinine, and creatine kinase. Statins group did not show significant elevation in liver enzymes, nosocomial infections or higher association of AKI. The incidence of rhabdomyolysis and POAF were significantly lower in the statins group (p = 0.025 and 0.02 respectively). In addition initial cardiac troponin and CK-MB were significantly lower in the statins group (p = 0.01 and 0.04 respectively). Statins treated

group had significant lower lengths of ventilation, stay in ICU and hospital ($p = 0.002$, 0.005 and 0.001 respectively).

CONCLUSIONS. Therapy with statins before cardiac surgeries is not associated with high incidence of adverse events; moreover statins treated group had favorable outcome regarding the POAF events, and lengths of stay in ICU as well as hospital.

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0832

DEVELOPMENTAL STUDY OF DYSLIPIDEMIA AND MORBID OBESITY ACCORDING TO GENDER IN ACUTE CORONARY SYNDROME WITH AND WITHOUT ST ELEVATION IN OUR ICUS

J. Bono Muñoz¹, M.J. Chaparro Sanchez², R. Gutierrez Rodriguez³, J.A. Arboleda-Sánchez²

¹Carlos Haya Hospital, Malaga, Spain, ²Carlos Haya University Hospital, Malaga, Spain, ³Hospital Carlos Haya, Intensive Care Unit, Malaga, Spain

OBJECTIVES. The risk factors which cause different cardiovascular illnesses in our day and age are widely accepted. Despite this epidemiological studies show that we are not managing to halt said factors and implement an appropriate health policy. Our objective was to analyze the increase in given cardiovascular risk factors in our medium.

MATERIALS AND METHODS. Prospective, observational study of the patients included in the ARIAM register of Andalusian hospitals for acute coronary syndrome between 2002–2012. Variables: demographic (sex and age), acute coronary syndrome with and without ST elevation, percentages of various risk factors, arterial hypertension, diabetes mellitus, smoking, dyslipidemia, and morbid obesity. Typical median deviation. Qualitative variables analyzed with X2 and continuous variables with T student. Significance at $P < 0.05$.

RESULTS. A total of 41,260 patients were studied. Mean age 65. Men 76 %. Acute coronary syndrome with ST elevation 57 %, and without ST elevation 42.4 %. We found that between 2002 and 2012 the three risk factors most subject to change were smoking, dyslipidemia and morbid obesity 8.6 vs 26 %, dyslipidemia 34 vs 44 %. In men $P < 0.005$ obesity 6.1 vs 22.1 %, dyslipidemia 35 vs 44.6 %, significant differences among groups. $P < 0.001$. In light of the results, we found that though the increase in obesity was greater in women, the progressive increase in obesity was paralleled in both sexes.

CONCLUSIONS. This study suggests there have been important changes in the prevalence of certain cardiovascular risk factors, with an increase in obesity, dyslipidemia, especially among women. Strategies are needed to prevent obesity in the general population, especially in the south of Spain, where recent studies suggest that obesity is higher than the figures in our study population; 37 % in the south of Spain and 22 % in the rest of Spain.

0833

INITIAL EXPERIENCE WITH ECMO AS A BRIDGE TO HEART TRANSPLANT

R. Jara-Rubio¹, F. Vilchez-Pizarro¹, D. Bixquert-Genovés¹, C. Albacete-Moreno¹, I.P. Garrido², M. García Villa³, L.A. Conesa Cayuela¹, J. García-Puente², S.J. Cánovas-López³, A. Ribó⁴

¹University Hospital Virgen Arrixaca, Intensive Care, Murcia, Spain, ²University Hospital Virgen Arrixaca, Cardiology, Murcia, Spain, ³University Hospital Virgen Arrixaca, Cardiac Surgery, Murcia, Spain, ⁴University Hospital Virgen Arrixaca, Anesthesia, Murcia, Spain

INTRODUCTION. Patients awaiting heart transplant might deteriorate increasing the risk of postoperative mortality. Extracorporeal membrane oxygenation (ECMO) may have the potential to significantly improve the clinical condition in these critically ill patients. Outcomes of the first 8 patients to receive this device as a bridge to heart transplantation are presented.

OBJECTIVES. To describe the results and complications of ECMO therapy as a bridge to heart transplant in a Tertiary University Hospital covering a population of 1,500,000 people.

METHODS. A multidisciplinary heart team composed of cardiologist, cardiac surgeon, anesthesiologist and an intensive care medicine doctor evaluated the patients and set the indication for AV ECMO. Patients were admitted to the Intensive Care Unit. Demographic and clinical data were recorded in a database. Statistical analysis was performed using SPSS 20 software (SPSS Inc, Chicago, IL). Standard deviation and means were calculated.

RESULTS. From 2010 through April 2014 eight patients (six men, two women) were supported with ECMO. They were a mean age of 51 ± 13 years (20–63), had a mean left ventricular ejection fraction of 30 %, and a mean lactate level of 2 mEq/L. Five patients (62.5 %) were INTERMACS level 1 and 3 patients (37.5 %) were INTERMACS level 2 at the time of ECMO implantation. The etiology varied: 3 were ischemic and the other 5 dilated of idiopathic origin. Two of them were on mechanical ventilation before ECMO insertion. The CentriMag Blood Pumping System (Levitronix LLC, Waltham, MA) was inserted in seven cases and the Maquet Cardiohelp (Maquet Cardiopulmonary AG, Hirrlingen, Germany) in one. In seven cases arterio-venous femoral cannulation was selected; in the other, subclavian artery-femoral vein were cannulated. Average duration of ECMO support was 11 ± 13 days (1–35) before heart transplant. In three patients ECMO was maintained after transplantation for an average of 3 days (2.2 and 5 days respectively). Two patients required treatment with V.A.C.[®] (Vacuum Assisted Closure[®]) therapy after weaning, due to wound dehiscence in the cannulation site. In two cases the oxygenator membrane had to be replaced after 20 days for worsening oxygenation. Overall, 6 patients (75 %) survived after being successfully transplanted and weaned off ECMO; the other two died awaiting transplantation, one due to hemorrhagic shock and the other due to septic shock after 23 days on ECMO.

CONCLUSIONS. AV ECMO was easy to insert, it provided adequate cardiovascular support, functioned without mechanical error, and successfully bridged patients to heart transplant. It significantly reduced expected mortality in these critically ill patients. In patients awaiting heart transplant with clinical deterioration or shock, ECMO support improves patients condition before urgent transplantation. Adherence to protocols in order to reduce complications is mandatory.

REFERENCE(S).

GRANT ACKNOWLEDGMENT.

0834

COHORT STUDY AFTER RESCUE PERCUTANEOUS CORONARY INTERVENTION

M.-V. de la Torre-Prados¹, C. Trujillano-Fernández¹, J. Perez-Vacas¹, A. Puerto-Morlán¹, E. Camara-Sola², T. Tsvetanova-Spasova¹, P. Nuevo-Ortega¹, A. García-Alcántara¹

¹Hospital Universitario Virgen de la Victoria/IBIMA Institute, Intensive Care Medicine, Málaga, Spain

INTRODUCTION. The major goal of therapy in patients presenting with ST-segment elevation myocardial infarction (STEMI) is early and complete reperfusion of the infarct-related artery to salvage myocardium and to improve clinical outcome.

OBJECTIVES. To relate clinical profile and quality parameters with mortality at 28 days, in patients with ST-elevation myocardial infarction (STEMI), treated with fibrinolysis and rescue percutaneous coronary intervention (PCI).

METHODS. Between January 1998 and May 2013, we analyzed prospectively clinical and healthcare variables in 448 patients admitted to coronary care unit for STEMI. They were treated with fibrinolysis and if there was non coronary reperfusion criteria, with persistent chest pain, ST segment elevation above 50 % or non reperfusion arrhythmias, the patients subsequently underwent rescue PCI. Descriptive and comparative statistical analysis was performed using the statistical software packages SPSS version 15.0 (SPSS Inc., Chicago, IL, USA)

RESULTS. Mortality at 28 days was 8.3 % ($n = 36$), being significantly higher in the older age group (68 ± 11 vs. 58 ± 10.7 , $p = 0.000$), more coronary arteries affected (1.43 vs. 1.81, $p = 0.01$), more myocardial damage or peak CK (3179 vs. 4260, $p = 0.04$), lower left ventricle ejection fraction (LVEF) (47 vs. 30 %, $p = 0.000$), greater percentage heart failure (HF) (33 vs. 2 %, $p = 0.000$) and TIMI < 3 after rescue PCI (17 vs. 7 %, $p = 0.01$). The logistic regression analysis showed that mortality was associated with a sensitivity of 99 % and a specificity of 53 % with more age (OR 5, 95 % CI 1.8 to 14, $p = 0.001$), presence of HF (OR 8.3, 95 % CI 3 to 24, $p = 0.000$), LVEF < 30 % (OR 13, 95 % CI 4.4 to 39, $p = 0.0000$) and delay from onset of symptoms to health system arrival, more than 120 min, (OR 2.5 95 % CI 0.9-6.5, $p = 0.07$).

CONCLUSIONS. In this review of our series of patients with STEMI and rescue PCI, the higher mortality is associated with coronary artery disease severity and delay to call the health system, both result in a greater degree of myocardial damage and cardiac dysfunction

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0835

GENDER INFLUENCE IN MORTALITY OF PATIENTS UNDERGOING CARDIAC SURGERY

S. Silvente Fernández¹, M.R. Mañas Vera¹, L. Olivencia Peña¹, A. Reina Toral¹, E. Aguayo De Hoyos¹

¹Virgen de las Nieves Hospital, Intensive Care Unit, Granada, Spain

INTRODUCTION. Female gender is considered a risk factor for mortality in patients undergoing cardiac surgery and is one of the features included for calculating risk scores.

OBJECTIVE. The study's objective was to evaluate the influence of female gender in hospital mortality in patients undergoing cardiac surgery.

METHODS. Data from 2390 patients undergoing cardiac surgery between June 2008 and December 2013 were prospectively collected from ARIAM registry (Andalusian cardiac surgery registry). Two groups were divided by gender and differences were analyzed by type of surgery: CABG, valvular, mixed, aortic and others. Classical cardiovascular risk factors and more prevalent items in specific in cardiac surgery or general predictive risk models (EuroSCORE, Parsonnet and SAPS 3) were also evaluated. We used the R statistical package version 3. Results were expressed in frequency and percentage, or mean values, and p value < 0.05 and odds ratio (OR) value whose confidence interval (CI) did not include unity were considered statistically significant.

RESULTS. About 57 % of the population studied was female (946 patients) with a mean age higher than males (65.18 vs 61.92, $p < 0.001$). Risk factors distribution: prior cardiac surgery and kidney disease were more prevalent in women group ($p < 0.001$) while cardiovascular risk factors mean value was higher in men ($p < 0.001$). Risk scores values were lower in men group except for logistic SAPS 3 ($p < 0.001$): additive EuroSCORE (6.95 vs 5.46), log. EuroSCORE (10.02 vs 7.77), additive Parsonnet (23.16 vs 14.49), log. Parsonnet (8.28 vs 3.92), additive SAPS 3 (39.96 vs 38.23), log. SAPS 3 (9.91 vs 9.15, $p = ns$). The crude mortality was analyzed by diagnostic groups: risk of death for men was lower in CABG (OR: 0.16, 95 % CI 0.06-0.45) and valvular (OR: 0.57, 95 % CI: 0.38-0.85) groups, so male global mortality rate was lower (OR: 0.59, 95 % CI 0.42-0.82). Our death risk model included the same variables as EuroSCORE and Parsonnet predictive models. Gender was not an independent predictor of in-hospital mortality ($p = 0.144$) but age ($p = 0.000$), NYHA class ($p = 0.000$), prior kidney function ($p = 0.000$), previous cardiac surgery ($p = 0.001$), active endocarditis ($p = 0.005$) and surgical priority ($p = 0.001$) were.

CONCLUSIONS. In our population, the risk-adjusted in-hospital mortality provides no great differences between genders. Female condition does not behave like a risk factor in this series.

0836

INFECTION PREVENTION WITH SELECTIVE DIGESTIVE TRACT DECONTAMINATION (SDD) IN PATIENTS WITH A VENTRICULAR ASSIST DEVICE (VAD)

S.R. Martín Amador¹, R.L. Jorge Luis¹, C.G. Juan Antonio¹, S.G. Miguel¹

¹H U Clínico San Carlos, Cardiovascular ICU, Madrid, Spain

INTRODUCTION. Patients requiring a VAD and mechanical ventilation (MV) are a subset of critically ill at high risk for nosocomial infection with rates above 50 % having been reported. SDD has proven to prevent infection in general populations of intubated patients. We reviewed our series of cases with VAD receiving infection prevention with SDD.

METHODS. Records of intubated patients with VAD (Centrimag, LevitronixTM) and MV, receiving SDD (oropharyngeal paste: 2 % colistin, tobramycin, and nystatin and 4 % vancomycin and oral suspension: colistin, tobramycin and nystatin) were reviewed. Infections were expressed as incidence density per 1000 days of VAD and SDD. Patients were followed for 30 days after end of SDD. Continuous variables are presented as mean \pm SD or median (interquartile range (IQR) as appropriate.

RESULTS. Ten male patients were identified (April 2011 to January 2014), with a mean age of 55.8 ± 8.3 years, APACHE II score of 19 ± 5.9 and SOFA score of 8 ± 2.7 . One patient died during placement of VAD and one was weaned from MV within 24 h. Indications for VAD were cardiogenic shock due to acute myocardial infarction in 8 and after cardiopulmonary bypass in 2 patients. Coronary angioplasty was performed in 7 and all had intra-aortic balloon counterpulsation. VAD was bi-ventricular in 5 patients, left in 4, and right in 1.

Median duration of ICU-stay was 15 (6.75; 32.25), MV with SDD 12 (1.75; 27.1), and VAD 8 (3.75; 11.3) days for a total of 224, 182, and 97 days, respectively.

During VAD 1 patient developed an exogenous infection, *Enterococcus faecium* on bacteremia on day 5 of VAD (10.3 per 1000 days) and MV-SDD (5.5 per 1000 days). Another patient presented multi-focal sepsis (carbapenem-resistant *K. pneumoniae* on catheter tip, pleural fluid, and urine) 40 days after decannulation. Three patients died (septic shock, haemorrhagic shock, sudden death).

CONCLUSIONS. The main limitation our data is being derived from a small sample size. Our results, showing low incidence of infection during VAD, suggest that SDD provides protection against infection during a high risk situation, as is the presence of VAD. Larger series and follow-up are required to confirm our findings.

0837

MANAGEMENT AND EARLY OUTCOME IN PATIENTS WITH ACUTE TYPE A AORTIC DISSECTION PRESENTING WITH CEREBROVASCULAR COMPLICATIONS

H. Murayama¹, H. Kito¹, S. Asano¹, M. Oba¹, M. Hirose¹, M. Kabasawa¹

¹Chiba Prefectural Cardiovascular Center, Chiba, Japan

INTRODUCTION. Type A acute aortic dissection (Type A-AAD) is a critical condition requiring an emergent surgery. However, in the patients presenting with cerebrovascular complications, cardiovascular surgery remains controversial because of progression risk of neurological deficit and lack of prospective controlled study. It is still difficult to determine to operate or not in the treatment of these high risk patients.

OBJECTIVES. The study aim is to examine perioperative factors affecting early outcomes and to determine the indication for surgery in patients presenting with type A-AAD with cerebrovascular complications (CVCs) in a tertiary care hospital.

METHODS. A retrospective observational study of consecutive patients presented with type A-AAD who admitted to ICU between April 2008 and March 2014.

RESULTS. A total of 81 patients (mean age 68 years, range 34-89 years, 44 males and 37 females) were included. The incidence rate of CVCs were 19.8% in our series. Types of CVCs included cerebral infarction in all patients. Surgical management was selected more often in patients without CVCs than in those with CVCs (75% vs 69%). The overall hospital mortality was 6.2% without CVCs and 56.3% with CVCs ($p < 0.01$). In the patients presenting with CVCs, mortality varied between the treatment of choice (36% in surgical group vs 83% in medical group). In the surgical groups, all the patients who survived operation showed no significant neurological exacerbation. Patients who survived operation presented with relatively small lesion (mean infarct size 10 mm, range 5-15 mm), and neurological status at discharge was mostly favorable with mean modified Rankin Scale of 2.5 (range 1-4). On logistic regression analysis, there was a tendency that surgery was protective against mortality in the patients with CVCs (odds ratio 0.11: surgical vs medical $P = 0.08$).

CONCLUSIONS. In the treatment of type A-AAD patients, CVCs adversely affects the early survival of the patients (odds ratio 9.1). In this observational study, the patients who selected to undergo surgery demonstrated improved survival and favorable neurological status.

Predictors of ICU outcome II: 0838-0851

0838

PROGNOSTIC VALUE OF RED CELL DISTRIBUTION WIDTH (RDW) IN PATIENTS UNDERGOING MAJOR NON-CARDIAC SURGERY

G.Y.N. Cheung¹, H.P. Shum², K.C. Chan², O.C.Y. Chan³, C.N. Tang³, W.W. Yan²

¹Pamela Youde Nethersole Eastern Hospital, Department of Anaesthesia, Hong Kong, Hong Kong, China, ²Pamela Youde Nethersole Eastern Hospital, Department of Intensive Care, Hong Kong, Hong Kong, China, ³Pamela Youde Nethersole Eastern Hospital, Department of Surgery, Hong Kong, Hong Kong, China

INTRODUCTION. Prognostication of surgical morbidity and mortality is an important quality assurance tool. Red cell distribution width (RDW), which quantifies heterogeneity in the size of circulating erythrocytes, is a readily available parameter from automated complete blood count. It has been shown to be associated with mortality in cardiac surgical patients or those critically ill.

OBJECTIVES. This study investigates the association of RDW with the 30-day mortality for patients who undergo major or ultra-major non-cardiac surgery in a regional hospital in Hong Kong.

METHODS. Data submitted for Surgical Outcomes Monitoring and Improvement Program (SOMIP) between July 2012 and May 2013 was retrieved. The pre-operative RDW values were collected. Since RDW is strongly influenced by low hemoglobin (Hb) level, only those with pre-op Hb level ≥ 10 g/dL were included. Univariate and multivariate analyses were performed to identify factors associated with 30-day mortality.

RESULTS. 1,598 patients enrolled. 200 patients with pre-op Hb < 10 g/dL was excluded ($n = 1398$). The mean age was 63.7 ± 15.7 . 443 patients (31.7%) underwent ultra-major surgery. The overall 30-day mortality was 11.4%. The mean RDW of the 30-day survivors was 13.6 ± 1.6 and that of non-survivors was 14.2 ± 2.1 ($p < 0.001$, t test) Other factors that were significantly different ($p < 0.05$) included: age, pre-op pulse rate, use of anti-hypertensives, diabetic drugs, steroid or immunosuppressant, pre-operative sodium, urea, creatinine, albumin, Hb and international normalized ratio (INR). The area under receiver operating characteristic (ROC) curve for RDW in determining 30-day mortality was 0.6. A cut-off of 13.35% gave the best discrimination power (sensitivity = 0.625, specificity = 0.557). Logistic regression revealed pre-op RDW $> 13.35\%$ ($p = 0.025$, OR 1.52), albumin level ($p < 0.001$, OR 0.909), INR ($p = 0.008$, OR 4.49), pre-op pulse rate ($p = 0.006$, OR 1.02) and use of anti-hypertensives ($p = 0.001$, OR 1.82) were independent factors associated with 30-day mortality (C index 0.705, Hosmer-Lemeshow test p -value 0.412).

CONCLUSIONS. Our study demonstrates that pre-operative RDW could be a readily available predictor of 30-day mortality in patients who undergo major or ultra-major non-

cardiac surgery. Inclusion of RDW in surgical risk assessment and prognostication model warrants further investigation.

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0839

CO₂ GAP AS A PREDICTOR OF MORTALITY IN THE ICU

T.T. Maskoen¹, I. Wiraatmaja¹, E. Oktaliansah¹

¹Faculty of Medicine Universitas Padjadjaran - Dr. Hasan Sadikin Hospital, Anesthesiology and Intensive Therapy, Bandung, Indonesia

INTRODUCTION. Sepsis is the most common condition that cause the increase mortality and morbidity in ICU patients. Approximately 400,000-500,000 patients a year die caused by sepsis.

APACHE II score still using as ICU predictor of mortality in developing country like Indonesia, but sometimes it is also difficult to realize, because of low cost of budget, so we try to find what kind of single parameter which can be used as a predictor of mortality in ICU patients. Several studies showed that $P_{(v-a)}CO_2$ or CO₂ gap and cardiac index have good correlation in severe sepsis patients.¹¹⁻¹³ In other study show that CO₂ gap can be used as a marker of blood flow adequacy to deliver CO₂ from peripheral tissue to the lung.¹⁹

OBJECTIVES. To investigate the power of CO₂ gap as a predictor of mortality in the ICU of Dr. Hasan Sadikin Hospital.

METHODS. An analytic cohort study has been done in 50 severe sepsis patients in ICU Dr. Hasan Sadikin Hospital to investigate the power $P_{(v-a)}CO_2$ as predictor mortality. The data were collected and were analyzed using Univariable Analysis (to measure sensitivity, specificity, Predictive Value and Likelihood Ratio) and Bivariable Analysis using Hosmer and Lemeshow for goodness of fit. ROC was analyze and the comparison of two independent variable were done using Hanley and Mc Neil method.

RESULTS. In this study we found that the sensitivity and specificity of $P_{(v-a)}CO_2$ or CO₂ gap are 94.7% and 90.3%. Sensitivity and specificity of APACHE II in this study are 89.5% and 96.8%. Also found that Positive and Negative Predicted Value in this study are 85.7% and 96.5%. Positive and Negative Value for APACHE Score are 94.4% and 93.7%. Positive and Negative Likelihood ratio in this study for CO₂ gap are 9.76 and 0.05 and for APACHE II Score are 27.96 and 0.108. ROC in this study are wide with Area Under Curve is 0.925.

CONCLUSIONS. From the result we can concluded the CO₂ gap can be used as predictor mortality which has high prognostic value in the ICU

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0840

DIC SCORING AT ADMISSION IS A USEFUL TOOL TO PREDICT OUTCOME IN SEVERE SEPSIS AND SEPTIC SHOCK PATIENTS

M.F. Azfar¹, M.F. Khan¹, S.M. Khurshid¹

¹King Khalid University Hospital, King Saud University, Critical Care, Riyadh, Saudi Arabia

INTRODUCTION. Disseminated Intravascular coagulation (DIC) is commonly seen in patients with severe sepsis and septic shock and is associated with an increased rate of mortality. In 2001 the DIC subcommittee of the International Society of Thrombosis and Haemostasis (ISTH) developed a DIC score based on laboratory assays which include Platelets, fibrin-related markers (d-Dimer), prothrombin time, and fibrinogen level mainly to establish with overt DIC and without overt DIC. However DIC Scoring at admission can also stratify severity of illness as well prediction of mortality in patients with severe sepsis and septic shock.

OBJECTIVES. To correlate DIC scoring at admission with mortality in patients with severe sepsis and septic shock in ICU.

STUDY DESIGN. Prospective observational cohort study.

SAMPLE SIZE. 99 cohort of patients with severe sepsis and septic shock.

SETTING. University based tertiary care hospital.

METHODOLOGY. The study was started after approval from hospital ethical committee. Informed consent were taken. Data were collected on a pre-designed proforma. First blood sample collected at admission were analyzed for platelets, d-Dimer, Prothrombin time and Fibrinogen level which are components of DIC score. The DIC scoring was based on ISTH Guidelines 1. We graded the DIC score into three categories i.e. 0-2, 3-5, and > 5 . Outcome was measured in terms of ICU mortality.

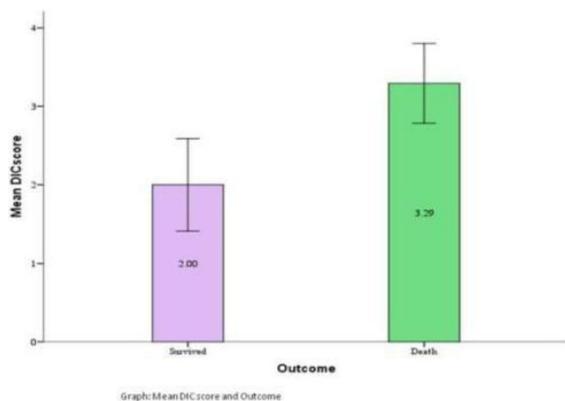
RESULTS. Logistic Regression applied after creating cutoff of DIC score.

Mortality was 3 times more likely in those cases who had DIC score between 3 to 5 [OR = 1.46, 95%CI: 1.46 to 6.59] and 5 times more likely in those cases who had DIC score more than 5 (OR = 5.5; 95%CI: 1.22 to 24.81) as shown in Table 1.

DIC Score	Survive	Death	P-Value	Odd Ratio	95 % CI of OR
0 to 2	23	26	-	1.00 (Ref)	-
3 to 5	9	28	0.003	3.11	1.46 to 6.59
> 5	2	11	0.027	5.5	1.22 to 24.81

[TABLE 1: DIC scoring at admission to predict mort]

Mean DIC score was high in non-survived group as shown in Graph 1.



[Mean DIC and Outcome]

CONCLUSIONS. DIC scoring in patients with severe sepsis and septic shock at admission in ICU significantly correlate with outcome.

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0841 DOES BRADEN SCALE IMPROVE THE PROGNOSTIC FEATURES OF NEWS IN CRITICALLY ILL PATIENTS?

S.O. Amin¹, A. Oskuei¹, D. Connolly¹, D. Kaufman¹, M. Hoq¹, A. Geeti¹

¹Bridgeport Hospital/Yale University School of Medicine, Bridgeport, United States
INTRODUCTION. Many studies have shown that critical deteriorations in hospitalized patients are often preceded by signs of instability. Rapid response teams (RRT) along with scoring systems have been employed to identify patients at risk of deterioration. One such early warning score is the National Early Warning Score (NEWS), which uses acute changes in vital signs and other physiological functions to assess risk of patient deterioration. However, it is not known whether chronic conditions, such as impaired functional status, may influence that risk of deterioration. The Braden Scale measures patients' risks for skin alteration, but several of its items also estimate functional ability.

OBJECTIVES. We hypothesized that adding functional disability, as measured by low Braden Scale score, would improve the diagnostic characteristics of the NEWS in early recognition and response to patient deterioration.

METHODS. We retrospectively analyzed 105 patients on the hospital wards who met criteria for RRT activation. NEWS and Braden Scale scores at the time of RRT evaluation were collected using the hospital's electronic medical records. The primary outcomes were transfer to Intensive Care, in-hospital death or transition to hospice care. The predictive value of Braden Scale, NEWS and combination of both were measured and compared using receiver operating characteristic (ROC) curves.

RESULTS. From the 105 patients analyzed, 39 had at least one positive outcome, while 11 patients had in-hospital death. For any one of the primary outcomes, the addition of Braden Scale to NEWS, decreased the AU-ROC from 0.783 [Figure 1A] (95 % CI, 0.691 to 0.874, $p < 0.05$) to 0.688 [Figure 2A] (95 % CI, 1.178-1.597, $p < 0.05$), while the PPV increased from 0.45 to 0.77 and the NPV went from 0.85 to 0.69; with an odds ratio (OR) of 1.372. When analyzing in-hospital death outcome, the addition of Braden Scale to NEWS lowered the AU-ROC from 0.772 [Figure 1B] (95 % CI, 0.655-0.888, $p < 0.05$) to 0.707 [Figure 2B] (95 % CI, 1.086-1.645, $p < 0.05$), OR 1.337.

CONCLUSIONS. In conclusion, the results of our study are consistent with previous investigations in affirming that NEWS is an independent predictor of patient deterioration at the time of RRT evaluation. Even though with our sample size, the addition of Braden Scale to NEWS did not improve the diagnostic characteristics of NEWS, the statistically significant AU-ROC and OR of Braden Scale plus NEWS is promising and warrants further investigation into the subject matter with a larger sample size.

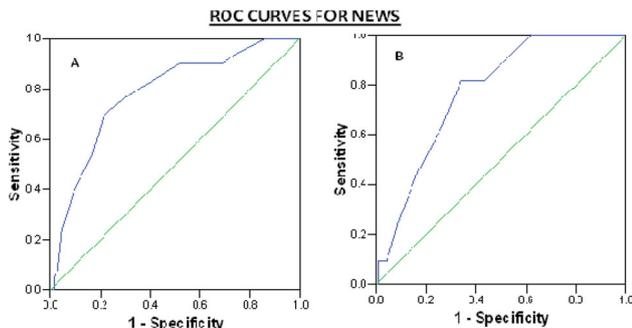


Figure 1: ROC curves for the following (A) NEWS for any outcome; (B) NEWS for in-hospital death

[ROC Curve for NEWS]

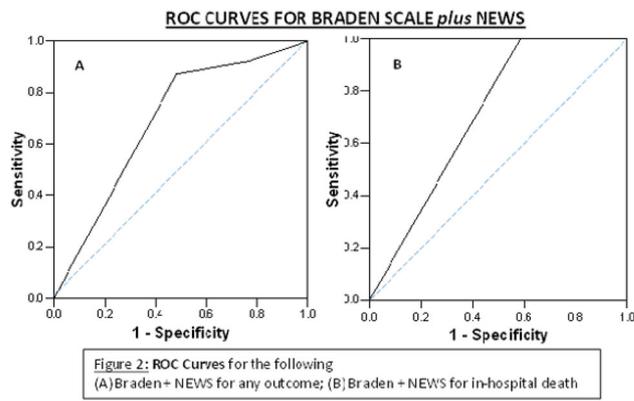


Figure 2: ROC Curves for the following (A) Braden + NEWS for any outcome; (B) Braden + NEWS for in-hospital death

[ROC Curves for Braden Scale + NEWS]

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0842 DESCRIPTION OF A NEW SCALE FOR ACUTE CORONARY SYNDROME SCALE BASED ON AGE AND KILLIP CLASS AT ADMISSION

R. Rivera-Fernández¹, E. Aguilar-Alonso², M.D. Arias-Verdu¹, J.A. Arboleda-Sánchez¹, A. García-Alcantara³, J. Latour-Perez⁴, R. de la Chica Ruiz-Riano⁵, M.P. Fuset-Cabannes⁶, J. Cuñat-De la Hoz⁶, ARIAM-SEMICYUC, ARIAM-ANDALUCIA

¹Carlos Haya University Hospital, Malaga, Spain, ²Infanta Margarita Hospital, Intensive Care Unit, Cabra, Spain, ³Virgen de la Victoria University Hospital, Malaga, Spain, ⁴University Hospital Elche, Elche, Spain, ⁵Virgen de las Nieves University Hospital, Granada, Spain, ⁶Hospital La Fe, Valencia, Spain

INTRODUCTION. Although acute coronary syndrome patients have a high ICU admission rate, the general prognostic indexes used in critical care are not been systematically applied to this pathology.

OBJECTIVES. To describe a new simple prognostic classification for STEMI patients based on age, Killip scale and acute coronary syndrome type with and without ST elevation (STEMI and NSTEMI).

METHODS. Prospective cohort observational study used data from ARIAM - Society of Intensive Care Medicine (Semicycuc) and ARIAM - Andalusia registry. We included all patients admitted to ICU with acute coronary syndrome with and without ST elevation (STEMI and NSTEMI) between 2011 and 2012 (ARIAM - Semicycuc registry) and a group of cases from ARIAM - Andalusia registry between 2002-2012. We analyzed age, sex, Killip class at admission, GRACE points and mortality. Predictive models were generated using multivariate logistic regression. ROC curve was used to assess discrimination capacity. $p < 0.05$ significant

RESULTS. 9192 patients, of which 3808 and 5384 from ARIAM - SEMICYUC and ARIAM-Andalusia respectively, 4966 (54 %) are STEMI and 4226 (46 %) are NSTEMI. 75.1 % males. Age was 64.89 ± 18.27 years. GRACE score was 142.35 ± 39.97 points. 7160 patients (77.9 %) were Killip I. ICU mortality was 4.4 % and hospital mortality was 6.4 %.

Dead patients were older (72.88 ± 10.37 vs 64.31 ± 18.72 years, $p < 0.001$). When age was categorized in intervals according to TIMI scale groups, the mortality was 2.7 % in < 65 years, 6.5 % in 65-74 years and 12.7 % in > 75 years ($p < 0.001$). Mortality increased at higher Killip score : 2.7, 10.4, 24.1 and 51.1 % ($p < 0.001$). Mortality was higher in STEMI (7.5 %) with regard to NSTEMI (5.2 %) ($p < 0.001$).

According to logistic Regression, the mortality relates to age (< 65 years: OR:1; 65-75 years: OR 1.97 (1.50-2.51); > 75 years: OR 4.12 (3.22-5.27)), to Killip score (Killip-I: OR: 1, Killip-II: OR 3.15 (2.45-4.06), Killip-III: OR 9.77 (7.61-12.54); Killip-IV: OR 33.20 (24.71-44.54)) and to STEMI : OR 1.76 (1.44-2.15).

We have used the Beta coefficients of Logistic Regression to assign scores in table 1. A 48-year-old patient, Killip-I and NSTEMI has 0 points and mortality probability of 1.1 %; and with STEMI has 1 point and probability of 1.8 %. Other patient with STEMI, 76 years-old and Killip 4 has 11 points and dead probability of 69 %.

Discrimination of this model evaluated with ROC area 0.84 (0.82-0.85). The GRACE scale model has a discrimination coefficient of 0.86 (0.84-0.88).

	Points	
KILLIP	I	0
	II	2
	III	5
	IV	7
AGE	<65	0
	65-75	1
	>75	3
Acute coronary syndrome	NSTEMI	0
	STEMI	1

CONCLUSIONS. We have designed a new scale for acute coronary syndrome patients with only three variables: age, Killip score and acute coronary syndrome type. This scale can be an alternative for classifying patients with acute coronary syndrome at admission. This scale is simple and has good discrimination.

0843**CORRELATION BETWEEN QRS AXIS ON ADMISSION ECG AND NURSING AND SEVERITY INDEXES IN ICU PATIENTS**A. Vakalos¹, E. Drampala¹¹Xanthi General Hospital, ICU, Xanthi, Greece

INTRODUCTION. Causes of axis deviation include: ventricular hypertrophy, bundle branch block, myocardial ischemia or right ventricular load, myocardial infarction, pulmonary embolism. All these clinical situations may impair physiological status and may have an impact on ICU hospitalization indexes.

OBJECTIVES. The aim of our observation retrospective study was to correlate QRS axis in ICU patients on admission ECG, with nursing and severity indexes in our both medical and surgical ICU served in community hospital.

METHODS. From October to December 2013 we looked for QRS axis (degrees) in ECG automatically analyzed on admission in 48 ICU patients who survived ICU. Mean age (years) 60.06, mean APACHE II score on admission: 23.28, mean length of ICU stay (LOS, days): 8.43, mean duration of mechanical ventilation (VD, days): 5.41, Predicted Mortality (%). Using linear correlation method, we looked for linear slope, correlation coefficient (r), and coefficient of determination (r²), and by linear regression method using ANOVA test we looked for p value, according QRS axis and nursing (LOS, VD) and severity (age, APACHE, Predicted mortality) indexes.

RESULTS.

	Slope	St. Error	r	r ²	L. CI	U. CI	p value
Age	-0.124	0.046	-0.372	0.138	-0.218	-0.030	0.0108
APACHE	0.038	0.019	0.286	0.082	-0.000	0.077	0.0533
Pred Mortality	0.179	0.063	0.394	0.155	0.032	0.306	0.0067
LOS	0.000	0.026	0.001	2.348	-0.054	0.054	0.9919
V.D	-0.005	0.024	-0.033	0.001	-0.538	0.043	0.8232

[Results]

CONCLUSIONS. According to our data, there was statistically significant correlation detected between QRS axis and LOS nor VD. On the other hand, there was statistical extremely significant, moderate positive linear correlation between QRS axis and Predicted Mortality, borderline statistical significant, weak positive linear correlation between QRS axis APACHE II score and statistical significant, moderate negative linear correlation between QRS axis and Age. Our data suggest that QRS axis in ICU patients on admission ECG may be used as a severity index.

0844**EVALUATION OF PNEUMONIA SCORES IN ICU ADMITTED PATIENTS WITH SEVERE COMMUNITY PNEUMONIA PATIENTS**E. Curriel-Balsera¹, E. Trujillo-García¹, G. Gómez-Gallego¹, H. Molina-Díaz¹, C. Joya-Montosa¹, M.C. Martínez-González¹¹H. R. U. Carlos Haya, Málaga, Spain

OBJECTIVES. Evaluating calibration and discrimination regarding mortality, in two specific pneumonia severe illness scores and two illness severity ICU scores in ICU admitted patients with severe community acquired pneumonia (CAP).

METHODS. Observational, retrospective study of patients with community acquired pneumonia admitted in ICU from January 2008 to October 2013. Clinical and epidemiological variables were analyzed and APACHE II, SAPS III, CURB-65 and PSI (pneumonia severity index) were registered with the first 24 h. Quantitative variables are expressed as mean and standard deviation, while qualitative variables are expressed as ratios and absolute value. The Mann-Whitney's test and Fischer's exact test were used when necessary; alpha error was set at 5 %. SMR (standardized mortality ratio) and the Hosmer-Lemeshow test were calculated to analyze calibration and ROC curve calibration for score discrimination purposes.

RESULTS. A total number of 111 patients were analysed from January 2008 to October 2013 (63.1 % being males); average APACHE II was 19.8 + 17.7. ICU mortality rate was 29.7 % (33 cases), and hospital was 32.4 % (no = 36 cases). CURB-65 and Pneumonia Severity Index were calculated upon admission, and both presented good correlation with mortality rate.

Higher correlation was observed in all these scores in relation of severity (p < 0.0001). APACHE II RMS was 0.87, and 0.85 for SAPS III. Picture 3 shows the COR curve for the four scores used in this study. SAPS III rendered the best correlation (AUC 0.79), and CURB-65 provided lower discrimination (AUC 0.7). The Hosmer-Lemeshow test showed good calibration in four predictive scores (p > 0.05).

CONCLUSIONS. These 4 predictive scores render good calibration, but regarding discrimination, SAPS III score seems better. In our opinion, given the complexities of PSI calculation and its proven low discrimination, we suggest the use of CURB-65 in our clinical practice.

0845**DIRECT-CURRENT POTENTIAL AND SEVERITY SCORING SYSTEMS IN THE CRITICALLY ILL**I. Zabolotskikh¹, T. Musaeva¹, O. Kulnich¹¹Kuban State Medical University, Krasnodar, Russian Federation

INTRODUCTION. Scoring systems for use in intensive care unit (ICU) patients have been introduced and developed over the last 30 years. They allow an assessment of the severity of disease and provide an estimate of in-hospital mortality but their predictions are not always accurate. Registration of direct-current potential (DCP) in forehead-palm lead allow to identify three different functional state of the body. Therefore, it is important to compare mortality in similarly groups of patients with different levels of DCP.

OBJECTIVES. To evaluate the prognostic value of the direct current potential when used in conjunction with the severity scoring systems.

METHODS. A double blind randomized retrospective study involved 350 ICU patients after major abdominal operations. Severity of the state was assessed using the APACHE III, SAPS 3 and SOFA severity scales. In an hour after the end of surgery registration of DCP was performed. Depending on the level of the DC potential patients were divided into three groups: 1 - compensated (DCP -15 to -25 mV), 2 - subcompensated (DCP -24 mV to -80 mV), and 3 - decompensated functional state (DCP -14 to positive values). Than the severity of condition and mortality was tested in each group.

RESULTS. The highest mortality was observed in the decompensated patients (26,6 %), and the lowest - in the compensated patients (13,0 %), in subcompensated state it was 14,2 %. APACHE III score was 59,0 (53,0-62,0) in group 1; 63,0 (59,0-67,0) in group 2 and 69,0 (61,5-76,0) in group 3. SAPS 3 score was 41,0 (37,0 - 44,0) in group 1; 52,0 (49,0-55,0) in group 2 and 61,0 (57,0-69,0) in group 3. And SOFA 4,0 (3,0-5,0) in group 1; 6,0 (5,0-7,0) in group 2 and 9,0 (6,0-12,0) in group 3.

CONCLUSIONS. Probability of the lethal outcome correlates with severity of decompensation in similarly severe patients. The prognostic value of the APACHE III, SAPS 3 and SOFA may be improved when used in conjunction with direct current potential level.

0846**MAXIMUM HEART RATE WITHIN 24 HOURS OF ADMISSION TO A MIXED INTENSIVE CARE UNIT IS A PREDICTOR OF INTENSIVE CARE UNIT MORTALITY**D. Kara¹, S.B. Akinci¹, G. Pektaşlı¹, U. Aypar¹¹Hacettepe University Medical Faculty, Anesthesiology and Reanimation Department, Ankara, Turkey

INTRODUCTION. Tight control of heart rate (HR) is important to improve outcomes in Intensive Care Unit (ICU). Previous studies showed tight HR control with beta blockers (BB) was associated with improved cardioprotective efficacy and survival (1,2). However, the effects of max HR within 24 h of admission to ICU on mixed population of critically ill patients have not been investigated yet.

OBJECTIVES. We aimed to investigate effects of max HR within 24 h of ICU admission on mortality.

METHODS. In this retrospective study the data of 850 patients over 45 years old, who had been hospitalized in ICU between 01/01/2006-01/31/2010, was analyzed. Patients were divided into 2 groups, regarding the max HR at admission. Group 1 was constituted from patients with max HR < 100 bpm, while group 2 was constituted from patients with max HR > 100 bpm. The groups were compared regarding age, sex, previous & in ICU BB use, hemodynamic parameters (max-min HR, systolic, diastolic, and mean arterial blood pressures, hypotension at admission), admission GCS, use of cardiac, inotrop, vasopressor drugs, anemia, mechanical ventilation (MV) at admission & during hospitalization, length of hospitalization (in ICU & total stay), mortality during & after ICU, total mortality (in ICU + other wards), CHARLSON&APACHE II scores. Normal distribution of data was tested by Kolmogorov-Smirnov test. Chi square, Mann-Whitney U, and student t tests were used for univariate analysis. Multivariate binary logistic regression was used to find independent predictors of ICU mortality. p < 0,05 was considered as statistically significant.

RESULTS. Univariate analysis showed statistical significant differences regarding age, sex, max HR at admission, previous use of cardiac, inotrop, vasopressor drugs, anemia, MV at admission & during hospitalization, length of ICU & total hospitalization, total & ICU mortality, CHARLSON&APACHE II scores in group 2 compared to group 1. In multivariate backward stepwise analysis; on the dependent variable of mortality in ICU, max HR < 100 bpm was found to be one of the two statistically independent variables among age, previous & in ICU BB use, hypotension, CHARLSON&APACHE II variables (Table 1).

CONCLUSIONS. Our study supports that max HR < 100 patients is associated with consequent better outcomes in ICU. Although severity of the patients' diseases has a direct role predicting mortality, further studies should be conducted to delineate whether controlling max heart rate as a prophylactic general measure in intensive care unit can decrease mortality.

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	B.	S.E	Wald	Sig.
APACHE II	-.223	0.026	76.234	0.000
HR < 100 (group 1)	-.860	0.436	3.893	0.048
Constant	8.722	1.052	68.770	0.000

*[Table 1. Variables in the Equation]***0847****VALIDATION OF THE GLASGOW-BLATCHFORD SCORE AND THE PRE-ENDOSCOPIC ROCKALL SCORE FOR PREDICTING ACTIVE GASTROINTESTINAL BLEEDING IN EMERGENCY DEPARTMENT PATIENTS WITH SUSPECTED UPPER GASTROINTESTINAL BLEEDING**D.W. Lee¹, Y.S. Park¹¹Yonsei University College of Medicine, Emergency Medicine, Seoul, Republic of Korea

INTRODUCTION. The Glasgow-Blatchford score¹ and the pre-endoscopic Rockall score² are clinical decision rules to determine the need for intervention or death, and identify low-risk patients in patients with gastrointestinal hemorrhage. However, no studies have tested whether the Glasgow-Blatchford score and the pre-endoscopic Rockall score can identify patients with active bleeding.

OBJECTIVES. The aim of this study was to validate the Glasgow-Blatchford score and the pre-endoscopic Rockall score to assess their ability to predict the presence of active bleeding in emergency department patients with suspected upper gastrointestinal bleeding.

METHODS. We reviewed and extracted data from electronic medical record on patients presenting with a suspicion of acute upper gastrointestinal bleeding at our emergency from January 1, 2012 to December 31, 2012. For each patient we calculated the Glasgow-Blatchford score and the pre-endoscopic Rockall score. Discriminative ability of the scoring systems for predicting outcomes was evaluated by receiver operator characteristic (ROC) curve analysis.

Primary outcome was the presence of active bleeding. Secondary outcome was the need for clinical intervention: blood transfusion and/or endoscopic/radiological intervention.

RESULTS. We identified 636 patients with upper gastrointestinal bleeding. There were 118 (18.6 %) patients with active bleeding and 520 (81.8 %) patients with the need for intervention. The ROC curve analysis showed the poor discriminative ability of the Glasgow-Blatchford score and the pre-endoscopic Rockall score for determining the presence of active bleeding (area under the curve (AUC) = 0.546, 95 % confidence interval (CI) 0.490-0.602 vs. 0.576, 95 % CI 0.523-0.630, $p = 0.34$). The sensitivity and the specificity of two scoring systems were suboptimal. However, the Glasgow-Blatchford score outperformed the pre-endoscopic Rockall score in predicting the need for clinical intervention (AUC = 0.867, 95 % CI 0.831-0.903 vs. 0.698, 95 % CI 0.643-0.754; $p < 0.001$).

CONCLUSIONS. The Glasgow-Blatchford score was superior in predicting the need for intervention in emergency department patients with suspected gastrointestinal hemorrhage. However, these clinical decision rules may be insufficient to predict the presence of active bleeding.

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0848

A COMPARISON OF APACHE II, SAPS II AND SOFA SCORES TO PREDICT 28-DAY MORTALITY IN A NEW DELHI ICU

R. Pande¹, M. Pandey², M.S. Khan², R. Agarwala²

¹BLK Superspecialty Hospital, Critical Care & Emergency Medicine, New Delhi, India, ²Lady Harding Medical College, Anesthesiology & Critical Care, New Delhi, India

INTRODUCTION. Limited data is available regarding the assessment of severity of illness scores in Indian patients.

OBJECTIVE. To compare the ability of APACHE II, SAPS II, SOFA scores to predict 28-day mortality.

METHODS. This prospective study was conducted in adult ICU patients with expected LOS > 48 h and included medical and surgical patients (n = 85). Patients with burns, ACS, terminal cancer, DNR orders were excluded. All patients were evaluated using APACHE II, SAPS II, SOFA scores at 24 & 48 h of admission. Primary outcome measure was 28-day mortality. The demographic data, mortality, ICU LOS and hospital LOS data was collected for analysis. All statistical tests were 2 sided ($p < 0.05$ significant). The accuracy of outcome prediction was compared by calibration (SMR) and discrimination (ROC) with 95 % CI.

RESULTS. The mean age was 39.14 ± 17.27 years with 40 % 28-day mortality (n = 34). Non-survivors were medical patients (61.76 % versus 38.24 %), older (44.44 ± 19.56 versus 35.61 ± 14.73) and male (41.18 % vs 35.29 %, $p < 0.05$). The hospital LOS (13.76 ± 8.70 versus 8.08 ± 4.24 days), duration of mechanical ventilation (182.49 ± 192.75 versus 105.58 ± 177.33 h) were significantly higher in non-survivors. The APACHE II₂₄, SOFA₂₄ and SAPS II₂₄ scores were higher in non-survivors (17.88 ± 9.43 versus 11.2 ± 6.0; 6.76 ± 2.60 versus 5.16 ± 3.05; 36.56 ± 11.66 versus 28.78 ± 9.68). All models were found to under predict mortality. APACHE II₂₄ prediction was better than SAPS II₂₄ (SMR 1.09 versus 1.32). At 48 h the calibration of SAPS II improved (SMR changed from 1.32 to 1.26). APACHE II had the largest AUC at 24 and 48 h (0.785 & 0.93) when compared to SAPS II (0.718 & 0.871) and SOFA (0.687 & 0.871). Discrimination of all scores improved from 24 h to 48 h of ICU admission.

CONCLUSION. APACHE II was the best scoring system for outcome prediction in patients at 24 and 48 h.

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0849

RELATIONSHIP BETWEEN PROGNOSIS AND FLUID OVERLOAD MEASURED BY BIOIMPEDANCE, DURING THE STAY IN CRITICAL CARE

C. Fritz¹, A. Follin¹, C. Medrano¹, D. Safran¹, R. Pirracchio¹

¹Hopital European Georges Pompidou, Department of Anesthesiology and Critical Care Med, Paris, France

INTRODUCTION. The management of critically ill patients is responsible of significant early changes in sodium and water balance. Several studies have found a correlation between fluid overload and morbidity in intensive care (1). There are few reliable methods to assess hydration and water distribution in the different compartments of the body. The multifrequency bioelectrical impedance spectroscopy (BIS) is a noninvasive technique that measures the impedance of the body (2).

OBJECTIVES. The goal of our study is to evaluate the relationship between fluid distribution in various compartments in critically ill patients, and outcome during the first four days of their stay.

METHODS. This is a prospective observational study of 22 patients admitted to the Surgical Critical Care (HEGP) having a predictable duration of hospitalization higher than 48 h. Patients with pacemaker and members amputations are excluded. We collected daily during 4 days: the SOFA score, fluid output, weight, serum sodium concentration, serum chloride concentration. Bioimpedance measurements are performed using the Body Composition Monitor (BCM) (Fresenius Medical Care). Data are presented as median and interquartile range for continuous variable, and percentage for categorical variable. The primary endpoint is the association between SOFA and distribution of water in the different compartments according to the BCM, evaluated by a generalized linear model.

RESULTS. 9 patients admitted for trauma and 13 patients admitted for septic shock were included. 55 % were men, aged 58 years. During four days, we observed that extracellular water compartment and fluid overload increased. The fluid balance was positive during the four days of measurements, and maximum on the first day (1700 ml). Chloride serum concentration increases during the first 4 days. We do not observe any relationship between SOFA score and the various measures of BCM or between the SOFA score and the measurement of fluid balance. A significant relationship was observed between SOFA score and chloride concentration ($p = 0.001$).

CONCLUSIONS. Fluid overload is a predictive factor of poor outcome in intensive care. The BCM is a noninvasive tool that measures and calculates the distribution of water in the intracellular and extracellular compartments. We observed in this study that the SOFA score

is related to serum chloride concentration, but not to changes in volume of the intra and extra cellular compartments measured by BIS.

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0850

CORRELATION BETWEEN QRS COMPLEX DURATION ON ADMISSION ECG AND NURSING AND SEVERITY INDEXES IN ICU PATIENTS

A. Vakalos¹, E. Drampala¹

¹Xanthi General Hospital, ICU, Xanthi, Greece

INTRODUCTION. QRS complex may indicate life threatening circumstances like severe hyperkalemia or myocardial ischemia, or even drug and poison abuse.

OBJECTIVES. The aim of our observation retrospective study was to correlate QRS complex duration in ICU patients on admission ECG, with nursing and severity indexes in our both medical and surgical ICU served in community hospital.

METHODS. From October to December 2013 we looked for QRS complex duration (ms) in ECG automatically analyzed on admission in 48 ICU patients who survived ICU. Mean age (years) 60.06, mean APACHE II score on admission: 23.28, mean length of ICU stay (LOS, days): 8.43, mean duration of mechanical ventilation (VD, days): 5.41, Predicted Mortality (%). Using linear correlation method, we looked for linear slope, correlation coefficient (r), and coefficient of determination (r²), and by linear regression method using ANOVA test we looked for p value, according QRS complex duration and nursing (LOS, VD) and severity (age, APACHE, Predicted Mortality) indexes.

RESULTS.

	Slope	St. Error	r	r ²	L. CI	U. CI	p value
Age	0.106	0.097	0.162	0.026	-0.090	0.303	0.2804
APACHE	0.073	0.038	0.279	0.077	-0.003	0.150	0.0602
Pred. Mortality	0.195	0.131	0.218	0.047	-0.069	0.460	0.1441
LOS	0.009	0.052	0.026	0.000	-0.097	0.115	0.8603
V.D.	0.013	0.047	0.043	0.001	-0.001	0.108	0.7741

[Results]

CONCLUSIONS. According to our data, there was no statistically significant correlation detected between QRS complex duration and Age, Predicted Mortality, LOS nor VD. On the other hand, there was borderline statistical significant, weak positive linear correlation between QRS complex duration and APACHE II score on admission. Our data suggest that QRS complex duration in ICU patients on admission ECG has no impact on ICU hospitalization, still may be useful bounding the severity in some ICU patients.

0851

USEFULNESS OF MEXSOFA SCORE TO PREDICT MORTALITY IN CRITICALLY ILL PATIENTS

S.S. Gomez Flores¹, B.C. Tejeda Huezol¹, A. Esquivel Chavez¹, A.A. Cano Oviedo¹, S. Zamora Varela¹, J.A. Baltazar Torres¹

¹Instituto Mexicano del Seguro Social Hospital de Especialidades Centro Medico Nacional La Raza, Mexico, Mexico

INTRODUCTION. A modified sequential organ failure assessment score called MEXSOFA was explored in Mexican population, it includes the use of SpO₂/FiO₂ ratio avoiding arterial punctures and excludes the neurological component¹. This prognostic scale has demonstrated an appropriate discriminative performance compared with SOFA for predicting mortality in critically ill adults. However its performance has not been extended to a different Mexican population with particular characteristics, and requires an external validation.

OBJECTIVES. The aim of the present study was to evaluate the usefulness of MEXSOFA score as a predictor of mortality in critically ill patients in one of the most important hospitals in Mexico called "La Raza".

METHODS. Prospective cohort study. Including patients of the Intensive care unit (ICU) of Hospitales Especialidades La Raza IMSS in Mexico between January and December of 2013. Interventions: None. Measurement: We compared the predictive accuracy of two prognostic models, SOFA and MEXSOFA at 24 and 48 h of length stay in ICU. Evaluation of discrimination through area under curve ROC (aROC) and calibration by Hosmer-Lemeshow goodness-of-fit test (HL).

RESULTS. Eighty patients with a mean age of 48 years and length of stay in ICU of 8.49 days. The main reasons for ICU admission were severe sepsis (18.8 %), hemorrhagic shock (15 %) and septic shock (11.3 %). The ICU mortality rate was 21.3 %. The mean SOFA and MEXSOFA scores at 24 h were 9.84 and 6.85, and at 48 h were 9.03 and 6.1 respectively. The MEXSOFA score showed good discriminative capacity and calibration for predicting mortality at both 24 and 48 h (aROC of 0.70 and 0.78, HL of 6.62 [$p = 0.57$] and 5.11 [$p = 0.64$], respectively). The OR for MEXSOFA score at 48 h was 1.35 (95 % CI 1.04-1.82, $p < 0.05$).

CONCLUSIONS. In this study MEXSOFA score was found accurate in predicting mortality in critically ill patients, especially when computed at 48 h of ICU stay.

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0855

EFFECTS OF A RECRUITMENT MANEUVER ON PLASMA LEVELS OF SRAGE, THE SOLUBLE FORM OF THE RECEPTOR FOR ADVANCED GLYCATION END PRODUCTS, IN PATIENTS WITH DIFFUSE ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS)

M. Jabaudon¹, N. Hamroun², L. Roszyk³, R. Blondonnet¹, R. Guerin², S. Perbet¹, J. Pascal², S. Cayot², E. Futier¹, V. Sapin¹, J.-M. Constantin¹

¹Etaing University Hospital, CHU Clermont-Ferrand, R2 D2-EA 7281, Universite d'Auvergne Clermont-Ferrand I, Department of Anesthesiology and Critical Care Medicine, Clermont-Ferrand, France, ²Intensive Care Unit, Department of Anesthesiology and Critical Care Medicine, Etaing University Hospital, CHU Clermont-Ferrand, Clermont-Ferrand, France, ³CHU Etaing, CHU Clermont-Ferrand, Department of Medical Biochemistry and Molecular Biology, Clermont-Ferrand, France, ⁴CHU Etaing, CHU Clermont-Ferrand, R2 D2-EA 7281, Universite d'Auvergne, Department of Medical Biochemistry and Molecular Biology, Clermont-Ferrand, France

INTRODUCTION. The soluble form of the receptor for advanced glycation end-products (sRAGE) is elevated in the plasma and the pulmonary edema fluid from patients with ARDS. Few data are available about the influence of ventilatory interventions on levels of sRAGE in the setting of ARDS.

OBJECTIVES. The purpose of this prospective monocentric randomized controlled crossover study was to describe the effects of a recruitment maneuver (RM) on plasma sRAGE during diffuse ARDS.

METHODS. Mechanically ventilated ICU patients with ARDS criteria (based on the 1994 definition) and non-focal CT scan lung morphology were included within 24 h of disease onset, and randomized into 2 groups: a "RM-SHAM" group when a 6 h-long RM sequence preceded a 6 h-long sham evaluation period, and a "SHAM-RM" group, in which patients received a sham sequence first. Protective ventilation was applied in all patients. RM consisted of the application of 40 cmH₂O airway pressure for 40 s. Arterial blood was sampled in order to analyze blood gases and sRAGE levels (duplicate ELISA) at different time-points: 5 min before the RM (or a 40 s-long sham period), 5 min, 30 min, 1 h, 4 h and 6 h after the RM (or a 40 s-long sham period). (ClinicalTrials.gov Identifier NCT01600651).

RESULTS. Twenty four patients (74 % were men, mean age 57, mean BMI 25.5 kg.m⁻²) were included, after a mean stay in ICU of 2 days. No was found between randomization groups in baseline demographic characteristics or comorbidity. Baseline PaO₂/FiO₂, tidal volume, PEEP, inspiratory plateau pressures were (mean ± standard deviation) 38 ± 49, 6.3 ± 1.6 ml.kg⁻¹ (ideal body weight), 13 ± 3 and 26 ± 4 cmH₂O, respectively. Baseline median plasma levels of sRAGE were 3232 pg.ml⁻¹ (IQR 2703-3954). An approach based on a mixed statistical model including "period", "group", "time", "order" and "interaction" effects confirmed a significant decrease in plasma sRAGE (-1598 ± 859 pg.ml⁻¹), 1 h after the RM (p = 0.043). At 4 and 6 h after RM, plasma levels of sRAGE increased progressively toward their baseline values (2860 ± 1795 and 3142 ± 1770 pg.ml⁻¹, respectively). Plasma levels of sRAGE, when measured before and 1 h after the RM, were associated to improved arterial oxygenation (predefined as an increase of 20 % or more in PaO₂/FiO₂ 1 h after RM) (AUC ROC 0.87; CI 95 % 0.67-0.97; p = 10⁻³, and 0.72; CI 95 % 0.50-0.88; p = 0.04, respectively).

CONCLUSIONS. We report the first kinetics study of plasma levels of sRAGE after a RM in patients with diffuse ARDS. Our data could reflect a RM-induced improvement in epithelial dysfunction, and may suggest a role for sRAGE as a biomarker of alveolar injury during ARDS.

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0856

RELATIONSHIP BETWEEN SERUM TYPE III PRO-COLLAGEN PEPTIDE AND ECMO DURATION IN SEVERE RESPIRATORY FAILURE

L. Camporota¹, M.A. Calderazzo¹, V. Mongelli¹, E.V. Caricola¹, G. Glover¹, C. Meadows¹, E. Nicoletti¹, M. Malafra¹, R. Beale¹, M. Shankar-Hari¹, N. Barrett¹

¹Division of Asthma, Allergy and Lung Biology, King's College London, Department of Adult Critical Care, Guy's and St Thomas' NHS Foundation Trust, King's Health Partners, London, United Kingdom

INTRODUCTION. Type III pro-collagen peptide (PCP-III) is a marker of collagen turnover. In patients with acute respiratory distress syndrome (ARDS) PCP-III may potentially direct therapy and predict outcome. However, little is known of the prognostic value of PCP-III in patients with refractory hypoxaemia requiring veno-venous extracorporeal membrane oxygenation (ECMO).

OBJECTIVES. To study the potential of PCP-III in predicting ECMO duration in patients with severe respiratory failure.

METHODS. A retrospective observational study of patients with severe respiratory failure (SRF) admitted to our ECMO centre from August 2012 to December 2013. Serum N-terminal pro-collagen type III (PCP-III) was measured within 24 h of ECMO commencement.

RESULTS. We recruited 56 subjects, median (IQR) age of 45 years (35 to 57), 53.6 % were female. 84 % had pulmonary ARDS. 21.4 % were current smokers. Median (IQR) Lung Injury Score was 3.5 (3 to 3.5). Median (IQR) PaO₂/FiO₂ pre-ECMO was 67 mmHg (54.3 to 85.2). The mean (SD) duration of mechanical ventilation prior to ECMO was 4.5 days (3.4). The median (IQR) admission SOFA score was 15 (12 to 17). ICU survival was 76.8 %. We found no difference in the levels of PCP-III in pulmonary or extrapulmonary ARDS with mean (SD) of 21.1 µg/L (14.8) vs 21.4 µg/L (8.9), respectively (p = ns). PCP-III was however higher in patients with confirmed bacterial sepsis compared to those of viral aetiology, with median (IQR) values of 24.7 µg/L (14 to 29.6) and 16.2 µg/L (8.3 vs 22.2) P = 0.03. There was no relationship between PCP-III and SOFA. PCP-III levels were associated with the duration of ECMO with an AUC ROC of 0.71 (sens 66.7 % and spec 71.4 %) and a cut-off PCP-III of 20 µg/L. The median (IQR) duration of ECMO was 6 days (4.5 to 9) for patients with PCP-III < 20 µg/L vs 11 days (9.5 to 18.7) for patients with PCP-III > 20 µg/L; (P = 0.008). The median duration of ECMO overall was 8 days (5 to 12.7). In patients requiring ECMO for < 8 days, PCP-III was 12.7 µg/L (4.8 to 16) vs 27.7 µg/L (24.3 to 35.3) for patients who remained on ECMO > 8 days, (P < 0.001). There was no difference between patients with high and low PCP-III levels in the length of ICU stay post-ECMO, median (IQR) 12 days (7 to 19) for patients with PCP-III < 20 µg/L vs 10 days (9 to 19) for patients with PCP-III > 20 µg/L; (P = 0.6). There was no difference in the median (IQR) PCP-III levels in survivors and non-survivors [18.9 µg/L (8.7 to 28.2) vs 21 µg/L (15.9 to 24.6); p = 0.67].

CONCLUSIONS. In this group of patients with SRF requiring ECMO, the admission PCP-III levels were higher in bacterial infections and correlated with ECMO duration but not ICU length of stay or mortality, independently from the degree of organ failure or aetiology of respiratory failure.

0857

COMPARATIVE ASSESSMENT OF EICOSANOIDS AS PREDICTORS FOR SEPTIC ACUTE RESPIRATORY DISTRESS SYNDROME

S. Shibata¹, N. Ishizuki¹, S. Endo¹

¹Iwate Medical University, Critical Care Medicine, Morioka, Japan

INTRODUCTION. Sepsis was an important factor for mortality in acute lung injury (ALI)/ acute respiratory distress syndrome (ARDS). Although elevated levels of eicosanoids in acute lung injury have been reported, the possibility that eicosanoids may act as predictors for ARDS remains poorly studied, especially, in sepsis patients.

OBJECTIVES. We simultaneously measured the plasma levels of the eicosanoids leukotriene B₄ (LTB₄), thromboxane B₂ (TXB₂), and 6-keto-prostaglandin F_{1α} (6-keto-PGF_{1α}) and used logistic regression analyses and receiver operating characteristic (ROC) curves to determine which eicosanoids act as predictors for septic ARDS.

METHODS. After obtaining informed consent from the patients or their families and approval to conduct the study from the Ethics Committee of our hospital, we enrolled 36 adult sepsis patients. The diagnoses of Sepsis and ARDS were made according to the American College of Chest Physicians/Society of Critical Care Medicine (ACCP/SCCM) and the Berlin Definition of ARDS, respectively. Blood samples were obtained from the ARDS patients within 24 h of ARDS onset and from the ARDS-free patients on the day of admission to the intensive care unit. The plasma levels of LTB₄, 6-keto-PGF_{1α}, and TXB₂ were measured by radioimmunoassays as substitutes for the plasma levels of prostaglandin I₂ and thromboxane A₂, which are unstable. We employed the cut-off value obtained by ROC analysis using the Youden index. The data are reported as means and 95 % confidence intervals (CIs). Mann-Whitney tests were used for comparisons of two groups. Values of P < 0.05 were considered statistically significant.

RESULTS. We conducted a case-control study comparing 13 sepsis patients with ARDS with 23 sepsis patients without ARDS. There were no significant differences between the groups regarding age or APACHE II score. The diagnostic categories were: diffuse peritonitis, 22; burn, 4; pneumonia, 5; and multiple trauma, 5. The levels of eicosanoids in sepsis patients with ARDS were significantly higher than those in sepsis patients without ARDS (LTB₄, TXB₂, and 6-keto-PGF_{1α}; P < 0.001). Logistic regression analyses revealed that the values of the odds ratios for LTB₄, TXB₂, and 6-keto-PGF_{1α} were 1.10 (95 % CI, 1.01-1.19; P = 0.02), 1.04 (95 % CI, 0.98-1.11; P = 0.17), and 0.99 (95 % CI, 0.83-1.19; P = 0.95), respectively. There was no exclusion considered to be a medical outlier. The area under the ROC curve values for LTB₄, TXB₂, and 6-keto-PGF_{1α} were 0.933 (95 % CI, 0.856-1.010; P < 0.001), 0.905 (95 % CI, 0.728-1.000; P < 0.001), and 0.878 (95 % CI, 0.485-0.990; P < 0.001), respectively. The optimal cut-off levels for LTB₄ at 82.0 pg/ml had a sensitivity of 100 %, specificity of 83 %, for TXB₂ at 51.5 pg/ml had a sensitivity of 92 %, specificity of 78 %, and for 6-keto-PGF_{1α} at 22.5 pg/ml had a sensitivity of 77 %, specificity of 83 %.

CONCLUSIONS. Among the eicosanoids examined, LTB₄ may be the most powerful predictor for septic ARDS.

0858

INCREASED INFLAMMATION MARKERS INTERLEUKIN-8 AND MUCIN-5AC IN BRONCHOALVEOLAR LAVAGE FLUID AND LUNG INJURY AFTER CARDIOTHORACIC SURGERY WITH CARDIOPULMONARY BYPASS

H. Melief¹, M.S. Arbous²

¹Rijnland Hospital, Intensive Care Medicine, Leiderdorp, Netherlands, ²Leiden University Medical Center, Intensive Care, Leiden, Netherlands

INTRODUCTION. Impaired pulmonary function is a well documented complication of cardiothoracic surgery after use of cardio-pulmonary bypass (CPB) resulting in increased morbidity and mortality. The extent of lung injury can be limited but develops into Acute Lung Injury (ALI) or even Adult Respiratory Distress Syndrome (ARDS) in a significant amount of cases. Various factors may play a role in CPB induced lung injury, among them inflammation. An increase in inflammatory markers Interleukin-8 (IL-8) and Mucin 5AC (Muc-5AC) in bronchoalveolar lavage (BAL) fluid after CPB has been shown.

OBJECTIVES. This study investigates the relationship between IL-8 and Muc-5AC in BAL fluid and the length of CPB, the extent of lung injury and postoperative course.

METHODS. Thirty-four adult patients undergoing cardio-thoracic surgery with CPB in Leiden University Medical Center in the Netherlands were included in the study. BAL fluid samples were taken at 4 specific timepoints, before and after surgery and concentrations of IL-8 and Muc-5AC were measured. IL-8 was measured by an ELISA kit (Sanguin) and Muc-5AC by dot blot analysis. Concentrations were expressed as pg/ml in BAL fluid. The extent of lung injury was measured using the PaO₂/FiO₂-ratio (P/F ratio) and a daily chest X-ray. Other outcome measures were duration of mechanical ventilation, stay in Intensive Care Unit (ICU) and ICU mortality. Linear regression was used to perform statistical analysis.

RESULTS. During the postoperative course significant lung injury with a P/F ratio < 200 was seen in 11 patients and a P/F ratio between 200-300 mmHg in 14 patients at any measured point. One patient died in the course of ICU stay. IL-8 in BAL fluid was shown to be significantly increased in relation to a longer duration of CPB (p = 0.010). A rise in Muc-5AC in BAL fluid at the end of surgery showed a significant relationship with decreased P/F ratio postoperatively (p = 0.017) and a longer duration of ICU stay (p = 0.012).

CONCLUSIONS. Inflammation may play an important role in CPB induced lung injury after cardio-thoracic surgery. These results show a relationship between increase of inflammation markers IL-8 and Muc-5AC in BAL fluid on the occurrence of lung injury and clinical course after cardio-thoracic surgery with CPB. Analysis of inflammation markers in BAL fluid could have a significant place in prediction of post-operative lung injury after cardio-thoracic surgery.

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0860

PREDICTING ARDS MORTALITY: VALUE OF PLASMA ST2

M. García de Acilu¹, O. Roca¹, L. Ruano¹, J.R. Masclans¹

¹Vall d'Hebron University Hospital, Critical Care Department, Barcelona, Spain

INTRODUCTION. Acute Respiratory Distress Syndrome (ARDS) is associated with high rates of mortality. Even though several risk factors have been identified in these patients, no clinically useful model in predicting mortality has been described.

OBJECTIVES. The aim of this study was to examine the predictive value of biomarkers involved in the IL-33/ST2 axis on 60-day mortality of patients with ARDS.

METHODS. It is a single-centre prospective cohort observational study, including patients with ARDS who required ICU admission. Plasma concentrations of IL-33, sST2 and IL-6 at

days 1 and 3 of ARDS onset were determined by Enzyme-Linked Immunosorbent Assay (ELISA). Differences were determined using t-test or Mann-Whitney U-test for continuous variables and Chi square or Fisher test for categorical variables. Best discrimination cut-off points of continuous variables were chosen using the Likelihood-based model selection criteria. Logistic regression model (forward stepwise with AIC-based selection criteria) was used to identify which variables were associated with 60-day mortality. Discrimination capacity of the model was tested by calculating the area of receiver operating characteristic curve (AUROC).

RESULTS. Sixty-one ARDS patients (44 [72.1 %] male) with a median age of 62 (interquartile range [IQR] 48-69) yo were included in a one year period. Median APACHE II was 24 (20-29) and the origin of ARDS was intrapulmonary in 31 (61.9 %) patients. At day 1, 42 (66.7 %) patients were mechanically ventilated and 21 (33.3 %) were treated with high flow nasal cannula. Mortality at day 60 was 44.4 %. Median concentrations of sST2 at day 1 [5016 [IQR 3091-7848]pg/ml vs 1972 [IQR 1157-3821]pg/ml; $p < 0.01$] and at day 3 [5102 [IQR 2057-8264]pg/ml vs 1199 [IQR 648-2011]pg/ml; $p < 0.01$] were higher among non-survivors. No significant differences in IL-33 and IL-6 concentrations were observed. The best performing model (AUC 0.87 [95 % CI 0.78-0.97]) included sST2 at day 1 ≥ 4153 pg/ml (OR 13.49; 95 % CI 1.99-91.55; $p < 0.01$), APACHE II ≥ 26 (OR 28.03; 95 % CI 2.61-301.47; $p < 0.01$) and previous immunosuppression (OR 9.42; 95 % CI 1.38-64.29; $p = 0.02$).

CONCLUSIONS. In the present study, a feasible model using sST2 concentrations and two clinical markers at day 1, is strongly predictive of mortality in ARDS patients.

GRANT ACKNOWLEDGMENT. No conflicts of interest to disclose.

0861

PREDICTIVE VALUE OF C-REACTIVE PROTEIN IN ACUTE LUNG INJURY PATIENTS

A.A. Mahrous¹, M.S. Atta², A.A. Hassanien¹, Acute Lung Injury Patients

¹University of Alexandria, Critical Care, Alexandria, Egypt, ²University of Alexandria, Chest Diseases, Alexandria, Egypt

BACKGROUND. Acute lung injury (ALI) is associated with significant mortality and morbidity. C-reactive protein level CRP is a marker of systematic inflammation widely-used in numerous clinical conditions, however little is known about the characteristics of CRP levels in patients with ARDS and acute lung injury (ALI).

The aim of this work was to examine plasma level of C-reactive protein (CRP) in patients with acute lung injury (ALI) and its relationship with prognosis, outcome, and severity of illness.

PATIENTS AND METHODS. The study was carried out on 100 consecutive patients, who were admitted to the Critical Care Medicine Departments in Alexandria Main University Hospital. Inclusion criteria included patients who aged > 18 years who had one or more of the acute lung injury (ALI) predisposing conditions, Patients who developed ALI based on standard definition according to American-European consensus conference were examined for C-reactive protein level measured in mg/dl, withdrawn within 48 h after fulfillment of criteria.

RESULTS. CRP levels were highest in patients with complete recovery ranged between 190 and 233 mg/dl with a mean of 211.5 ± 30.406 mg/dl, modest in patients who recovered with residual complications ranged between 107 and 120 with a mean of 111.33 ± 7.506 mg/dl, and lowest in patients who died ranged between 35 and 106 with a mean of 79.55 ± 24.007 mg/dl, higher CRP levels were significantly associated with better survival ($P = 0.000$). There was an inverse relationship between CRP level and duration of mechanical ventilation while ICU stay increased as the CRP level increased. The relationships between CRP levels and both mechanical ventilation days and ICU stay were statistically non significant ($P = 0.710$ & 0.801 respectively). The CRP levels were lower in patients who developed multiorgan dysfunction syndrome (MODS) with a mean of 76.6 ± 28.778 mg/dl compared to a mean of 111.43 ± 59.332 mg/dl in patients who didn't develop MODS, this relationship was not statistically significant ($P = 0.060$).

CONCLUSIONS. Although CRP has widely been considered to be a marker of systemic inflammation, our findings show that higher levels of CRP are associated with decreased mortality, organ failure, and need for mechanical ventilation among patients with ALI.

KEYWORDS. Acute lung injury, CRP.

0862

SERUM LEVELS OF NITRIC OXIDE AS A PREDICTOR OF SURVIVAL IN ACUTE RESPIRATORY DISTRESS SYNDROME CAUSED BY HINI PNEUMONIA?

P. Kovacevic¹, S. Dragic², J. Vidovic¹, S. Zeljkovic¹, D. Momcicevic², T. Kovacevic²

¹University Hospital of Banja Luka, Medical Intensive Care Unit, Banja Luka, Bosnia and Herzegovina, ²University Hospital of Banja Luka, Banja Luka, Bosnia and Herzegovina

INTRODUCTION. A large number of studies show elevated levels of nitric oxide (NO) in infective syndromes, but there is a insufficient number of studies which investigated serum levels of NO in patients with acute respiratory distress syndrome (ARDS) and in relation to survival.

OBJECTIVES. Hence, we created a study with an aim to determine the NO levels in relation to ARDS survival.

METHODS. Serum levels of NO were measured by Griess reaction in 29 patients [16 men (55 %), mean age years 52.72 ± 18]. All data were statistically analyzed using one way ANOVA.

RESULTS. Our results show significantly higher serum NO levels in ARDS survivors ($6.98 \mu\text{mol/L} \pm 2.58$) compared to ARDS non-survivors ($3.45 \mu\text{mol/L} \pm 0.83$), ($p < 0.05$).

CONCLUSIONS. We concluded that higher serum levels of NO are strongly associated with better clinical outcomes, including increased survival.

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Acute respiratory failure miscellanea: 0864–0877

0864

EFFECT OF HIGH DOSE AMBROXOL ON THE EXTRA-VASCULAR LUNG WATER AND OXYGENATION OF PATIENTS WITH EXTRA-PULMONARY ACUTE RESPIRATORY DISTRESS SYNDROME

L. Yong-Jun¹, C. Juan², O. Bin², C. Min-Ying², G. Xiang-Dong²

¹The First Affiliated Hospital of Sun Yat-sen University, Department of SICU, Guangzhou, China, ²The First Affiliated Hospital of Sun Yat-sen University, Guangzhou, China

INTRODUCTION. Acute respiratory distress syndrome (ARDS) can result from either a primary pulmonary process or a systemic insult, which is characterized by increased capillary permeability, interstitial and alveolar edema and an influx of circulating inflammatory cells. Ambroxol, a mucolytic agent, has been used for the treatment of chronic bronchitis and neonatal respiratory distress syndrome. It exhibits antioxidant and anti-inflammatory properties with reduction of the release of inflammatory cytokines from bronchoalveolar macrophages, monocytes and granulocytes. This study was to evaluate the effect of high dose ambroxol on the extra-vascular lung water index and oxygenation of patients with extra-pulmonary ARDS in the ICU.

OBJECTIVES. To evaluate the effect of high dose ambroxol on the extra-vascular lung water index and oxygenation of patients with extra-pulmonary ARDS in the ICU.

METHODS. 68 patients suffered from ARDS were divided randomly into treatment group and control group. Patients from treatment group received high dose ambroxol (1005 mg) intravenous and those in control group received equal volume of 0.9 %NaCl intravenous for 7 consecutive days. The cardiac index (CI), extra-vascular lung water index (ELWI), pulmonary vascular permeability index (PVPI) were observed by pulse indicator continuous cardiac output (PiCCO) and partial pressure of oxygen (PO₂), oxygen saturation (SaO₂) and PaO₂/FiO₂ were measured by blood gas analysis before interference, 3d later, 5d later and 7d later respectively. Times of intubation, ICU length of stay, mean days in hospital were compared between the patients of two groups.

RESULTS. There was statistically decreasing in PO₂, SaO₂ and PaO₂/FiO₂ and statistically increasing in ELWI, PVPI before interference in both groups. The PO₂, SaO₂, PaO₂/FiO₂, ELWI and PVPI of patients in treatment group with high dose ambroxol therapy were improved significantly ($P < 0.05$), which much better than those in control group. The times of intubation, ICU length of stay, mean days in hospital of treatment group were also significantly decreased compare with control group.

CONCLUSIONS. High dose ambroxol have the effect of decreasing ELWI, PVPI, improving oxygenation in patients with extra-pulmonary ARDS.

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0865

INFLUENCE OF RIGHT VENTRICULAR FUNCTION IN DEVELOPMENT OF PRIMARY GRAFT DYSFUNCTION AFTER LUNG TRANSPLANTATION

P. Pérez-Terán¹, O. Roca¹, J. Rodríguez-Palomares², J. Sacanell¹, J.C. Ruiz¹, A. Román³, A. Evangelista⁴, J.R. Masclans⁴

¹1963, Intensive Care Unit, Barcelona, Spain, ²Vall d'Hebron Hospital, Cardiology, Barcelona, Spain, ³Vall d'Hebron Hospital, Respiratory, Barcelona, Spain

BACKGROUND. Primary graft dysfunction (PGD) remains a significant cause of post-transplant morbidity and mortality. Previous studies have attempted to identify potential risk factors associated with PGD development. However, the underlying mechanism is not completely understood. The objective of our study was to demonstrate that a good right ventricular function (RVF) could be a risk factor for PGD development.

METHODS. It is a retrospective analysis of a prospectively assessed cohort, including all lung transplant recipients (LTr) admitted in Vall d'Hebron Intensive Care Unit (ICU) between July 2010 and June 2013. Clinical and demographic variables were recorded. Conventional echocardiographic parameters and two-dimensional (2D) Strain were used to evaluate RVF. Differences in these variables were assessed according to the development of PGD grade 3 (PGD3). Discrimination of significant variables was tested by calculating the area of receiver operating characteristic curve (AUROC). Multivariate logistic regression was used to adjust for potential confounding variables. Confounding variables introduced into the multivariable model one at a time in order to prevent model overfitting. The SPSS statistical package (SPSS Inc., v18.0 Chicago, Illinois) was used for the analysis.

RESULTS. A total of 120 LTr were included. We observed that preoperative systolic pulmonary arterial pressure (sPAP) (48 ± 20 vs. 41 ± 18 mmHg; $p = 0.048$) and ischemic time (349 ± 73 vs. 306 ± 92 min; $p < 0.01$) were higher in LTr who developed PGD3. Patients who developed PGD3 had better RVF estimated by basal free wall 2D Strain (24 ± 9 vs. 20 ± 6 %; $p = 0.039$). In contrast, no differences were observed in other echocardiographic variables. LTr who developed PGD3 had a higher LOS in ICU (40 [± 35] vs. 25 [± 35] days; $p = 0.032$), length of MV (34 [± 35] vs. 20 [± 34] days; $p = 0.037$), ICU (16 vs. 3 %; RR 5.1, [CI 95 % 1.16-22.81], $p = 0.023$) and 6-month mortality (25 vs. 8 %; RR 3.3 [CI 95 % 1.14-9.58], $p = 0.027$). Basal 2D strain ≥ 21.5 % is the cutoff that better identified patients who develop PGD3 (AUROC [CI 95 % 0.54-0.85], $p = 0.020$). In the multivariate analysis we observed that a basal 2D Strain ≥ 21.5 % was an independent risk factor for PGD3 development (OR 3.7, [CI 95 % 1.110-12.453], $p = 0.033$).

CONCLUSIONS. In the present study, a higher basal free wall 2D strain was an independent risk factor for PGD3 development.

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0867**INFLUENCE OF HUMIDIFICATION ON IN VITRO DOSE DELIVERY FOR AMIKACIN INHALE BY MECHANICAL VENTILATION**N. Kadri¹, S. Boc¹, K. Corkery¹, P. Challoner²¹Novartis Pharmaceuticals, San Carlos, United States, ²Nektar Therapeutics, San Francisco, United States

INTRODUCTION. To prevent drying of respiratory mucosa, inspired gases administered by mechanical ventilation to intubated patients may be humidified actively using a heated humidifier or passively through a heat and moisture exchanger (HME). The impact of humidification on delivered dose (DD) was studied using a novel drug-device combination, Amikacin Inhale (Bayer HealthCare and Nektar Therapeutics), for adjunctive treatment of intubated, mechanically ventilated patients with Gram-negative pneumonia. Amikacin Inhale is currently being evaluated in two Phase III clinical trials. It consists of a specially-formulated Amikacin Inhalation Solution (400 mg, 3.2 mL of 125 mg/mL, q12 h for 10 days) aerosolized using the Pulmonary Drug Delivery System (PDDS) - a disposable, proprietary vibrating mesh nebulizer.

OBJECTIVES. The goal of this study was to evaluate the impact of active (AH) and passive (PH) humidification on the DD of Amikacin Inhalation Solution.

METHODS. Inhaled amikacin in vitro DD was measured post endotracheal tube (ETT) using a state of the art "on-ventilator" method [1]. AH used non-heated and heated ventilator circuits. The PH moisture contents of 6 HMEs placed between the nebulizer and Wye connector were monitored for up to 2 h. Of these HMEs, three were further tested for in vitro DD after reaching steady-state moisture content. *In vitro* DD with no humidification (NH) was also evaluated. Each trial was conducted at the nominal simulated clinical use ventilator setting (tidal volume of 500 mL, 15 breaths per minute, peak inspiratory flow rate of 40 LPM, inspiratory:expiratory of 1:1.9) using Amikacin Inhalation Solution. Nebulization time for each test run was also recorded. Three vibrating mesh nebulizers were studied; each was placed at the Wye connector of the ventilator circuit. Drug distribution within the compartments of the test setup was analyzed using HPLC.

RESULTS. Average in vitro DDs (% of nominal) of AH, PH, and NH conditions were 44 ± 9 %, 46 ± 9 %, and 47 ± 7 %, respectively. The average nebulization times were also comparable across the three test configurations (33 ± 12 min, 36 ± 12 min, and 37 ± 13 min for AH, PH and NH, respectively). No increase in airway peak pressure was observed. Moisture content data for AH were higher than some of the PH. The study results indicated that the in vitro DD of Amikacin Inhalation Solution by the PDDS, post-ETT, is not affected by humidification.

CONCLUSIONS. This study demonstrated the robust and consistent delivery of Amikacin Inhale irrespective of humidity or humidification method, which enables flexibility in the configuration of patients' mechanical ventilation systems.

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0868**VARIABILITY IN TIME TO LOCAL REGULATORY APPROVALS FOR MULTICENTER CLINICAL TRIALS - EXPERIENCES IN THE OSCILLATE TRIAL**V. Danesh¹, P. Austin², D.J. Cook³, L. Hand³, F. Clarke³, A.C. Arroliga^{4,5}, N.K. Adhikari^{6,7}, J.O. Friedrich⁸, M.P. Wise⁸, T. Mcardle⁹, Q. Zhou³, N.D. Ferguson⁴, M.O. Meade³, OSCILLATE Investigators and CCCTG

¹Orlando Regional Medical Center, Clinical Trials, Orlando, United States, ²McMaster University, Clinical Epidemiology & Biostatistics, Hamilton, Canada, ³McMaster University, Hamilton, Canada, ⁴Scott & White Healthcare, Temple, United States, ⁵Texas A&M Health Science Center College of Medicine, Temple, United States, ⁶University of Toronto, Toronto, Canada, ⁷Sunnybrook Health Science Centre, Toronto, Canada, ⁸University Hospital of Wales, Cardiff, United Kingdom, ⁹Ottawa Hospital, Ottawa, Canada

INTRODUCTION. The vulnerable nature of critically ill patients may influence the time to achieve Research Ethics Board (REB) approval and execute site contracts for randomized trials in critical care. Meanwhile, lengthy or delayed start-up procedures can influence costs, enrollment efficiency, and time to study completion. Data informing projected timelines for the initiation of various study types would help assist in budgeting both time and money for a trial.

OBJECTIVES. To describe the time to REB approval, contract execution, and screening initiation at centers participating in the multicenter trial of high frequency oscillatory ventilation versus conventional ventilation for adults with early ARDS (OSCILLATE).

METHODS. We combined prospectively collected data on REB approval and Clinical Trial Agreement (CTA) execution times for OSCILLATE trial centers in Canada, with a survey to each center to collect additional information on center characteristics and research infrastructure.

RESULTS. Participating Canadian sites were primarily teaching institutions (27, 96.4 %), with a median (IQR) of 24 (17, 30) ICU beds. Research infrastructure was strong in most centers, with a median (IQR) of 10 (4.5, 13) years of regulatory submission experience by the person submitting the OSCILLATE trial ethics application. Most centers used a hospital-based REB for ethics reviews (18, 64.3 %) while others used a university-based REB (9, 32.1 %) or provincial REB (2, 7.1 %). Membership representation by a pulmonary or critical care physician existed for 12 (42.9 %) REBs. When surveyed for a typical timeline to obtain REB approval for randomized trials in the ICU, centers reported a median (IQR) of 69 (42, 91) days whereas the actual time from receiving the OSCILLATE application package to obtaining final REB approval was 151 (86, 218) days. The CTAs took even longer with a median (IQR) of 200 (140,244) days from receiving the contract to final contract approval. The overall time from centers receiving a trial start-up package to commencing screening for enrolment was 259 (157, 368) days.

CONCLUSIONS. Trial start-up times were long for the OSCILLATE trial, with both REB approval and CTA negotiation contributing to this delay. Considerable variation in site preparation times exists for clinical trials, and self-reported estimates of preparatory document processing times may be misleading.

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0869**CLINICAL FEATURES AND OUTCOME OF INTERSTITIAL LUNG DISEASE IN INTENSIVE CARE UNIT**V.R. Fonseca¹, J. Bacariza¹, I. Gonçalves¹, R. Ribeiro¹¹Centro Hospitalar de Setúbal, Unidade de Cuidados Intensivos, Setúbal, Portugal

INTRODUCTION. Interstitial lung diseases (ILD) are a heterogeneous group of disorders that require mechanical ventilation during acute respiratory deterioration. ILD is reported to have a poor prognosis questioning the benefits of intensive care treatment (1). However, when life-threatening hypoxemia is the first sign of ILD the search for aetiology in the intensive care unit (ICU) is mandatory.

OBJECTIVES. To characterize the clinical features, aetiology investigation strategies and the outcome of these patients.

METHODS. We conducted a retrospective study of all adult patients admitted to the ICU with acute respiratory failure as well as a discharge diagnosis of ILD between 2011 and 2013.

RESULTS. Eight patients were included (mean age 72.1 years), six being firstly diagnosed with ILD during the ICU: four patients were diagnosed with hypersensitivity pneumonia, one with idiopathic pulmonary fibrosis and one with ILD secondary to rheumatoid arthritis. On ICU admission, the mean paO₂/FiO₂ was 63.9 with six patients receiving invasive mechanical ventilation. Patients were investigated with thoracic computed tomography (n = 6), bronchofibroscopy with bronchoalveolar lavage (n = 3), autoimmunity studies (n = 5) and microbiology studies (n = 6). All patients received antibiotics and all except one received corticosteroids. Inhospital mortality was 75 % (mean SAPS II 42.9), with a mean ICU inpatient time of 5.8 days.

CONCLUSIONS. ILD patients have a high mortality rate even in those without idiopathic pulmonary fibrosis, raising ethical issues in the ICU management of these patients. Aetiology investigation is not standardized and may reflect the unsuitability of current available algorithms (2) for the ICU setting. The development of an algorithm for ILD aetiology investigation and management in ICU is required.

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0870**EVALUATION OF ICU PHYSICIANS' KNOWLEDGE AND HARD TASKS FOR UNDERSTANDING OF MECHANICAL VENTILATION**M.M. Pylypenko¹, O.Y. Khomenko²

¹National Medical Academy Postgraduate Education named by P.L. Shupyk, Anaesthesiology and Intensive Care, Kyiv, Ukraine, ²Kyiv City Center Reproductive and Perinatal Medicine, Anaesthesiology and Intensive Care, Kyiv, Ukraine

INTRODUCTION. Mechanical ventilation (MV) has always been the area of rapid developing and making it challenging for ICU physician to follow, but particular aspects and tasks of MV that hard to understanding for clinicians often remain uncertain.

OBJECTIVES. To evaluate physicians' knowledge about ventilation and difficulties that concern them in their daily practice.

METHODS. We asked clinicians from 99 ICUs in 14 different regions of Ukraine and to answer tests and take part in a questionnaire. Beside general questions about equipment of ICUs with ventilators, tests about description and usage of MV regimens etc. they were requested to describe the difficulties they have during providing the respiratory support and what additional information they would like to know.

RESULTS. From 178 anaesthesiologists which filled the survey, 176 responded for the test about description of assist mechanical ventilation and 135 (76.7 %) of responders answered correctly. 104 responders described difficulties encountered while managing MV - response rate 58.4 %. Near a half of responders (43 %) indicated one particular issue regarding ventilation and other - two or more areas of difficulties. Challenges in selection of ventilation mode during different conditions experienced 59 clinicians (57 %). Other most frequent answers identified areas of knowledge gaps in areas such as patients adaptation to ventilator support or synchronization with respiratory pattern (35.5 %), lack or insufficiency of modern ventilators in ICU (21.2 %), cleaning and maintenance of ventilators (15.4 %), indications for beginning of invasive ventilation and weaning (12.5 %), different ventilators in usage and confusion around "brand" names of ventilation modes and regimens (5.8 %). The questionnaires also revealed that equipment of ICU by ventilators is rather unsystematic and inadequate. On average, there is around 0.85 ventilators per one ICU bed. Furthermore, many departments have 3-4 low or middle class models of ventilators from different producers. Overall, Ukrainian physicians reported current use of more than 35 different names of ventilation modes or regimens because of absents of their uniformity among the producers. Acute shortage of contemporary ventilators, outdated equipment from wide variety of manufacturers, unconformity of the names of ventilation modes and regimens were the main factors challenging conduction of MV and contributing to inconvenience of clinicians in their knowledge. Furthermore, majority of ICU physicians regard MV as a topic of considerable complexity and warrants wide acknowledgement. Curriculum of postgraduate trainings needs further adaptation in light of our findings.

CONCLUSIONS. The analysis of this survey revealed valuable information about physicians' current knowledge and desire to improve their ventilatory practice. As result we can improve postgraduate teaching in this field and provide valuable information to healthcare managers.

0871**KETAMINE IN THE TREATMENT OF BRONCHOSPASM DURING MECHANICAL VENTILATION COMPARED TO CONVENTIONAL TREATMENT: PRELIMINARY REPORT**N. Bernal¹, E. Bautista¹, A. Torres², J. Aguirre¹, J. Franco¹, B. González¹, F. George¹¹Medical Center American British Cowdray ABC, Intensive Care, Mexico, Mexico,²Medical Center American British Cowdray ABC, Mexico, Mexico

INTRODUCTION. Bronchospasm during mechanical ventilation is a frequent respiratory adverse event observed in intensive care. It may lead to hypoxia, hypercapnia and cardio-pulmonary deleterious complications. Although conventional rescue treatment with

bronchodilators may be the first line of treatment some patients are unresponsive. Anesthetic like ketamine has been proposed as an alternative treatment.

OBJECTIVES. To evaluate Ketamine efficacy as compared to placebo for bronchospasm in patients during mechanical ventilation with conventional treatment and analyze differences between and within respiratory mechanics in both groups through the measurement of airway resistance, intrinsic PEEP, airways peak pressure, PaO_2 , PaCO_2 , hemodynamics and mechanical ventilation days.

METHODS. Controlled, double blinded clinical prospective trial. All patients included were under mechanical ventilation and all of them had a bronchospasm event diagnosed with respiratory mechanics (increased pulmonary resistance and intrinsic PEEP) unresponsive to conventional treatment with a combination of β agonist and anticholinergic inhaled treatment. Then an endovenous infusion was administered in a random blinded fashion. Group 1: Ketamine initial dose 2 mg/kg bolus IV dose + then IV infusion 1 mg/kg/h for 6 h or saline NaCl 0.9 % for the control group. Respiratory mechanics, gasometric arterial and hemodynamic measurements were registered before treatment and then immediately after IV bolus and after 6 h.

RESULTS. Up to date 13 patients under mechanical ventilation, sedated with IV anesthesia, with a bronchospasm event unresponsive to conventional treatment were included, 46 % male and 54 % female. 6 patients did receive Ketamine and 7 receive placebo. Admission diagnosis in 7 patients was pneumonia, 2 patients with lung cancer, 1 patient with near to fatal asthma, 1 patient with peritonitis and abdominal sepsis. Both groups at baseline measurements were statistically not different, although peak airway pressure was higher within Ketamine group ($p = 0.001$). After treatment with ketamine measurements showed a trend in major decrease in airways resistance ($p = 0.006$), intrinsic PEEP ($p = 0.004$), peak airway pressure ($p < 0.001$), PaCO_2 (0.009) and an increase in compliance ($p = 0.030$), nevertheless only the increase in compliance was statistically significantly different ($p = 0.030$) as well as a minor need for vasopressors between both groups. No difference was found in mechanical ventilation days.

CONCLUSIONS. Although initial data may suggest that Ketamine treatment for bronchospasm in patients unresponsive to conventional treatment could be useful and cardiopulmonary safe, more data is needed.

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0872

LUNG PROTECTIVE VENTILATION IN ELECTIVE MAJOR ABDOMINAL SURGERY - AN AUDIT

T. Miller¹, W. Angus¹, T. Mahambrey¹, K. Glennon¹, K. Sim¹

¹Whiston Hospital, Critical Care, Liverpool, United Kingdom

INTRODUCTION. In 2013 Futier *et al.* published work showing that a lung protective ventilation strategy with low tidal volumes for patients undergoing elective major abdominal surgery was associated with improved clinical outcome and reduced healthcare utilisation. It is established within intensive care that protective ventilation strategies are best practice, however until Futier *et al.*'s work, this had not been investigated in anaesthetised patients.

OBJECTIVES. To conduct an audit to investigate tidal volume (Vt) usage in patients anaesthetised for elective major abdominal surgery within our hospital. Audit standards were taken from Futier *et al.*'s work with target tidal volume to be between 6-8mls/Kg IBW (ideal body weight).

METHODS. A retrospective audit was conducted over a 4-month period from Sep 2013-Jan 2014 inclusive. Data was extracted from an electronic document management system. Inclusion criteria were open or laparoscopic abdominal surgery of duration equal to or greater than 2 h and age over 18. Patients were excluded if BMI (body mass index) > 35, sepsis or mechanical ventilation within preceding 2 weeks or if they had undergone emergency surgery i.e. non-elective. IBW was calculated using calculation from ARDSnet².

RESULTS. 63 patients were included, 35 male and 28 female. Mean BMI was 26.28. Mean recorded Vt was 514mls. 58.7 % of patients had ventilatory Vt within a range of 6-8mls/Kg of ABW (73 % below 8mls/Kg ABW in total), but only 28.6 % had a Vt of 6-8mls/Kg of IBW. Overall, patients were ventilated at a mean of 1.36mls/kg above an upper limit of 8mls/Kg IBW.

CONCLUSION. Post-operative respiratory complications have significant consequences for both the patient and the hospital system, which is under ever increasing pressure. As clinicians we have a responsibility to reduce where possible any foreseeable complications associated with general anaesthesia, especially pertinent as part of an enhanced recovery programme and in the prevention of unplanned intensive care admissions. In contrast to the original study we included adult patients below 40 years of age as we felt that protective ventilation represents best practice that should be applicable to all, barring other specific exceptions. It was shown that in our institution, using ABW the majority of patients are ventilated within a target range of 6-8mls/Kg but this is significantly reduced against IBW. A protocol for ventilation in major abdominal surgery will be implemented in line with the provision to all theatres of a conversion chart for ABW to IBW, following which the audit will be repeated to close the cycle. Let's not forget, *Primum non nocere*.

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0873

MANUAL VENTILATION PERFORMANCE: WHICH METHODS ARE USED FOR ITS ANALYSIS? A REVIEW OF THE LITERATURE

A. Khoury^{1,2}, F.S. Sall^{1,2}, A. De Luca^{1,2}, L. Pazar², G. Capellier^{1,3}

¹Besaçon University Hospital, Department of Emergency Medicine and Critical Care, Besaçon, France, ²Besaçon University Hospital, INSERM CIC 1431, Besaçon, France, ³Monash University, Melbourne, Australia

BACKGROUND. Nearly 700000 victims suffer sudden death yearly in Europe. Early cardiopulmonary resuscitation (CPR) is essential for patient survival. This technique, combining chest compressions and artificial ventilation, is difficult to achieve. The International Liaison Committee on Resuscitation (ILCOR) recommended ideal tidal volumes and frequency rates for adequate ventilation but does not include in their guidelines how to assess and analyze ventilation performance. Thus, several studies tried to analyze ventilation efficiency without a real consensus. This review of the literature aims at exploring the different methods published these last years.

METHODS. We searched different electronic databases, from 2000 to present, including PubMed, Science Direct, Google search, Clinical Trials and Cochrane. The main inclusion criterion of articles in this literature review is the analysis of the ventilation performance. Thus, the key words used were Bag-Valve-Mask, manual ventilation and ventilation performance.

RESULTS. 53 articles were selected from which we identified 14 to be more relevant and eligible regarding our main inclusion criterion. Among them, 11 are bench test studies on manikin and the 3 remaining are clinical. The ventilatory parameters recorded in these studies presented in Table 1 were tidal volume (V_T), mask tidal volume (V_{mask}), peak airway pressure (P_{peak}), peak inspiratory flow (PF), volume minute (V_m), inspiratory time fraction (T_i/T_{tot}), gastric inflation (V_{gastric}), ventilation rate (V_R), inspiratory/expiratory ratio (I/E) and maximum airway pressure (P_{max}).

DISCUSSION AND CONCLUSION. This literature review shows a wide heterogeneity in the methods used for analyzing ventilation performance. We outline three main methods: an overall mean analysis which is the most commonly used method, an analysis of the mean over each ventilation period and an instantaneous breath-by-breath analysis. However, all these methods do not fully provide a clear understanding of the ventilatory parameter variability in time as well as the ventilation efficiency. This review highlights the necessity to define and develop a new standardized method in order to accurately assess ventilation performance.

0874

NEUROMUSCULAR DISEASES IN PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT: CLINICAL CHARACTERISTICS AND OUTCOME

A. Jerez¹, J.M. Nicolas², J.M. Grau², R.A. Losno², P. Moreno², P. Castro²

¹Hospital Clinic de Barcelona, Internal Medicine, Barcelona, Spain, ²Hospital Clinic de Barcelona, Barcelona, Spain

INTRODUCTION. Patients with neuromuscular diseases may be diagnosed after admission to the intensive care unit (ICU). However there is little information about the real incidence of this problem and the characteristics of these patients.

OBJECTIVES. To assess the number of patients first diagnosed of a neuromuscular disease during ICU admission, as well as their main clinical characteristics and outcomes.

METHODS. We conducted a retrospective study in a University Hospital. All patients with a first diagnosis of a neuromuscular disease during ICU admission from January 2005 to December 2013 were included. Clinical data was obtained from both the ICU and the Muscle Research Unit. Patients with Guillain-Barré syndrome were excluded.

RESULTS. We identified nine patients affected of a previously undiagnosed neuromuscular disease out of 2,917 admissions (0.31 %). Six of them were men, and their median age was 66 years (range 27-83). Their final diagnoses were: miastenia gravis (2 patients), amyotrophic lateral sclerosis, muscular amiloidosis, inclusion body myositis, polymyositis, dermatomyositis, Pompe disease and an undefined metabolic myopathy, one case of each condition. Five electromyograms and seven muscle biopsies were performed for diagnostic purposes and the median time to diagnosis was 10 days since ICU admission.

The main cause of ICU admission was hypercapnic respiratory failure (7 patients), whereas the other two patients entered the ICU because of normocapnic respiratory failure (1) and convulsive epileptic status (1). Most of the patients were admitted from the emergency department (6 patients), and 3 came from the ward. Their median APACHE-II score at admission was 9.1 (range 4-14) and their median SOFA score was 3.56 (range 1-8). Seven patients required invasive mechanical ventilation for a median time of 8.6 days (range 1-20). A tracheostomy was needed in five cases. Six patients needed vasoactive drugs and one patient required hemodiafiltration.

Their median length of stay in ICU and hospital was 29 (range 9-77) and 42 days (range 5-88), respectively. Three patients died during their ICU admission and two after ICU discharge, being the cause of death related to the newly diagnosed neuromuscular disease. When discharged from the hospital, one of the patients needed permanent ventilatory support, four required oxygen supply and four remained with a permanent tracheostomy.

CONCLUSIONS. Although infrequent, neuromuscular disorders can be diagnosed after ICU admission, usually due to respiratory failure. Although most of them do not have specific treatment, diagnosis of these entities is important because they usually have a bad outcome.

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GRANT ACKNOWLEDGMENT. No grants were received for this study.

0875

CHARACTERISTICS AND CLINICAL OUTCOMES OF ACUTE RESPIRATORY DISTRESS SYNDROME IN MEDICAL INTENSIVE CARE UNIT, TERTIARY HOSPITAL OF THAILAND

N. Chindavech¹, W. Ngaosri¹, S. Siri Wong²

¹Buriram Hospital, Pulmonary and Critical Care Medicine, Buriram, Thailand, ²Buriram Hospital, Anesthesiology, Buriram, Thailand

INTRODUCTION. There are very few studies in diagnosis and pattern of ARDS patients in Thailand. The various causes reported for ARDS have been associated with a variety of tropical infections.

OBJECTIVES. The aim of this study was to assess the clinical characteristics and factors predicting outcomes among ARDS patients.

METHODS. Prospective observational study was done over 1 year from October 2012 to December 2013 in medical intensive care unit, Buriram hospital. Baseline characteristics, etiology, disease severity, length of hospital stay and mortality were collected. Factors significantly influenced mortality were examined by univariate analysis.

RESULTS. 80 of 560 (14.3 %) patients were ARDS were enrolled. Mean age was 45.8 (\pm SD 15.2), 52 (65.0 %) were men. Mean $\text{PaO}_2/\text{FiO}_2$ was 163.0 ± 9.1 and severe ARDS ($\text{PaO}_2/\text{FiO}_2 < 100$) was 37.5 %. PEEP level was $12 \pm 3.7\text{cmH}_2\text{O}$. Mean APACHEII was 35.1 ± 4.5 , SAPII 66.5 ± 8.2 , SOFA day1 14.5 ± 3.0 , SOFA day3 10.8 ± 5.1 , lactate 8.9 ± 3.8 , ScVO_2 75.7 ± 14.4 , creatinine 3.8 ± 1.6 , 81.3 % of patients were in AKIN stage 3, 93.1 % received continuous renal replacement therapy.

Bacterial pneumonia including melioidosis, leptospirosis and scrub typhus were three main diagnosis (31.3 %, 20.0 %, 10.0 %, respectively). Length of hospital stay was 12.5 ± 11.9 days, ICU stay 6.2 ± 7.2 days, mechanical ventilator free day 6.3 ± 9.0 . Additionally, in hospital mortality was 43.8 % and 28 day mortality was 46.3 % associated with pulmonary complications included diffuse pulmonary hemorrhage and pulmonary edema. Moreover, patients with presence of septic shock, required vasopressor, more than three organ failures prior to admission had a significantly higher mortality rate ($p < 0.05$).

CONCLUSIONS. Septic shock and tropical infections were a significant risks in the development of ARDS patients in northeastern part of Thailand.

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GRANT ACKNOWLEDGMENT. Medical intensive care unit, Buriram hospital, Thailand

0876

PROGNOSIS OF DIFFUSE ALVEOLAR HAEMORRHAGE IN CRITICAL ILL PATIENTS

A. Jamoussi¹, H. Maamouri¹, T. Merhebene¹, K. Belkhouja¹, K. Ben Romdhane¹, F. Mezni¹, J. Ben Khelil¹, M. Besbes¹

¹Réanimation Respiratoire, Ariana, Tunisia, ²Anatomo-Pathologie, Ariana, Tunisia

INTRODUCTION. Diffuse alveolar haemorrhage (DAH) is a therapeutic emergency because of its respiratory impact. In many cases, the severity of this illness may reach a life-threatening condition, especially ARDS.

OBJECTIVES. To assess the severity and mortality in patients with DAH admitted in ICU. **METHODS.** We retrospectively enrolled patients with DAH admitted in our ICU from January 2009 to march 2014. In all patients, we recorded demographic characteristics, respiratory impact, etiologies of the DAH and outcome of patients.

RESULTS. During the study period, we recorded 34 cases of DAH. The median age was 39 years [18 - 75] with a sex-ratio of 0.58. The median SAPS II score was 24 [6 - 52]. An acute respiratory failure was present at admission in 26 patients (76.7 %) with a median PaO₂/FiO₂ of 190 mm Hg [59 - 471]. DAH etiologies were immunologic in 10 cases (29.4 %) and non immunologic in the 24 others (70.6 %). Mechanical ventilation was required in 22 patients (64.7 %), it was NIV in 9 patients (26.5 %) and invasive in 13 patients (38 %). According to the Berlin classification, all ventilated patients had an ARDS: severe in 7 cases, moderate in 9 cases and mild in 6 cases. The median length of stay was 11 days [1 - 66]. Mortality rate was 26.5 % (9 patients). Causes of death were refractory hypoxemia in 4 and multiorgan failure in 5 patients.

In univariate analysis, 3 predictive mortality factors were identified: age (62 vs 31; p = 0.011), SAPS II score (35 vs 20; p = 0.016) and need of invasive ventilation (61.5 % vs 4.8 %; p = 0.001).

In logistic binary analysis, the only independent predictive mortality factor was the need of invasive ventilation with p = 0.018, OR = 19.9 [1.66 - 239.04].

CONCLUSIONS. In ICU, DAH is a severe affection with a mortality rate of 26.5 %. The need of invasive mechanical ventilation predicts independently a pejorative prognosis.

0877

I COUGH UK - A PERI-OPERATIVE SERVICE IMPROVEMENT PATHWAY FOR REDUCING POST OPERATIVE PULMONARY COMPLICATIONS

N. Thomas¹, J. Moore²

¹Manchester Royal Infirmary, Manchester, United Kingdom, ²Manchester Royal Infirmary, Critical Care Department, Manchester, United Kingdom

INTRODUCTION. Post-operative pulmonary complications can be devastating and costly for patients and healthcare services [1][2]. Internal audits demonstrated high risk surgical patients followed the national trend for the rates of developing a post-operative pulmonary complication (PCC). We classified PPCs as atelectasis, pneumonia, pneumothorax, respiratory failure and exacerbation of a pre-existing lung condition [3] and high risk as ASA > 3, surgery time > 180 min, upper abdominal incision, diabetes and smoking.

OBJECTIVES. We have adapted a service improvement project, I-COUGH [4] with an aim to reduce our rates of PCCs.

METHODS. Introduction of a care bundle running throughout the operative period, namely:

I-Incentive spirometry
C-Coughing and deep breathing exercises
O-Oral hygiene
U-Patient and carer understanding
G-Getting out of bed and early mobilisation
H-Head of bed elevation

UK-Pre-operative: education on fitness, diet and smoking. Post-operative: enhanced recovery incorporating I COUGH.

Pre-operatively patients will receive education on I-COUGH UK from trained nursing staff. To encourage the use of this bundle we have developed a patient education leaflets and videos, educating patients to use an incentive spirometer, oral hygiene and virtual tours of theatre and HDU. We have designed a website to hold these videos and a 'youtube' station. We have developed a pathway, based on the enhanced recovery model, incorporating I COUGH for nursing staff to follow on HDU.

RESULTS. Initial audits showed 24 % (n = 50) of patients admitted to HDU developed a PCC. We have looked at these patients against all patients undergoing a surgical procedure, regardless of risk, on a given day and found 2 % (n = 51) of these patients developed PCC. Indicating our work should be directed towards the high-risk. We are conducting a rolling audit on patients going through the new pathway.

CONCLUSIONS. PCCs are a concerning area for most clinicians, but we aim to reduce our rate by 50 % over the next 2 years with I COUGH UK

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Oral Sessions

What's new in cardiovascular dynamics and cardiac arrest: 0878-0882

0878

INCIDENCE, RISK FACTORS AND OUTCOMES OF NEW-ONSET ATRIAL FIBRILLATION IN CRITICALLY ILL PATIENTS WITH SEPSIS

P.M.C. Klein Klouwenberg^{1,2,3}, S. Kuipers¹, M.J. Schultz⁴, L.M. Peelen³, M.J. Bonten^{2,3}, O.L. Cremer¹

¹University Medical Centre Utrecht, Department of Intensive Care Medicine, Utrecht, Netherlands, ²University Medical Centre Utrecht, Department of Medical Microbiology, Utrecht, Netherlands, ³University Medical Centre Utrecht, Julius Centre for Health Sciences and Primary Care, Utrecht, Netherlands, ⁴Academic Medical Centre, University of Amsterdam, Department of Intensive Care Medicine, Amsterdam, Netherlands

INTRODUCTION. Critically ill patients with sepsis are at increased risk of developing cardiac dysrhythmias, most commonly atrial fibrillation (AF). This is thought to be due to the systemic inflammatory response, increased levels of circulating stress hormones, and autonomic dysfunction that accompanies sepsis. Furthermore, the occurrence of new-onset AF in critically ill patients is associated with both increased morbidity and mortality, but it is uncertain whether these relations are causal, and whether they hold true for patients with sepsis. **OBJECTIVES.** To determine the incidence, risk factors and outcomes of AF in a cohort of patients with sepsis.

METHODS. We identified new-onset AF in a cohort of critically ill patients admitted with sepsis to two tertiary intensive care units (ICU) in the Netherlands between January 2011 and June 2013. Patients following cardiac surgery were excluded. Multivariable-adjusted predictors of new-onset AF during sepsis were identified. We used competing risks analyses to determine the association of new-onset AF with mortality.

RESULTS. 1786 patients with sepsis were included. A total of 1076 AF episodes occurred in 410 patients. The median number of AF episodes during ICU admission per patient was 2 (interquartile range (IQR) 1-3) and the median length of both first and recurrent AF episodes was 4 h (IQR 2-10). The increase in heart rate was 9 beats/min (IQR 4-28) after onset of first episodes and 6 beats/min (IQR 3-27) after onset of recurrent episodes. There was no change in mean arterial pressure after onset of AF (median change first episodes -2 mmHg (IQR -9-5), recurrent episodes -1 mmHg (IQR -10-7)). The cumulative risk of new-onset AF was 10 % (95 % CI: 8-13), 21 % (18-24), 39 % (35-43) in patients with sepsis, severe sepsis and septic shock, respectively. Independent predictors for AF during sepsis included age, APACHE score, temperature and inotrope use. New-onset AF was associated with both an increased length of ICU stay (cause-specific hazard ratio for discharge alive 0.72; 95 % CI 0.63-0.81) and increased ICU mortality, when accounting for imbalances in baseline markers of disease severity and the competing risk of discharge (subdistribution hazard ratio 2.18; 95 % CI 1.69-2.82).

CONCLUSIONS. New-onset AF is common in critically ill patients with sepsis and is associated with excess mortality. Early risk stratification of patients may allow for pharmacological interventions to prevent this complication.

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0879

ARTERIAL CARBON DIOXIDE LEVELS PREDICT IN-HOSPITAL MORTALITY INDEPENDENT OF ARTERIAL OXYGEN AFTER RESUSCITATION FROM CARDIAC ARREST

H.J. Helmerhorst¹, M.-J. Blom², D.J. van Westerloo¹, A. Abu-Hanna², N.F. de Keizer², E. de Jonge¹

¹Leiden University Medical Center, Department of Intensive Care Medicine, Leiden, Netherlands, ²Academic Medical Center, Department of Medical Informatics, Amsterdam, Netherlands

INTRODUCTION. Cardiac arrest heralds devastating effects on organ perfusion and tissue oxygenation, including cerebral ischemia. Derangements in both arterial carbon dioxide (PaCO₂) and oxygen (PaO₂) have been associated with worse outcome in critically ill patients after cardiac arrest [1, 2]. However, it is presently unknown whether the effects of PaO₂ and PaCO₂ are independent of each other.

OBJECTIVES. We aimed to assess the association and interaction of PaCO₂ and PaO₂ with in-hospital mortality in a multicenter cohort of patients admitted to Dutch intensive care units (ICUs) after cardiac arrest.

METHODS. Data were collected from the Dutch National Intensive Care Evaluation (NICE) registry, a high quality database. Retrospective analyses were performed on data from mechanically ventilated patients after out-of-hospital cardiac arrest and cardiopulmonary resuscitation, between 2007 and 2012. PaCO₂ and PaO₂ values from arterial blood gas analyses with lowest PaO₂/FiO₂ ratios in the first 24 h of ICU admission were retrieved for analyses. In logistic regression models, cubic splines of PaCO₂ and PaO₂ were introduced as predictors for in-hospital mortality. Multivariable analyses were conducted using logistic regression adjusted for APACHE IV score, age, admission source, year of admission, lowest glucose, therapeutic hypothermia and propensity scores for hypo-/hypercapnia. Statistical model performance and interaction effects were tested using Akaike information criterion (AIC).

RESULTS. Overall, 2631 (47.6 %) patients died in the ICU and 2992 (54.2 %) died before hospital discharge. PaCO₂ was significantly associated with in-hospital mortality (P < 0.001) in univariate analysis. This model was significantly improved when PaO₂ was fitted to the model (ANOVA, P < 0.001). No significant interaction effect (arterial oxygen by arterial carbon dioxide concentration) on mortality was found (ANOVA, P = 0.25). After adjustment for additional confounders, the association was attenuated but remained statistically significant for PaCO₂. Including PaO₂ in the multivariate model did not essentially change the predictive performance (ANOVA, P = 0.14).

CONCLUSIONS. In our retrospective analyses of a multicenter cohort, carbon dioxide and oxygen in arterial blood were, independent of each other, significantly associated with in-hospital mortality after resuscitation from cardiac arrest. After adjustment for additional confounders, arterial carbon dioxide, but not oxygenation emerged as a significant independent predictor for death. Our findings stress the need for future studies on optimal PaCO₂ and PaO₂ targets in these patients.

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0880**ACUTE KIDNEY INJURY AFTER OUT-OF-HOSPITAL CARDIAC ARREST: PREVALENCE, RISK FACTORS AND OUTCOME**

L. Guillemet¹, G. Geri^{1,2,3}, F. Dumas^{1,2,3}, J. Charpentier¹, M. Antona¹, V. Lemiale⁴, W. Bougouin^{1,2,3}, J.-P. Mira^{1,2}, C. Vinsonneau¹, A. Cariou^{1,2,3}, J.-P. Empana³

¹Cochin Hospital, Paris, France, ²Paris Descartes University, Paris, France, ³INSERM U970 Paris Cardiovascular Research Center, Paris, France, ⁴Saint Louis Hospital, Paris, France, ⁵Marc Jacquet Hospital, Melun, France

INTRODUCTION. The prevalence and the prognosis of acute kidney injury (AKI) during post out-of-hospital cardiac arrest (OHCA) period are unclear. We aimed at evaluating AKI's prevalence within the 48 first hours after OHCA, identifying risk factors for developing AKI and evaluating the impact of AKI on ICU and D28 mortality.

METHODS. Retrospective analysis of prospectively collected data in a large OHCA patients cohort from a cardiac arrest center in Paris. We excluded patients previously suffering from chronic kidney disease, for whom ethnic origin was unknown and patients dead on arrival. AKI was defined as: urine output < 0.5 mL/kg/h during the first six hours, admission creatinine level higher than 1.5 fold than theoretic creatinine estimated with MDRD (glomerular filtration rate considered normal as 75 mL/min/1.73 m²), renal replacement therapy (RRT) still necessary at day-3 or peak creatinine over the first 48 h higher than 1.5 fold the theoretic creatinine estimated with MDRD in patients not filling previous criteria. Main outcome was day-30 mortality. Multivariate and multinomial logistic regressions were performed to pick up factors associated with AKI and with day-7 and day-30 mortality, respectively.

RESULTS. 803/907 patients were included in the analysis. (67.9 % were males of median age 60.6 [50.2,72.7] years. An initial shockable rhythm was observed in 51.1 % and OHCA was related to a cardiac cause in 52.7 %. Post-resuscitation shock occurred in 51.6 %. Therapeutic hypothermia (TH) and percutaneous coronary intervention (PCI) were performed in 86.3 and 24.7 % of cases, respectively. Day-7 and day-30 mortality rates were 46.2 and 66.1 %, respectively.

AKI was observed in 313 (39.0 %) patients. Median admission creatinine level was 150 vs 89 µmol/L in patients with compared to those without AKI (p < 0.01). Median 6-first hours urine output was 0.3 and 1.7 mL/kg/h in patients with and without AKI, respectively. RRT was performed in 48.5 % of patients at admission whereas it remained necessary in 13.4 % at day-3. Age higher than 61 years (OR = 1.47; 95 %CI [1.08,1.98]; p = 0.01), post resuscitation shock (OR 2.52; 95 %CI [1.85,3.44]; p < 0.01) were associated with AKI occurrence whereas an initial shockable rhythm (OR 0.69, 95 %CI [0.49-0.97] p = 0.03) and PCI performing (OR 0.61; 95 %CI [0.42,0.90]; p = 0.01) were protective from AKI. In multinomial logistic regression, AKI was independently associated with day-7 (OR 2.91 [1.93,4.40]; p < 0.01) and day-30 (OR 2.02 [1.26,3.25]; p < 0.01) mortality. All patients still requiring dialysis at ICU discharge (n = 4) were weaned at hospital discharge.

CONCLUSION. AKI occurred in nearly 40 % of our large cohort of OHCA patients. An age higher than 61 years and post resuscitation shock were independently associated with AKI's occurrence. AKI was independently associated with day-7 and day-28 mortality.

0881**PRELOAD-DEPENDENCE INDICES TO TITRATE VOLUME EXPANSION DURING SEPTIC SHOCK: A RANDOMIZED CONTROLLED TRIAL**

J.-C. Richard^{1,2,3}, F. Bayle¹, B. Gaël¹, V. Leray¹, S. Debord¹, B. Delannoy¹, A. Storan Cividjian¹, F. Wallet¹, H. Yonis¹, C. Guerin^{1,3,4}

¹Hospices Civils de Lyon, Hôpital de la Croix-Roussse, Service de Réanimation Médicale, Lyon, France, ²Université de Lyon, Université Lyon I, Lyon, France, ³CREATIS INSERM 1044 CNRS 5220, Villeurbanne, France, ⁴Université de Lyon, Université LYON I, Lyon, France

INTRODUCTION. Preload dependence indices (such as pulse pressure or cardiac output variation during passive leg raising) are reliable to predict fluid responsiveness^{1,2}, and may help to identify patients requiring intravascular volume expansion, while avoiding unnecessary fluid administration in other patients. However, whether using these indices for fluid resuscitation improves septic shock prognosis remains unknown.

OBJECTIVES. To determine the clinical benefit of using preload dependence indices to titrate volume expansion during septic shock.

METHODS. In a single-center randomized controlled trial, septic shock patients were randomized into either a central venous pressure-guided group (control group, n = 30) or a preload dependence indices-guided group (n = 30) for the intravascular volume expansion. Cardiac output was continuously monitored with the Pico device (Pulsion Medical Systems, Munich, Germany). In both groups, an hemodynamic algorithm was run at each episode of hypotension, every hour during the first 6 h after randomization, and then every 4 h until shock resolution or death. The primary end-point was time to shock resolution defined by vasopressor weaning.

RESULTS. Both treatment arms were well balanced regarding general characteristics at admission and randomization, characteristics of infection, and hemodynamics. Time to shock resolution was not different between treatment arms (2.0 [1.2-3.1] vs. 2.3 [1.4-5.6] days in control and preload dependence groups, respectively (figure 1)). The daily amount of fluids administered for intravascular volume expansion was higher in control than in preload dependence group (917 [639-1511] vs. 383 [211-604] mL, p = 0.01). The values of physiologic variables did not change between groups over time, except for plasma lactate (figure 2). There was a strong trend towards lower mortality in the preload dependence group (23 % vs 47 %, p = 0.10).

Figure 1

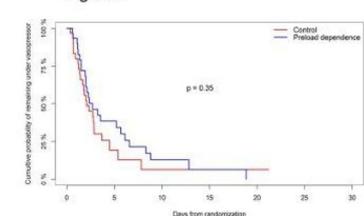
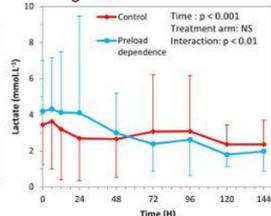


Figure 2



[Figure 1 & 2]

CONCLUSIONS. Titrating intravascular volume expansion with preload dependence indices has no effect on time to shock resolution, but is associated with a decrease in the daily amount of intravascular fluids administered as compared to control. Further studies are required to assess the impact of this strategy on patient survival.

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0882**PULMONARY HYPERTENSION POSSIBLY LINKED TO LEFT HEART DISEASE IN COPD**

D. Lepida¹, E. Galiatsou¹, A. Papatheanasiou¹, V. Koulouras¹, C. Katsouras², G. Nakos¹

¹University Hospital of Ioannina, ICU, Ioannina, Greece, ²University Hospital of Ioannina, Cardiology, Ioannina, Greece

INTRODUCTION. Pulmonary hypertension (PH) in COPD is generally thought to reflect disease severity. PH is also a common complication of left heart disease (PH-LHD) which is a well known comorbidity of COPD.

OBJECTIVES. The aim of this ongoing study is to look at the association, if any, between PH and LHD in COPD. The results of a preliminary analysis are presented here.

METHODS. COPD patients who gave consent to participate in the study underwent clinical examination, ABGs, spirometry, ECG and echocardiography. Those with echocardiographic evidence of pulmonary hypertension who agreed to, underwent right heart catheterisation (RHC). Exclusion criteria were a diagnosis of asthma as predominant disease and admission for any other cause than COPD exacerbation.

RESULTS. Eighty nine consecutive patients with COPD (13 female, 76 male) were screened for the presence of PH and LHD. Age was 65.71 ± 11.52. Forty of them were seen as outpatients and 59 were admitted either to the ward (21) or to the ICU (28), with acute COPD exacerbation. Forty-six percent were stage GOLD 4, 20 % were stage 3, 13 % were stage 2, 12 % were stage 1 and 9 % were stage 0. Forty-nine (55 %) had a known history of arterial hypertension, 24 (27 %) of diabetes and 13 (15 %) of coronary artery disease. All of the patients were evaluated with echocardiography, 17 underwent RCH and four coronary angiogram. Echocardiography disclosed the presence of left ventricular systolic dysfunction in 26 patients (29 %), with 6 presenting with segmental hypokinesia. The vast majority had left ventricular diastolic dysfunction (68, 76 %) and forty patients (45 %) had right heart disease (right ventricular dysfunction or right atrial and ventricular dilatation). According to the echo findings PH when velocity of tricuspid regurgitation exceeded 3.4 m/s, possible if velocity was 2.9-3.4 m/s or ≤ 2.8 m/s but with additional echocardiographic findings suggestive of PH, and unlikely if tricuspid regurgitation velocity was ≤ 2.8 m/s with no other findings suggestive of PH. PH was thus likely in 15 patients (17 %), possible in 28 (31 %), and unlikely in 46 (52 %). PH was confirmed in thirteen of the seventeen patients who underwent right heart catheterisation. In nine of the thirteen patients this was associated with a pulmonary artery wedge pressure more than 15 mmHg. Five of these patients had isolated post-capillary and four combined pre- and post capillary PH as classified according to a diastolic pressure difference of < 7 mmHg or ≥ 7 mmHg respectively.

CONCLUSIONS. LHD was evident in the vast majority of patients with COPD, with LV diastolic dysfunction being the prevalent type. Almost half of these patients (48 %) presented with likely or possible PH based on echocardiographic criteria. PH was confirmed in 13 out of 17 patients who underwent RHC and was mainly associated with LHD (PH-LHD). **REFERENCE(S).** 1. J Am Coll Cardiol 2013;62:D100-8 2. J Am Coll Cardiol 2013;62:D109-16

Pneumonia: 0883—0887**0883****DIAGNOSING PNEUMONIA ON THE INTENSIVE CARE UNIT WITH SERUM ¹H NMR SPECTROSCOPY**

D. Antcliffe¹, B. Jiménez², K. Veselkov², E. Holmes², G. Hanna³, M. Takata¹, A.C. Gordon¹

¹Imperial College London, Section of Anaesthetics, Pain Medicine and Intensive Care, London, United Kingdom, ²Imperial College London, Section of Computational and Systems Medicine, London, United Kingdom, ³Imperial College London, Division of Surgery, London, United Kingdom

INTRODUCTION. Clinical features and investigations lack predictive value when diagnosing pneumonia so new tools to aid diagnosis are important to improve outcomes.

Metabonomics compares and quantifies differences in metabolic profiles of biological fluids enabling potentially hundreds of metabolites to be explored.

OBJECTIVES. To apply proton nuclear magnetic resonance (¹H NMR) spectroscopy to serum from ICU patients with and without pneumonia to determine if metabolic profiling has potential to aid diagnosis.

METHODS. Patients admitted for invasive ventilation were recruited within 48 h of the start of ventilation, with consent from the next of kin. Two groups were enrolled; those with pneumonia based on clinical features, investigations and Clinical Pulmonary Infection Score (CPIS), and those with brain injuries (BI) without pneumonia at the start of ventilation. Serum was separated immediately and frozen at -80 °C until NMR analysis.

¹D ¹H NMR spectra were obtained on a 600 MHz Bruker spectrometer. After phasing, baseline correction and peak alignment of the spectra comparisons were performed using multivariate statistics including recursive maximum margin criterion discriminant analysis with a Mahalanobis-distance based classifier and ten-fold cross validation. Individual metabolites were compared using analysis of variance (ANOVA).

RESULTS. Thirty-three patients were recruited (22 without and 11 with pneumonia). Mean age (52 ± 15 yrs vs 54 ± 18 yrs p = 0.75), sex (55 % vs 82 % male p = 0.25), APACHE II score (17 ± 5.9 vs 20 ± 6.8 p = 0.26) and time to sampling (41 ± 17 h vs 42 ± 8 h p = 0.67) were similar between groups. As expected C-reactive protein (69 ± 62 mg/L vs 175 ± 92 mg/L p < 0.01) and white cell count (10.0 ± 3.8 10⁹/L vs 16.1 ± 8.2 10⁹/L p = 0.04) were higher in the pneumonia group and minimum Pa/FiO₂ ratio was lower (41.7 ± 15.1 kPa vs 26.3 ± 8.6 kPa p < 0.001).

Discriminant analysis provided a model with a classification accuracy of 77 % (area under the receiver operating curve (AUROC) 0.80). Using only metabolites that reached a significance threshold of 0.05 or better on ANOVA classification accuracy improved to 85 % (AUROC 0.94). Of the identified metabolites levels of formate (p < 0.01) appeared higher in patients with pneumonia and alanine (p < 0.01) in those without.

Six BI patients developed ventilator associated pneumonia (VAP), based on CPIS, during their stay. Comparison of samples taken at the time VAP developed to the 22 BI admission samples produced a model with a classification accuracy of 71 % (AUROC 0.65) after

selecting only significant metabolites the classification accuracy improved to 89 % (AU-ROC 0.97).

CONCLUSIONS. This preliminary investigation demonstrates that metabonomic techniques may be applied to the serum of critically ill patients with the potential to assist in the diagnosis of pneumonia and specifically VAP.

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0884

RISKS AND PROGNOSTIC FACTORS FOR ICU-ACQUIRED PNEUMONIA DUE TO *PSEUDOMONAS AERUGINOSA* WITH AND WITHOUT MULTIDRUG RESISTANCE

F. De Rosa¹, L. Fernandez-Barat², M. Ferrer¹, A. Gabarrus², M. Esperatti², S. Terraneo³, M. Rinaudo², L.F. Difrancesco², G. Li Bassi², A. Torres²

¹Università degli Studi di Milano, Dipartimento di Anestesia e Rianimazione, Milan, Italy, ²Hospital Clinic, Department of Pneumology, Barcelona, Spain, ³Università degli Studi di Milano, San Paolo Hospital, Dipartimento di Scienze della Salute, Respiratory Unit, Milan, Italy

RATIONALE. *Pseudomonas aeruginosa* is one of the most frequent microorganisms causing intensive care unit (ICU)-acquired pneumonia (ICUAP). While antibiotic resistance for *P. aeruginosa* continues to increase in Europe, there is lack of information regarding specific risk factors and its associated inflammatory response.

OBJECTIVES. To identify risk factors for ICUAP due to *P. aeruginosa* and for the presence or absence of multidrug resistance (MDR) and the associated inflammatory response.

METHODS. Among 394 consecutive episodes of ICUAP collected prospectively from 6 medical and surgical ICUs in a tertiary hospital, we included 246 (62 %) cases with etiologic diagnosis. We compared the main clinical characteristics and the variables representing disease severity and outcomes between patients with ICUAP caused by *P. aeruginosa* or other pathogens and between *P. aeruginosa* with and without MDR.

RESULTS. *Pseudomonas aeruginosa* was the most frequent causative microorganism (72, 29 %); in 21 (29 %) of them *P. aeruginosa* was MDR. Compared with other etiologies, patients with *P. aeruginosa* were older, more often previously colonized by *P. aeruginosa*, they had received more frequently previous antibiotics, they had higher rates of chronic obstructive pulmonary disease, less incidence of chronic alcohol abuse, and less pleural effusion. Multivariate analysis showed that prior airway colonization by *P. aeruginosa* and previous antibiotic treatment, both monotherapy and in combination, were independently associated to a higher risk of *P. aeruginosa* aetiology, while chronic alcohol abuse and pleural effusion were independently associated to a lower risk for this pathogen. Inflammatory biomarkers were similar between patients with and without *P. aeruginosa*; however, patients with MDR *P. aeruginosa* had lower levels of interleukin-6 at day 1 than those with *P. aeruginosa* without MDR. Non-response to treatment was not significantly different between cases with and without *P. aeruginosa*, as well as in patients with *P. aeruginosa* with and without MDR. *Pseudomonas aeruginosa*, with or without MDR, was not associated with a different mortality compared with other etiologies, even when adjusting for confounders.

CONCLUSIONS. Prior airway colonization by *P. aeruginosa* and previous antimicrobial treatment predicted *P. aeruginosa* aetiology, while alcohol abuse and pleural were associated to a lower risk for this pathogen. *Pseudomonas aeruginosa* is not associated to higher mortality or treatment failure compared to other pathogens.

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0885

SERUM LEVELS OF IMMUNOGLOBULINS (IG) AND SEVERITY OF COMMUNITY-ACQUIRED PNEUMONIA (CAP)

M.C. de la Torre¹, P. Toran², E. Palomera³, M. Serra-Prat³, A. Albis⁴, E. Güell⁴, M. Solsona⁵, G. Miró⁶, J.C. Yébenes⁴, J. Almirall⁴, R. Martínez⁷

¹Consorci Sanitari Mataró, Intensive Care Unit, Mataró, Spain, ²Institut Català de la Salut, Unitat Suport Recerca Metropolitana Nord, Barcelona, Spain, ³Consorci Sanitari Mataró, Research Unit, Mataró, Spain, ⁴Consorci Sanitari Mataró, Intensive Care Unit, Mataró, Spain

INTRODUCTION. There is evidence of the relationship between severity of infection and inflammatory response of the immune system.

OBJECTIVES. To assess serum levels of immunoglobulins and to establish its relationship with severity of community-acquired pneumonia (CAP) and clinical outcome.

METHODS. This was an observational and cross-sectional study in which three groups of patients diagnosed with CAP were compared: patients treated in the outpatient setting (n = 54), patients requiring in-patient care (hospital ward) (n = 173), and patients requiring admission to the intensive care unit (ICU) (n = 191).

RESULTS. Serum total IgG (and IgG subclasses IgG1, IgG2, IgG3, IgG4), IgA, and IgM were measured at the first clinical visit. Normal cutpoints were defined as the lowest value obtained in controls (≤ 680 , ≤ 323 , ≤ 154 , ≤ 10 , ≤ 5 , ≤ 30 , and ≤ 50 mg/dL for total IgG, IgG1, IgG2, IgG3, IgG4, IgM, and IgA, respectively). Serum immunoglobulin levels decreased in relation to severity of CAP. Low serum levels of total IgG, IgG1, and IgG2 showed a relationship with ICU admission. Low serum level of total IgG was independently associated with ICU admission (OR = 2.45, 95 % CI 1.4 to 4.2, P = 0.002), adjusted by CURB-65 severity score and comorbidities (chronic respiratory and heart diseases). Low levels of total IgG, IgG1, and IgG2 were significantly associated with 30-day mortality.

VARIABLE	Odds ratio (95 % confidence interval)	P value
Low level of total IgG (≤ 680 mg/dL)	2.45 (1.4-4.2)	0.002
CURB-65 severity score	4.62 (3.33-6.4)	< 0.001
Chronic heart disease	0.22 (0.12-0.4)	< 0.001
Chronic respiratory disease	0.29 (0.17-0.51)	< 0.001

[Low levels of IgG adjusted by risk factors]

CONCLUSIONS.

1. Patients with severe CAP admitted to the ICU showed lower levels of circulating immunoglobulins (IgG1, IgG2, IgG3, IgG4, IgA and IgM) than non-ICU patients. 2. A decreased level in IgG total, IgG1 and IgG2 during a pneumonia process, is related to higher mortality.

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0886

CONTRIBUTION OF TRACHEAL PH IN THE EARLY DIAGNOSIS OF VENTILATOR-ASSOCIATED PNEUMONIA (VAP) - PRELIMINARY RESULTS

M. Ben Romdhane¹, A. Ben Souissi¹, M. Karoui¹, S. Kamoun¹, A. Riahi¹, W. Laaribi¹, M.S. Mebazaa¹

¹Mongi Slim Hospital, La Marsa, Anesthesiology and ICU, Sidi Daoued, Tunisia

INTRODUCTION. Pneumonia associated with mechanical ventilation is a leading cause of morbidity and mortality in ICU. In humans, the tracheal pH is slightly more acidic than plasma pH (1). The aim of this study is to assess the relationship between tracheal pH variability and the occurrence of VAP.

METHODS. A prospective observational study conducted in a medicosurgical ICU over a period of 60 days including 25 patients intubated within the first 48 h of admission. The pH was measured by test strips on samples of tracheal secretion aspirated from the tracheal intubation (T0) every day at a fixed time. In the mean time, we monitored parameters needed to calculate the "clinical pulmonary infection score" (CPIS). We also noted the bacteriological data including protected specimen brush (PSB). Patients were classified into two groups: VAP (+) and (-) based on the PSB and the CPIS. Statistical analysis was performed with SPSS-18.0 software: variables were expressed in effectives and %. VAP groups (+) and (-) were compared using the Chi Square test.

RESULTS. At T0, the tracheal pH was acid (pH < 7) in all patients except three who had inhaled (pH > 8). During the ICU stay, among these 25 patients, 13 developed a VAP (4 early and 6 later after day 5) with a CPIS > 6. Tracheal pH was alkaline among 11 patients. Of those patients who had developed VAP, 8 were already under probabilistic antibiotic-therapy - 2 for aspiration pneumonia and 4 for extrapulmonary sepsis. We noted the concomitant tracheal pH with the PSB and the corresponding CPIS:

- 8 PSB < 0: pH < 7,
- 10 PSB corresponding to a colonization: 3 with pH > 8 and 7 with pH < 7,
- 7 PSB > 0 and CPIS > 6: 6 with pH > 8 and 1 pH < 7.

DISCUSSION. By comparing these preliminary results with the literature, we discovered that the acid tracheal pH promotes the onset of pneumonia (2,3). The majority of infected patients with CPIS > 6 have an alkaline pH regardless of the time pneumonia was diagnosed and the preliminary antibiotic therapy. It is certain that our study has some limits:

- (1) the small number of patients studied,
- (2) the pH was not measured at the distal airways and may be influenced by local conditions, and
- (3) the measure itself was not performant (reactive strip).

Nevertheless, contradictory results found in the literature concerning such a topic requires the attention of clinicians and further research. Among nosocomial infections in ICU, VAP is probably one of the most severe pathologies increasing morbidity and mortality. This is requires a more exhaustive study for earlier diagnosis of VAP.

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0887

FINAL REPORT OF THE "PNEUMONIA ZERO" PROJECT

F. Alvarez-Lerma¹, M. Palomar², M. Sanchez Garcia³, L. Lorente⁴, F. Gordo⁵, J. Alvarez⁶, J.M. Anón⁷, R. Garcia⁸, R. Jam⁹, S. Arias¹⁰, M. Vazquez-Calatayud¹¹

¹Hospital del Mar, Parc de Salut Mar, ICU, Barcelona, Spain, ²Hospital Universitario Arnau de Vilanova, Lleida, Spain, ³Hospital Clínico San Carlos, Madrid, Spain, ⁴Hospital Universitario de Canarias, Santa Cruz de Tenerife, Spain, ⁵Hospital Universitario del Henares, Madrid, Spain, ⁶Hospital Universitario de Fuenlabrada, Madrid, Spain, ⁷Hospital Virgen de la Luz, Cuenca, Spain, ⁸Hospital Universitario de Basurto, Vizcaya, Spain, ⁹Hospital Parc Tauli, Sabadell, Spain, ¹⁰Hospital 12 de Octubre Universitario de Getafe, Madrid, Spain, ¹¹Clinica Universitaria de Navarra, Pamplona, Spain

INTRODUCTION. Pneumonias related to mechanical ventilation are the most frequent complications associated with invasive devices in the ICU. The presence of this complication has a high morbidity and mortality.

OBJETIVES. To assess the clinical impact of the implementation a set of preventive measures for mechanical ventilation-related pneumonia (MVP) in Spanish ICUs ("Pneumonia Zero" project).

METHODS. Prospective, intervention and multicentre study sponsored by the Spanish Ministry of Social Services and Equality and scientifically supported by the SEMICYUC and the SEEUC. For the development of the project, an assessor team was established, which identified 7 preventive measures of MVP whose fulfillment was compulsory and 3 non-compulsory highly recommendable measures. The ENVIN-ICU registry was used as the measurement instrument and the rate of MVP expressed as incidence density (ID) per 1000 days on mechanical ventilation (MV) as the evaluation measure. Cooperation of the Health Care Councils of the different Autonomous Communities, hospital managers as well as leaders and health care personnel of the Spanish ICUs participated actively in the implementation of the project, which took place between April 1st, 2011 and December 31st, 2012. Descriptive results month by month throughout the intervention period are presented.

RESULTS. During a period of more than 9 months, 210 ICUs participated in the study, with a total of 119,171 patients admitted to the ICU, in which MV was used for 555,752 days. In 93 (44.3 %) cases, ICUS belonged to hospitals of > 500 beds, in 86 (40.9 %) cases to hospitals of 200 to 500 beds and in 31 (14.8 %) cases to hospitals of < 200 beds. Also, in 151 (61.4 %) cases hospitals were university-affiliated and in 196 (93.3 %) belonged to public administrations. A total of 3533 episodes of MVP in 3197 patients were diagnosed. A progressive decrease of the ID-MVP from the second trimester of 2011 (8.35 episodes per 1000 days on MV) to the fourth trimester of 2012 (4.33 episodes per 1000 days on MV) was observed. The ID-MVP was higher in ICUs from hospitals of > 500 beds (6.68 episodes per 1000 days on MV) and lower in hospitals of 200-500 beds (5.52 episodes) and of < 200 beds (5.16 episodes). Also, the ID-MVP was higher in ICUs from teaching hospitals as compared with non-teaching centres (6.56 vs. 5.61 episodes per

1000 days on MV) and in ICUs from public hospitals as compared with private centres (6.37 vs. 6.02 episodes per 1000 days on MV). **CONCLUSIONS.** The implementation of a set of measures for preventing MVP included in the “Pneumonia Zero” project has been associated with a 48 % reduction of pneumonia related to assisted ventilation.

INSIGHTS INTO PATHOGENESIS OF AKI: 0890–0892

0890

A RE-AUDIT OF APPROPRIATE ANTIBIOTIC DOSING ACCORDING TO RENAL FUNCTION OR RENAL REPLACEMENT THERAPY IN CRITICAL CARE

K.D. Donnelly¹, K. Patel¹, J.J. Coleman², D. Westwood³, K. England¹

¹Queen Elizabeth Hospital, Anaesthetics & ICM, Birmingham, United Kingdom, ²Queen Elizabeth Hospital, Clinical Pharmacology, Birmingham, United Kingdom, ³Queen Elizabeth Hospital, Infomantics, Birmingham, United Kingdom

INTRODUCTION. A re-audit of antibiotic dosing over 1 year was conducted over the four critical care units at University Hospital Birmingham. The prescribed regimen of co-amoxiclav, meropenem, piperacillin/tazobactam (piptaz) and ciprofloxacin was compared to the recommended regimen according to the hospitals local prescribing guidelines, based on renal function and use of renal replacement therapy (RRT). The initial audit considered all prescriptions of 2009, using the unpublished prescribing guidelines as the standard. These guidelines were published on the hospital intranet one year after the initial audit.

OBJECTIVES. To determine adherence to local antibiotic prescribing protocol with respect to renal function and RRT during 2012.

METHODS. The same method as the initial audit was used. The electronic prescribing system was interrogated for all intravenous (i.v.) prescriptions of the antibiotics on the 4 critical care units in 2012. The dose, duration, number of administrations, patient’s eGFR, and use of RRT were recorded. One off prescriptions and records without a recent eGFR were discarded. A total of 3306 prescriptions were included. They were grouped by Unit and antibiotic, then further sub classified to renal function (normal, mild, moderate, severe, RRT).

RESULTS. Of the 3306 prescriptions 81.2 % (2687) were correct as per renal function and RRT.

The total number of prescriptions per antibiotic were as follows: co-Amoxiclav 1002 (97 % correct), piptaz 1104 (84 %), meropenem 984 (60 %) and ciprofloxacin 220 (93 %). Of note: meropenem was overdosed in 27 % of prescriptions; 20 % during mild renal impairment (median doses 15, range 0-96) and 4.3 % during RRT (14.5, 0-77). Underdosing occurred in 9.2 % with normal renal function (8, 0-94). Piptaz was underdosed in 14 %; 5 % normal renal function (4, 0-27) and 6.5 % mild impairment (4, 0-37). Ciprofloxacin was underdosed in 6.8 %; 5 % with normal renal function (3,1-12).

	Area 1	Area 2	Area 3	Area 4	Totals
Meropenem	244/429 = 56 %	155/226 = 68 %	101/131 = 76 %	91/198 = 46 %	591/984 = 60 %
Tazocin	367/435 = 84 %	161/188 = 85 %	137/155 = 88 %	254/322 = 79 %	919/1100 = 84 %
Ciprofloxacin	52/67 = 77 %	25/25 = 100 %	18/18 = 100 %	110/110 = 100 %	205/220 = 93 %
Co-amoxiclav	170/187 = 91 %	137/140 = 98 %	52/52 = 100 %	613/623 = 98 %	972/1002 = 97 %
Totals	833/1118 = 75 %	478/579 = 83 %	308/352 = 88 %	1068/1253 = 85 %	

[Table 1]

CONCLUSIONS. In comparison to the previous audit(1), dosage errors have increased across all units despite the publication of prescribing guidelines. Piptaz was again frequently underdosed across all four units, particularly in those with no or mild renal impairment. Sub optimal treatment is possible. Overdosing was again common with meropenem across all four units, and particularly in those with mild renal impairment. Whilst higher peak levels may be advantageous (2), the significance of dose dependent side effects must be considered.

The integration of prescribing advice based upon renal function and RRT to the electronic system may reduce errors.

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0891

EARLY TUBULAR CELLULAR STRESS DETECTED BY URINARY BIOMARKERS TIMP-2 AND IGFBP7 IS ASSOCIATED WITH INCREASED 28-DAYS MORTALITY

I. Gocze¹, F. Zeman², M.H. Dahlke¹, H.J. Schlitt¹, J.A. Kellum³, T. Bein¹

¹University Hospital Regensburg, Department of Surgery, Regensburg, Germany, ²University Medical Center Regensburg, Center for Clinical Studies, Regensburg, Germany, ³University of Pittsburgh, Center for Critical Care Nephrology and CRISMA Center, Department of Critical Care, Pittsburgh, United States

INTRODUCTION. Cell-cycle arrest proteins TIMP-2 and IGFBP7 (tissue inhibitor of metalloproteinase 2 and insulin-like growth factor-binding protein 7) are markers of cellular stress and damage in the early phase of tubular injury. Combined analysis of these biomarkers allows the identification of patients at high risk for moderate to severe acute kidney injury (AKI) (KDIGO stage 2 and 3). However, the performance of this test in the very early phase (4-6 h) after a potential kidney injury, as well as the potency to combine its results with standard bedside clinical measurements; to predict different severities of AKI (including and excluding stage 1); to signal early use (< 48 h) of renal replacement therapy (RRT) and to predict 28-days mortality, have not been previously reported.

OBJECTIVES. We evaluated the association of early structural cellular stress and damage detected through elevated biomarkers [TIMP-2] x [IGFBP7] > 0.3 ng/l²/1000 with

increased risk of AKI, use of RRT and its association with short-term mortality in surgical critically ill patients.

METHODS. In this prospective study, urinary [TIMP-2] x [IGFBP7] was measured 4-6 h after admission. Clinical bedside variables such as norepinephrine dosing, mean arterial pressure, hemoglobin level, cumulative fluid balance and urine output were evaluated and logistic regression models of risk assessment with and without the [TIMP-2] x [IGFBP7] test were calculated.

RESULTS. A total of 120 patients were included in the study. In a multivariable regression model, addition of [TIMP-2] x [IGFBP7] to real time bedside clinical parameters significantly improved the ability to predict risk for AKI where the area under receiving operating curve (AUC) 0.79 (95 %CI 0.71,0.88) increased to AUC 0.85 (95 %CI 0.78,0.92), p < 0.001 and risk for use of RRT with AUC 0.88 (95 % 0.76,1.00) improving to AUC 0.89 (95 %CI 0.79,1.00), p = 0.009. The [TIMP-2] x [IGFBP7] test was the strongest predictor of AKI and use of RRT. Moreover, [TIMP-2] x [IGFBP7] > 0.3 was significantly associated with increased 28-day mortality (p = 0.014) in the multivariable model, although the test remained primarily an AKI risk assessment tool (median [TIMP-2] x [IGFBP7] value for patients dying prior to 28-days was lower than median value for those developing AKI stage 2-3 or for those receiving RRT).

CONCLUSIONS. In general surgical patients, application of the [TIMP-2] x [IGFBP7] test obtained 4-6 h after admission, significantly improved early detection of risk of AKI and use of RRT in the clinical daily routine. Early cellular damage is associated with an increased risk for 28-days mortality, highlighting the importance of early structural biomarker assessment in future evaluation of AKI.

0892

MICROPARTICLE-BOUND ENDOGLIN (CD105-MPS) IS ASSOCIATED WITH ACUTE RENAL FAILURE DURING SEPTIC SHOCK

X. Delabranche^{1,2}, J. Boisramé-Helms^{1,2}, L. Stiel¹, P. Asfar³, Y. Mootien⁴, A. Monnier¹, T. Lavigne⁵, F. Toti⁶, F. Mezian^{1,2}

¹Hôpitaux Universitaires de Strasbourg, Service de Réanimation Médicale, Strasbourg, France, ²Université de Strasbourg, EA3072 - Fédération de Médecine Translationnelle, Strasbourg, France, ³CHU Angers, Service de Réanimation Médicale et Médecine Hyperbare, Angers, France, ⁴Centre Hospitalier de Mulhouse, Service de Réanimation Médicale, Mulhouse, France, ⁵Université de Strasbourg, EA4438, Strasbourg, France, ⁶Université de Strasbourg, UMR 7213 - CNRS, Illkirch-Grattenfaden, France

INTRODUCTION. Acute kidney injury (AKI) and renal failure (ARF) are common features during septic shock but their pathogenesis remains debated. Macrovascular impairment has been evoked, but hypotension is not required nor sufficient to induce AKI. Mitochondrial activation and energy-sparing adaptation to injury is emerging to unify sepsis-induced AKI¹. Endoglin (CD105) is rapidly expressed during hypoxia to favor neoangiogenesis². CD105 could be a marker of hypoxia-induced AKI.

OBJECTIVES. We look at circulating microparticle-bound endoglin (CD105-MPs) as a marker of ARF during septic shock. Microparticles (MPs) are sub-micron plasma membrane fragments released from stressed cells that expose procoagulant phosphatidylserine (PhtdSer).

METHODS. 100 patients with septic shock were enrolled in 3 medical ICUs. To assess cellular injuries, total microparticles (PhtdSer-MPs), CD31-MPs and CD105-MPs (endothelial cells) and CD11a-MPs (leucocytes), were quantified by prothrombinase assay at admission (D1), and at D3. Soluble (s)E-selectin, sP-selectin, platelet glycoprotein V (sGPV), routine hemostasis and prothrombin fragments 1 + 2 (F1 + 2) were quantified by ELISA. AKI and ARF were according RIFLE stratification. Attending physician initiates renal replacement therapy (RRT) when required. Repeated measures were analysed with ANOVA, linear mixed model and two-way ANOVA with post hoc analysis when recommended. (NTC #01604551)

RESULTS. 92 patients were investigated. Patients were divided in three groups: (1) no ARF, n = 39; (2a) ARF without RRT, n = 19 and (2b) ARF requiring RRT, n = 35. SAPS2 and SOFA were higher (p < 0.05) in (2b) vs. (1) and (2a): 67 ± 18, 51 ± 14, 54 ± 19 and 11.6 ± 2.6, 8.7 ± 2.4, 9.3 ± 3.3 respectively. Coagulation activation was obvious in patients (2b), with increased F1 + 2: 733 ± 435, 485 ± 401, 588 ± 457 μmol/L [70-230], higher ISTH score and DIC diagnosis (%): 4.8 ± 1.3 (63 %), 3.6 ± 1.0 (16 %), 4.1 ± 1.1 (37 %). Total MPs were increased in the same proportion in the three groups, as CD31-MPs (apoptosis). Nevertheless, a specific pattern could be evidenced during ARF not only on endothelial cell injury markers (elevated CD105-MPs and sE-selectin) but also on leucocyte (CD11a-MPs) and platelet (sP-selectin and sGPV) activation. Cytokines were dramatically increased during ARF. RRT induces increased platelet activation with thrombocytopenia at D3 while generated thrombin (F1 + 2) was in the range. On the other hand, RRT was unable to lower CD105-MPs, CD11a-MPs and sE-selectin between groups (2a) and (2b).

CONCLUSION. In our cohort, ARF was associated with increased hemostasis activation but also cell activation (CD105-MPs, sE-selectin, and in a lesser extend CD11a-MPs). There is a strong association between cellular activation, hemostasis and ARF arguing for a cytopathological rather than a hemodynamic injury.

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What’s new in sepsis and infection?: 0898–0902

0898

IN PATIENTS WITH SEVERE SEPSIS MICROPARTICLE PROFILES DIFFER ACCORDING TO THE SOURCE OF INFECTION

H. Lashin¹, S. Nadkarni¹, C. Hinds¹, M. Perretti¹

¹Queen Mary, University of London, William Harvey Research Institute, London, United Kingdom

INTRODUCTION. Microparticles (MP) are small, protein containing vesicles shed from cells upon activation that are being evaluated as possible novel biomarkers in severe sepsis (SS). Many studies have investigated MP originating from different cells with inconsistent and sometimes conflicting results.

OBJECTIVES. To quantify and characterise MP subsets according to their cells of origin in two well-defined cohorts of patients with SS [community acquired pneumonia (CAP) and faecal peritonitis (FP)].

METHODS. Patients were recruited to the UK Genomic Advances in Sepsis (GAINs) study. Plasma samples collected from patients with CAP or FP during the first 24 h

following admission to ICU were analysed. MP were measured in platelet free plasma (prepared by differential centrifugation) using flow-cytometry following staining with monoclonal antibodies (granulocytes MP CD66b+, monocytes MP CD14+, lymphocytes MP CD3+, platelets MP CD41+, erythrocytes MP CD235+, endothelium MP CD51+) and Annexin V (to identify MPs).

RESULTS. Sixty CAP and 20 FP patients were studied. Their mean age (\pm SD) was 65 (\pm 16.3) and 71 (\pm 12.3) years respectively (NS). Females constituted 39% and 50% of the CAP and FP cohorts, respectively (NS). SOFA [median (range) 8(2-17) vs. 7(1-12)] and APACHE II scores [18(7-34) vs. 18(8-35)] were similar between CAP and FP patients, respectively. Comorbidities were also similar between both groups. There was no significant difference in granulocyte count [median (range): 11.55(0.34-59.7) $\times 10^9/L$ vs. 8.48(1.34-30.34) $\times 10^9/L$], lymphocyte count [0.6(0-2.4) $\times 10^9/L$ vs. 0.56(0.16-1.88) $\times 10^9/L$], monocyte count [0.55(0-2.7) $\times 10^9/L$ vs. 0.56(0.02-1.98) $\times 10^9/L$] or platelets count [191(13-617) $\times 10^9/L$ vs. 163(12-567) $\times 10^9/L$] between CAP and FP patients.

When compared to FP patients those with CAP had significantly higher counts of AV+/CD66b+ MP (119 \pm 21/ μ l vs. 64 \pm 123/ μ l, $p = 0.02$), AV+/CD14+ MP (367 \pm 67/ μ l vs. 22 \pm 12/ μ l, $p < 0.0001$) and AV+/CD3+ MP (216 \pm 42/ μ l vs. 44 \pm 14/ μ l, $p = 0.0004$). The counts for AV+/CD41+ MP (7235 \pm 1473/ μ l vs. 4039 \pm 1832/ μ l), AV+/CD235+ MP (668 \pm 221/ μ l vs. 208 \pm 57/ μ l) and AV+/CD51+ MP (280 \pm 49/ μ l vs. 240 \pm 42/ μ l) were not significantly higher in CAP patients than in those with FP (Figure 1).

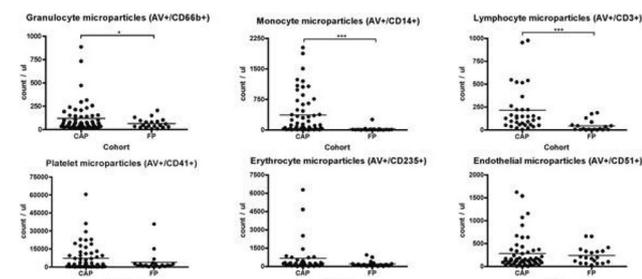


Figure 1. Microparticle subsets according to cells of origin in community acquired pneumonia (CAP) and faecal peritonitis (FP) severe sepsis patients. * $p < 0.05$. *** $p < 0.001$.

CONCLUSION. Counts for granulocyte-, monocyte- and lymphocyte-derived MP were significantly higher in patients with SS due to CAP than in those with FP. These observations suggest that in SS the pathophysiological mechanisms may differ according to the source of infection, highlighting the importance of studying more homogeneous patient cohorts.

GRANT ACKNOWLEDGEMENT. HCA international

0899

PERFORMANCE OF NEW HIGH PERFORMANCE DRESSINGS AS COMPARED TO TRADITIONAL ONES IN PREVENTION INFECTION AND NON INFECTION COMPLICATIONS OF CATHETERS IN ICU: A RANDOMIZED CONTROLLED STUDY

S. Calvino Gunther¹, M. Chautemps², C. Schwebel², E. Sengel², S. Ruckly³, M.-R. Djaguidi⁴, A. Vésin⁵, J.-F. Timsit^{1,5}

¹University Grenoble 1 - University Hospital A Michallon, Medical ICU, Grenoble, France,

²Université de Grenoble, Joseph Fourier, Medical ICU, Grenoble, France, ³Université de Grenoble, Joseph Fourier, Inserm U 823/Outcomerea Study Group, Grenoble, France,

⁴University Hospital-Inserm U 823, Grenoble, France, ⁵Université Paris Diderot/APHU-Hopital Bichat, Inserm UMR 1137 IAME Team 5 Decision Sciences in Infectious Diseases, Paris, France

INTRODUCTION. In ICUs, it is essential to maintain a high quality intravascular access. Despite its benefits, it also exposes patients to serious complications, such as infectious complications (colonization and infection) and mechanical complications (dysfunction, thrombosis, extravasation, accidental removal).

OBJECTIVES. The ADVANCED Study aimed to determine whether the use of a new generation transparent dressing (3 M™ IV Advanced), compared to 3 M™ HP Dressing and to Smith and Nephew's IV3000™, could help reduce post-insertion complications on ICU's most used intravascular access: central venous catheters (CVC), arterial catheter (AC), dialysis catheter (DC), pulmonary arterial catheter (PAC) and peripheral catheters (PC). Secondary endpoints included mean number of complications per patient, time of occurrence, life span of catheters, number of disrupted dressings and tolerance.

METHODS. All patients > 18yo with an expected length of stay of 48 h in the ICU and at least one of the study catheter's placed inside the ICU, were randomized into two groups, depending on the type of dressing available for the control group: 3 M™ IV Advanced vs control dressings. between oct 2012 and Feb 2013 the control dressing was 3 M™ HP Dressing, between Feb 2013 and Oct 2013 the comparator was Smith & Nephew IV3000™. Complications were reviewed by an independent group of experts, not aware of the randomization group; who were also in charge of validating their gradation.

RESULTS. We included and evaluated 629 patients, 2221 catheters (875 PC, 632 CVC, 514 AC and 200 DC and PAC) and 5562 dressings. The overall incidence density of complications was 5/1000 catheter days. Complication rate was not different between groups. At least one minor complication occurred in 20% vs 16.5% in the period 1 (RR = 1.2, $p = 0.35$) and in 25.5 vs 26.6% in the period 2 (RR = 0.95, $p = 0.65$). Dysfunction was the most common complication leading to catheter early removal, specially on AC (28.8%), DC (21%) or PC (19.6%). Colonization rates ranged from 12% for DC, to 7% for AC and CVC, whereas thrombosis rates were lower (5% for DC < 1% for AC and CVC). The severity of these complications was very variable, depending on the impact on patients.

CONCLUSIONS. 3 M™ IV Advanced was well tolerated and associated with a similar complication and disruption rate as control dressings (2.2 vs 2.1 in mean, RR = 1.04, $P = 0.19$). The ADVANCED Study is the first one to evaluate the overall rate of catheter related complication in ICU, and the on-going analyses about the risk factors of dressing disruption and of complications should help us to improve efficacy in catheter management and quality of care.

GRANT ACKNOWLEDGMENT. unrestricted research grant from 3 M

0901

CLINICAL SIGNIFICANCE OF PERIPHERAL VEIN OXYGEN SATURATION IN PATIENTS WITH SEVERE SEPSIS OR SEPTIC SHOCK AFTER INITIAL RESUSCITATION

H. Chung¹, J.H. Lee¹, K. Kim¹, Y.H. Jo¹, J.K. Kim¹

¹Seoul National University Bundang Hospital, Department of Emergency Medicine, Sungnam-si, Republic of Korea

INTRODUCTION. The pathophysiology of severe sepsis or septic shock is related to an imbalance between systemic O₂ delivery and consumption. ScvO₂ can reflect balance between systemic O₂ delivery and consumption. However C-line placement is one of the most time-consuming procedure for protocol-guided resuscitation of septic patients. And during initial shock states, O₂ consumption depends on O₂ supply and overall balance may be similar in each part of body. Thus, it can be extrapolated that systemic balance between O₂ delivery and consumption by ScvO₂ can be estimated by regional balance by SpvO₂ from peripheral venous blood sampling.

OBJECTIVES. To evaluate the clinical significance of SpvO₂ and to compare the correlation and agreement between SpvO₂ and ScvO₂ in severe sepsis or septic shock.

METHODS. This study was a prospective observational study in patients who visited ED and diagnosed as severe sepsis or septic shock from Mar. 1, 2009 to Sep. 30, 2012. Initial management was according to "Surviving sepsis campaign: 2008". The outcome was 28-day mortality. The blood sample for gas analysis was obtained at initial ScvO₂ sampling time and at 6 h after initial resuscitation. Peripheral venous blood for SpvO₂ was obtained from radial artery or dorsalis pedis artery within 30 min of central venous blood sampling for ScvO₂.

RESULTS. From 380 eligible patients, 241 patients were finally included. The overall 28-day mortality was 17.0%. Baseline ScvO₂ and SpvO₂ values were not significantly different between survivors and non-survivors. After 6-hr management, SpvO₂ were significantly lower in non-survivors than survivors. But, ScvO₂ was not significantly different between groups. In survivor group, correlation between ScvO₂ and SpvO₂ was significant at initial and after 6-hour resuscitation (Spearman $r = 0.290$, $p < 0.001$;

Spearman $r = 0.307$, $p < 0.001$, respectively). However, in non-survivor group, correlation was not significant (Spearman $r = 0.172$, $p = 0.315$ at baseline; Spearman $r = 0.136$, $p = 0.397$ at 6-hr resuscitation). Initial lactate values were significantly correlated with SpvO₂ at baseline (Spearman $r = -0.199$, $p = 0.004$) but not with ScvO₂ (Spearman $r = -0.054$, $p = 0.445$). After 6-hr resuscitation, blood lactate values were significantly correlated with SpvO₂ but not with ScvO₂ (lactate vs SpvO₂, Pearson $r = -0.437$, $p < 0.001$; lactate vs ScvO₂, Pearson $r = -0.028$, $p = 0.6934$, respectively). Mortality rate was significantly higher in SpvO₂ < 70% group than in SpvO₂ > 70% group without reference to ScvO₂ values. And Patients who had ScvO₂ > 70% and SpvO₂ > 70% were significantly higher survival times during 28-day follow-up period.

CONCLUSIONS. Agreement between SpvO₂ and ScvO₂ were poor and SpvO₂ was not correlated with ScvO₂ especially in non-survivor group. However, SpvO₂ values were significantly correlated with lactate values and the achievement of SpvO₂ > 70% during initial resuscitation showed significantly lower 28-day mortality without reference to ScvO₂.

0902

MEROPENEM AND PIPERACILLIN CONCENTRATIONS IN ICU PATIENTS TREATED WITH CONTINUOUS RENAL REPLACEMENT THERAPY

J. Petersson^{1,2}, C.G. Giske³, E. Eliasson⁴

¹Karolinska University Hospital Solna, Dept. of Anesthesiology and Intensive Care, Stockholm, Sweden,

²Karolinska Institutet, Section of Anesthesiology and Intensive Care Medicine, Dept. of Physiology and Pharmacology, Stockholm, Sweden,

³Karolinska Institutet, Karolinska University Hospital, Clinical Microbiology, Dept. of Microbiology, Tumor and Cell Biology (MTC), Stockholm, Sweden,

⁴Karolinska University Hospital Huddinge, Division of Clinical Pharmacology, Dept. of Laboratory Medicine, Stockholm, Sweden

INTRODUCTION. Higher than traditional serum concentration targets have been suggested to improve clinical outcome for critical care patients treated with beta-lactam antibiotics. Previous studies have questioned beta-lactam dosing recommendations for critical care patients treated with continuous renal replacement therapy (CRRT).

OBJECTIVES. To evaluate serum concentrations obtained with standard doses of meropenem and piperacillin in ICU patients treated with CRRT.

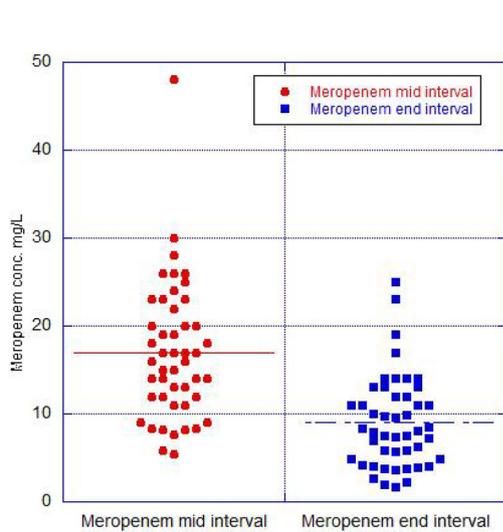
METHODS. This is a single center observational study of patients treated with meropenem or piperacillin-tazobactam and CRRT. For these patients serum concentrations were measured as a clinical routine. Repeated measurements were recommended after major changes in antibiotic or CRRT regimes. Paired serum samples were obtained at 50% and 100% of the dosing interval. Concentrations of the antibiotics were determined by LC-MS according to quality-assured routine methods in the hospital pharmacology laboratory. Unbound piperacillin concentration was calculated assuming a protein binding of 20%, meropenem protein binding was considered negligible. Serum concentrations was compared with the susceptibility breakpoints (MIC) for *Pseudomonas aeruginosa*, 2.0 and 16.0 mg/L for meropenem and piperacillin respectively. The comparisons are reported as the percentage of all sampling occasions with a concentration below the breakpoint at the mid and end of the dosing interval and below four times the breakpoint at the end of the dosing interval. A beta-lactam concentration above the breakpoint at the mid of the dosing interval is considered as a traditional target. Linear regression was used to correlate effluent CRRT flow corrected for predilution with measured concentrations and terminal concentration half-time.

RESULTS.

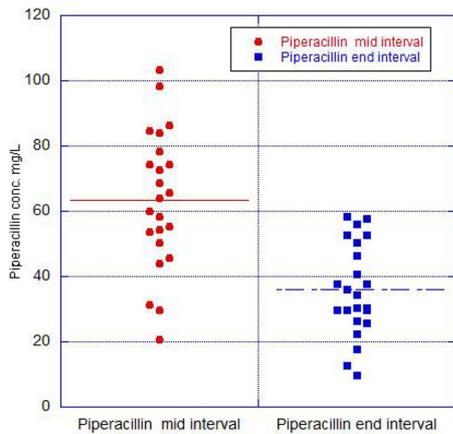
47 and 23 paired samples were analyzed from 38 and 19 patients treated with meropenem 1 g q8 h and piperacillin 4 g q8 h respectively. Meropenem concentrations were (mean \pm standard deviation) 17.0 \pm 7.8 and 9.0 \pm 5.2 mg/L at the mid and end of the dosing interval respectively. For piperacillin the concentrations were 63.4 \pm 21.3 and 35.9 \pm 14.2 mg/L. Effluent CRRT flow were (mean \pm standard deviation), 2.6 \pm 0.7 L/h for both antibiotics. Linear regression demonstrated a weak ($R^2 = 0.11$) but statistically significant ($P < 0.05$) correlation between effluent CRRT flow and meropenem concentration at the end of the interval, for all other comparisons the correlation was not statistically significant.

	% measurements < 1xMIC at mid of dosing interval	% measurements < 1xMIC at end of dosing interval	% measurements < 4xMIC at end of dosing interval
Meropenem	0 %	4.3 %	48.9 %
Piperacillin	0 %	8.7 %	100 %

MIC (minimal inhibitory concentration) refers to the susceptibility breakpoint for *Pseudomonas aeruginosa*.



[Meropenem]



[Piperacillin]

CONCLUSIONS. Among ICU patients treated with CRRT, standard doses of meropenem and piperacillin results in serum concentrations consistent with traditional concentration targets but fail to reach higher targets in many patients. Our result suggest that standard doses of meropenem and piperacillin can be used when CRRT dosages are comparable to those in the current study.

Severity assessment: 0903–0907

0903

LONG TERM CHANGES IN DYSNATREMIA INCIDENCE IN THE ICU. A SWITCH FROM HYPONATREMIA TO HYPERNATREMIA

A. Oude Lansink¹, E.J. Hoom², M.W. Nijsten¹

¹UMC Groningen, ICU, Groningen, Netherlands, ²Erasmus Medical Center, Internal Medicine, Rotterdam, Netherlands

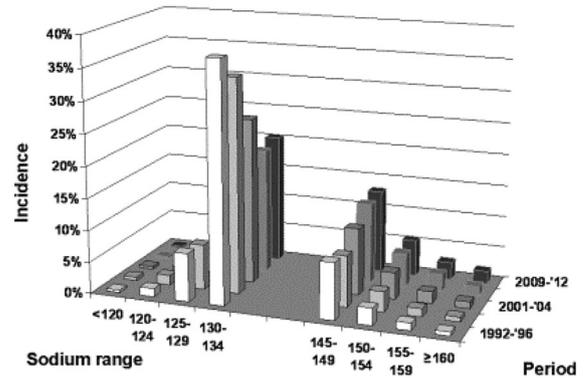
INTRODUCTION. Dysnatremias (hyponatremia and hypernatremia) are common during treatment of patients in the intensive care unit (ICU). Patients are at high risk of developing sodium disturbances during ICU stay because of the incapacitation, lack of free access to water and the treatment given for their critical illness. Both ICU-acquired dysnatremias and those present at ICU admission are associated with increased in-hospital mortality¹. Since therapeutic strategies that may affect dysnatremia incidence have changed considerably, the epidemiology of dysnatremia may also have changed.

OBJECTIVES. We studied the temporal changes over the past two decades in the incidence of dysnatremia on ICU admission or acquired during ICU stay. We also related these states with outcome.

METHODS. This retrospective study was performed in ICU patients from two university teaching hospitals located in different regions in the Netherlands. All adult patients were considered eligible for inclusion. Of all patients admitted during the study period (1992–2012) all sodium measurements were collected. Hyponatremia was defined as $[Na^+] < 135 \text{ mmol}\cdot\text{L}^{-1}$ and hypernatremia as $[Na^+] \geq 145 \text{ mmol}\cdot\text{L}^{-1}$. Survival was determined at 1 year after ICU-admission.

RESULTS. For the two centers studied, 46,407 consecutively admitted ICU patients were included. The 21-year study period was divided into five contiguous periods: 1992–1996, 1997–2000, 2001–2004, 2005–2008, 2009–2012. In this cohort of ICU patients we observed a clear shift in the incidence of ICU-acquired dysnatremias. The incidence of hyponatremia nearly halved (from 47 % to 25 %; $P < 0.001$) over the study period whereas the incidence of hypernatremia nearly doubled (from 13 % to 24 %; $P < 0.001$). This trend was evident for both mild and severe hyponatremia and hypernatremia. Note that for clarity the incidences of normonatremia are not shown in Fig. 1.

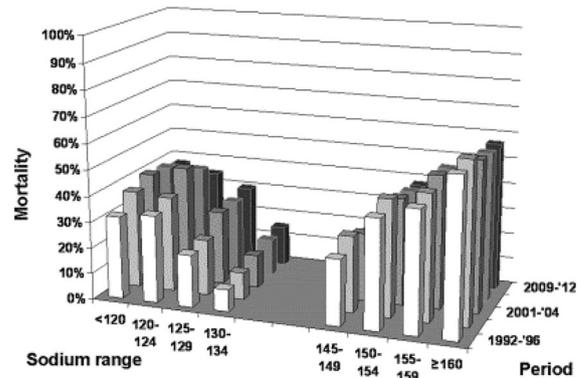
Changes in dysnatremia in two ICUs over 21 years



[Fig. 1: Changes in dysnatremia over two decades]

Most dysnatremias developed after ICU admission. Dysnatremia was strongly associated with mortality. The relation between hyponatremia and mortality and the relation between hypernatremia and mortality both remained largely unchanged (Fig. 2) over the 21-year observation period. For the normonatremic patients (not shown in Fig 2) the mortality rate also showed a marginal change from 1992-'96 to 2009-'12 from 7.5 % to 7.2 %.

Mortality risk of hyponatremia and hypernatremia



[Fig 2: Dysnatremia and mortality over two decades]

CONCLUSIONS. In a large cohort of patients from two ICUs we could demonstrate a shift in the incidence of dysnatremias. For hyponatremia the incidence decreased, and for hypernatremia the incidence increased over the study period. The observed shift strongly suggests changes in therapeutic strategy as underlying causes, especially since dysnatremia is mostly ICU-acquired.

Potential iatrogenic causes include the increased use of relatively hypertonic infusion fluids and increased use of hydrocortisone.

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0904

CAN STRONG ION DIFFERENCE-WITHOUT LACTATE (SID_{WL}) BE USED AS A PROGNOSTIC INDICATOR FOR MORTALITY AT THE INTENSIVE CARE UNIT ADMISSION?

B. Gucyetmez¹, H.K. Atalan², A. Ogan¹, A. Cimet Ayyildiz¹, B. Yalcin Guder¹, S. Cobanoglu³, N. Cakar⁴, L. Telci⁴

¹International Hospital, Intensive Care Unit, Istanbul, Turkey, ²Atasehir Memorial Hospital, Intensive Care Unit, Istanbul, Turkey, ³International Hospital, Cardiovascular Surgery, Istanbul, Turkey, ⁴Istanbul University Medical Faculty, Anesthesiology and Reanimation, Istanbul, Turkey

INTRODUCTION. According to Stewart's approach, the 3 independent variables determining the pH value of the blood are pCO₂, SID and total weak acid⁽¹⁾. Apparent strong ion difference (SID_A) is found to be related to the mortality of critically ill patients and its normal value is accepted to be $39 \pm 1 \text{ mmol/L}$ ⁽²⁾. In order to prevent the misinterpretation of hyperlactatemia in acid–base balance, SID_{WL} calculation is recommended⁽³⁾.

OBJECTIVES. The objective of this study is to research whether there is any prognostic relation between the SID_{WL} values at the intensive care unit admission and the mortality.

METHODS. In our two-centered study, 2691 patients being admitted to the intensive care unit between 2006 and 2013 were retrospectively evaluated and 1069 of them were included in the study. The patients were divided into 3 groups as low SID_{WL} ($< 38 \text{ mmol/L}$), normal SID_{WL} ($\geq 38 \text{ mmol/L} - \leq 40 \text{ mmol/L}$) and high SID_{WL} ($> 40 \text{ mmol/L}$); and 4 groups in accordance with lactate levels as LacG1 ($< 2 \text{ mmol/L}$), LacG2 ($\geq 2 \text{ mmol/L} - \leq 5 \text{ mmol/L}$), LacG3 ($> 5 \text{ mmol/L} - < 10 \text{ mmol/L}$) and LacG4 ($> 10 \text{ mmol/L}$). The patients' age, gender, diagnosis, APACHE II score, pH, PaCO₂, HCO₃⁻, standard base excess (SBE), base excess-chloride (BE_{Cl}), Na⁺, Ca²⁺, Cl⁻, lactate, SID_{WL}, anion gap (AG) values, length of stay in intensive care unit and mortality have been recorded.

RESULTS. 1069 patients have been categorized as low SID_{WL} (768, 71.8 %), normal SID_{WL} (127, 11.9 %) and high SID_{WL} (174, 16.2 %). In the low SID_{WL} group, Cl⁻ value is higher and Na⁺ value is lower than normal SID_{WL} group. In the high SID_{WL} group, Cl⁻ value is lower while there is no difference in Na⁺ values when compared to normal SID_{WL}.

group. In the univariate analysis, low SID_{WL} and high SID_{WL} have increased mortality as 2.17 fold(1.1-4.25) and 2.54 fold(1.19-5.39) respectively ($p = 0.025$ and $p = 0.015$). In the multivariate regression model, low SID_{WL} and high SID_{WL} have increased mortality as 1.94 fold(0.95-3.95) and 3.18 fold(1.41-7.16) respectively. The increase in mortality with high SID_{WL} is statistically significant ($p = 0.068$ and $p = 0.003$). While $PaCO_2$ increases mortality 1.02 fold (1.03-1.04); lactate levels higher than 2 mmol/L increases mortality 2.95 fold (2-4.36) ($p < 0.001$ for both). While SID_A and SBE decrease significantly, there is no difference in SID_{WL} and BE_{CI} values in LacG1, LacG2 and LacG3 groups. SID_{WL} increases and BE_{CI} positively increases significantly when the lactate level is higher than 10 mmol/L ($p = 0.005$ $p = 0.003$).

CONCLUSIONS. SID_{WL} values calculated at the intensive care unit admission can be used as prognostic indicators for mortality independently of the lactate level. SID_{WL} and BE_{CI} can show the effect of the strong ion difference on metabolic acid-base balance more clearly and contribute to the treatment method.

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0905
INFLUENCE OF HOSPITAL BED DESIGN ON PATIENT MIGRATION

K. Davis¹, S. Kotowski¹, M. Coombs¹, S. Meyer¹

¹University of Cincinnati, Cincinnati, United States

INTRODUCTION. Maintaining proper patient position in bed has benefits for both patients and caregivers. For the patient, migration (e.g., sliding toward the foot of the bed) causes friction and shear forces which are risk factors for pressure ulcers¹. Additionally, some Head of Bed (HOB) articulation designs compress the patient's torso when elevated, which may reduce lung expansion volume. For the caregiver, repositioning patients who have migrated down in bed is a risk factor for low back injury².

OBJECTIVE. To determine patient migration and torso compression during HOB articulations on three ICU bed designs.

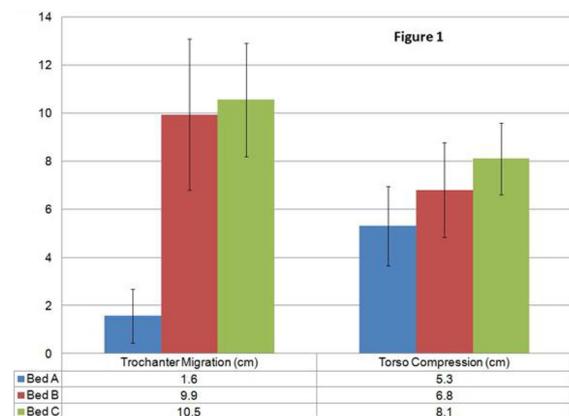
METHODS. Six males and six females lay supine in bed while the head section was articulated from flat to 45° to flat with five repetitions (12 subjects X 3 beds X 5 reps = 180 trials). Three ICU beds with different HOB articulation designs from three manufacturers were tested. In Bed A, as the HOB was raised the head section pivot slid backward while the head section simultaneously extended in length. In Bed B, the head section did not lengthen and the pivot did not slide. In Bed C, the head section did not lengthen and pivoted at two hinge points that did not slide. Using previously reported methods³, a motion capture system measured changes in body position relative to the bed frame as a result of articulating the HOB to 45°. Outcome variables were: 1) trochanter migration distance, the relative change in distance at the end of trial compared to beginning, and 2) torso compression, the change in distance between the shoulder and trochanter. Repeated ANOVA ($\alpha = 0.05$) tested for significant effects with Tukey tests identifying sources of differences.

RESULTS. Bed A resulted in 85 % less patient migration and 34 % less torso compression compared to Bed C (Figure 1). Means for trochanter migration during flat to 45° HOB articulation were Bed A: 1.6 cm, Bed B: 9.9 cm or Bed C: 10.5 cm, with Bed A being significantly less than Beds B and C. Torso compression was also significantly lower for Bed A than Beds B and C (Bed A: 5.3 cm, Bed B: 6.8 cm, Bed C: 8.1 cm).

CONCLUSIONS. Critical care beds with fixed pivots and head sections that do not lengthen appear to result in more patient migration and torso compression. Reduced migration and compression on Bed A suggests that its articulation accommodated the natural elongation of the patient as the patient bends at the hip. Optimal bed design should minimize patient migration and torso compression, which may lead to clinically significant reductions in health risks to patients and caregivers.

REFERENCES. ¹ Byrne DW, Salzberg CA, 1996, *Spinal Cord*, 34, 5, 255-263. ² Hignett S, 1996, *Journal of Advanced Nursing*, 23, 1238-1246. ³ Kotowski SE, Davis KG, Wiggemann N, Williamson R, 2010, *Human Factors*, 55, 36-47.

GRANT ACKNOWLEDGEMENT: Partial funding for the study was provided by Hill-Rom, Inc.



[Figure 1 Patient Migration]

0906
IMPACT OF BODY MASS INDEX, PERFORMANCE STATUS, COMORBIDITIES AND THEIR INTERPLAY ON THE SHORT TERM PROGNOSIS OF MEDICAL ADMISSIONS TO THE ICU

F.G. Zampieri^{1,2}, F. Colombari¹

¹Hospital Alemão Oswaldo Cruz, Intensive Care Unit, São Paulo, Brazil, ²Universidade de São Paulo, Faculdade de Medicina, Disciplina de Emergências Clínicas, São Paulo, Brazil

INTRODUCTION. Body mass index (BMI) appears to be related to outcome of critically ill patients in a complex way, with reports of reduced mortality in obese patients. It is unclear if

the so-called “obesity paradox” is due to a protective effect of obesity *per se* or is a consequence of the confounding effect of previous performance status (PS) and comorbidities.

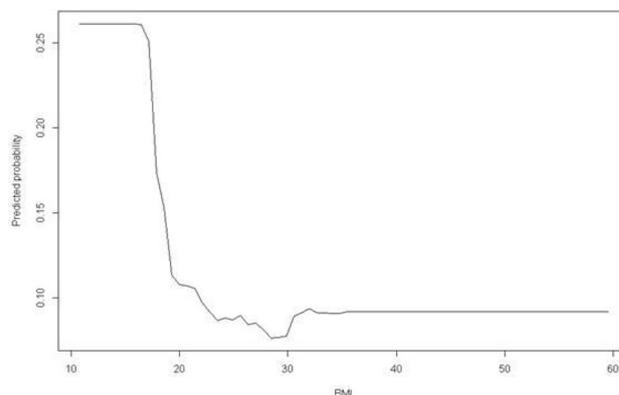
OBJECTIVES. To evaluate the impact of BMI, PS, comorbidities and their interplay on the short term prognosis (hospital mortality) of non-surgical patients admitted to the intensive care unit (ICU).

METHODS. Retrospective analysis of prospective collected data during a two year-period (01/11 through 12/13) in an ICU in Brazil. Severity of illness was measured through SAPS3. PS was categorized as 0 (fully independent), 1 (dependent for at least one basic daily activity) or 2 (fully dependent). Comorbidities were measured through Charlson Comorbidity Index - CCI. Two statistical analyses were performed: (1) Logistic regression and (2) Generalized boosted regression model (GBM). GBM was performed with 10,000 validation trees, 5 cross-validation. Up to four ways interactions were allowed. PS and BMI were included as continuous variables in both analyses. For logistic regression, BMI was additionally categorized according to BMI in underweight (< 18.5), normal (18.5-24.9), overweight (25-29.9), obese (30-34.9) and very obese (> 35) in a secondary exploration. **RESULTS.** 2007 patients were included in the analysis. 345 patients died during hospital stay. SAPS3, BMI, PS and CCI were associated with mortality on univariate analysis (Table 1)

	All patients (n = 2007)	Survivors (n = 1662)	Non-survivors (n = 345)	p
SAPS3, points [IQ]	52[44,61]	50[42,57]	68[58,80]	<0.001
BMI, kg/m ²	25.5[22.5,29.1]	25.8[22.8,29.3]	24.3[21.1,28]	<0.001
CCI, n [IQ]	1[0,3]	1[0,3]	3[1,6]	<0.001
PS, n (%)				<0.001
0	1226(61)	1098(66)	128(37)	
1	557(28)	421(25)	136(40)	
2	224(11)	143(9)	81(23)	

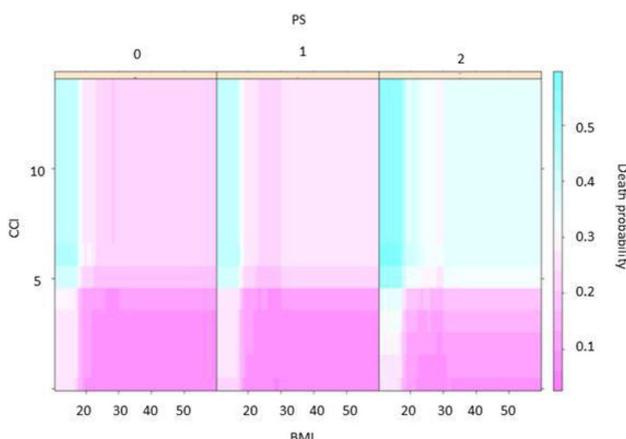
[Table 1]

Logistic regression odds ratio and 95 % confidence interval for SAPS3, BMI, CCI and a PS of 2 were, respectively: 1.1 (1.08-1.11), 0.95 (0.92-0.98), 1.17 (1.09-1.24) and 1.69 (1.14-2.51). Categorization of BMI in logistic regression suggested that only underweight patients had higher mortality risk (OR 2.34, 95 % CI 1.27-4.32). On GBM, the relative influences of SAPS3, BMI, CCI and PS on hospital mortality were 59.7, 20.8, 13.6 and 5.9 %, respectively. The lowest mortality was found for patients with a BMI from between 28-30 (Figure 1). There was a steep increase in mortality for underweight patients with BMI below 20 and a small increase in mortality for patients with BMI greater than 30 (Figure 1)



[Figure 1]

GBM analysis highlighted the complex interplay between BMI, PS, CCI and mortality (probability plot - Figure 2), with a higher mortality being encountered in patients with high CCI, low BMI and worse PS. Patients with a BMI close to 28-30 had lower mortality in all categories of PS.



[Figure 2]

CONCLUSIONS. When comorbidity burden, performance status and illness severity are considered, obesity is not associated with a clear mortality benefit.

REFERENCE. Pickkers P, de Keizer N, Dusseljee J, et al. Body mass index is associated with hospital mortality in critically ill patients: an observational cohort study. *Crit Care Med.* 2013 Aug;41(8):1878-83

0907

COMPARISON BETWEEN REVISED ATLANTA CLASSIFICATION AND DETERMINANT-BASED CLASSIFICATION FOR ACUTE PANCREATITIS IN INTENSIVE CARE MEDICINE

F. Zubia Olaskoaga¹, E. Maravi Poma², L. Bordejé Laguna³, R. Ramírez Puertas⁴, M. Mourello Fariña⁵, EPAMI Study Group

¹Donostia Unibertsitate Ospitalea, Intensive Care Unit, Donostia- San Sebastian, Spain, ²Navarra University, Pamplona, Spain, ³Hospital Germans Trias i Pujol, Intensive Care Medicine, Badalona, Spain, ⁴Hospital San Cecilio, Intensive Care Medicine, Granada, Spain, ⁵Hospital a Coruña, Intensive Care Medicine, A Coruña, Spain

INTRODUCTION. Two new classifications for acute pancreatitis (AP) have been described in last years: the Atlanta Revised Classification (ARC) and Determinants-Based Classification (DBC). However, it is not determined which one is better, especially in the most severe forms.

OBJECTIVES. Compare both classifications in a sample of patients with acute pancreatitis admitted to Intensive Care Units (ICU).

METHODS. Observational, prospective, multicentric study in 45 Spanish ICU (EPAMI study). Study period: January 1 to December 31, 2013. Inclusion criteria: diagnosis of AP and admission in ICU. Variables: age, gender, ARC, DBC, APACHEII and SOFA in the first 24 h, need for mechanical ventilation (MV) and continuous renal replacement therapy (CRRT), need for surgery, ICU length of stay (LOS), hospital LOS and hospital mortality.

RESULTS. 365 patients, age 60.19 ± 15.67 years, 62.5 % male. APACHE II in 24 h 16.01 ± 8.23, SOFA in 24 h 6.61 ± 4.51. Surgery: 29.6 %, mortality 29.1 %. If we apply ARC, 158 AP cases are moderate, 207 are severe. If we apply DBC, 129 cases are moderate, 173 are severe, 63 are critical. Both classifications show significant differences between their groups with respect to mortality, mechanical ventilation, CRRT, surgery and ICU LOS. The DBC shows a statistically significant difference in hospital LOS, but not the ARC. To compare both classifications, we analyze the discrepancies between groups (Fig 1).

ARC	Moderate AP 158	Severe AP 207
DBC	Moderate AP 129	Severe AP 173
		Critical AP 63

[Fig 1]

The 129 cases classified as moderate in DBC, they are also classified as moderate in ARC. However, there are 29 cases classified as severe in DBC, which are classified as moderate in ARC. If we compare these 29 cases with the remaining 129 classified as moderate in ARC, they show a statistically significant higher rate of mechanical ventilation, need for surgery, ICU LOS and hospital LOS. The mortality is also increased, although not significantly (Table 1).

Variable	ARC moderate DBC moderate	ARC moderate DBC severe	p
n	129	29	
Mortality	2,3 %	6,9 %	NS
Mechanical Ventilation	14,7 %	37,9 %	0,004
CRRT	2,3 %	0 %	NS
Surgery	5,4 %	51,7 %	<0,0001
ICU LOS (days, IQ)	5 (3-7)	12 (4-23)	< 0,0001
Hospital LOS (days, IQ)	19 (13-27)	36 (28,5-60)	< 0,0001

[Table 1]

In addition, there are 63 cases classified as critical with DBC and as moderate with ARC. If we compare these cases with remaining severe cases in ARC (144 cases), ones classified as critical present greater use of MV, need for surgery, ICU LOS and hospital LOS with differences statistically significant. Mortality and use of CRRT are also higher in this group, and the difference is almost significant (Table 2).

Variable	ARC severe DBC severe	ARC severe DBC critical	p
n	144	63	
Mortality	45,1 %	57,1 %	0,112
Mechanical Ventilation	72,9 %	90,5 %	0,005
CRRT	46,5 %	60,3 %	0,068
Surgery	20,8 %	90,5 %	< 0,0001
ICU LOS (days, IQ)	11 (5-22)	36 (10-62)	< 0,0001
Hospital LOS (days, IQ)	22,5 (7,25-38,75)	51 (27-83)	< 0,0001

[Table 2]

CONCLUSIONS. DBC offers a better selection of patients than ARC for patients with acute pancreatitis admitted to ICU.

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GRANT ACKNOWLEDGMENT. This study received no financial support.

Therapeutic manipulations of the injured brain: 0908–0912

0908

AN EFFECTIVE AND SAFE STRATEGY TO TARGET NORMOTHERMIA IN NEUROCRITICAL PATIENTS WITH FEVER

M.G. Abate¹, A. Grassi², A. Patruño¹, A. Vargiolu¹, F. Sala¹, E. Zanotto¹, M. Panzeri¹, B. Cadore¹, G. Citerio¹

¹Ospedale San Gerardo, Dipartimento di Anestesia e Rianimazione, Monza, Italy, ²Università di Milano Bicocca, Dipartimento di Scienze della Salute, Monza, Italy

INTRODUCTION. Fever, due to infective or central causes, is common in neurocritical care patients (NCCP) and it is associated with neurological deterioration. Among strategies to contrast fever, non-steroidal anti-inflammatory drugs (NSAIDs) are usually unsuccessful and frightened for their effects on platelets, with a potential risk of intracranial bleeding, and

on renal function. In our unit we described a strategy with infusion of low dose diclofenac sodium (DCF)¹ efficacious in controlling fever in NCCP, that is currently used.

OBJECTIVES. Aim of this study is to evaluate in a large cohort of NCCP the effectiveness and the side effects of DCF infusion in controlling temperature.

METHODS. A retrospective analysis of data prospectively collected was performed on NCCP admitted to our neurosurgical ICU (NICU) in 4 years with a length of stay (LOS) > 48 h. Core temperature (CT) was continuously monitored minute by minute with a Foley catheter temperature sensor. Fever has been defined as a single recording of a CT ≥ 38,3 °C. Low dose continuous infusion of DCF (75 mg/day) was started according to clinical judgment in patients with temperature ≥ 37,5 °C, refractory to first line treatment (paracetamol bolus). Infusion modalities have been described elsewhere¹. We evaluated the efficacy of DCF in maintaining normothermia assessing the time spent over the fever threshold. We recorded, as safety endpoints, renal complication (defined as urinary output decrease and serum creatinine increase at the levels defined by KDIGO criteria for stage I AKI²) along with secondary intracranial bleeding (a new or an evolution of a previous intracranial bleeding).

RESULTS. 318 (M 180, mean age 56y ± 18) consecutive NCCP admitted to NICU with a LOS > 48 h (median 10 ± 9 days) were included in the study. 179 (56.3 %) received DCF. 119 patients suffered fever (37 %), 68 % due to infectious causes. Mean temperature at which DCF was started was 37,9 ± 0,5 °C and the mean infusion lasted 9 ± 6,4 days. In 69 % of patients who received DCF normothermia was effectively maintained (no fever episodes). 31 % experienced fever during DCF infusion but fever was very short lasting (0,8 ± 1,8 % of the time, i.e. 168 ± 252 min of fever along NICU stay). Only few patients in DCF group had intracerebral bleeding (3.9 %) comparable with other series without DCF³. No AKI occurred and no clinically significant creatinine increment (0,03 ± 0,16 mg/dl) was the mean difference after 5 days of DCF infusion was recorded. Urinary output (UO) was preserved in all patients (> 0,1 ml/kg/h).

CONCLUSIONS. Low dose DCF infusion effectively maintained normothermia in most of the patients and fever episodes were extremely short lasting. Although continued for a long period, DCF infusion had an acceptable safety profile in NCCP.

REFERENCE(S). 1. Cormio M et al. Neurocrit Care (2007) 6:82-89 2. KDIGO Clinical Practice Guidelines for Acute Kidney Injury (2012) 3. Lassen B et al. Neurosurgery. (2011) May; 68(5):1259-68

0909

EFFECTS OF TIGHT COMPUTERIZED GLUCOSE CONTROL ON NEUROLOGICAL OUTCOME IN SEVERE BRAIN-INJURED PATIENTS. A MULTI-CENTER SUB-GROUP ANALYSIS OF THE RANDOMIZED-CONTROLLED OPEN-LABEL CGAO-REA STUDY

R. Cinotti¹, C. Ichai², J.-C. Orban², P. Kalfon³, F. Feuillet⁴, A. Roquilly¹, B. Riou⁵, Y. Blanloeil⁶, K. Asehnoune¹, B. Rozec⁶

¹CHU. Hôtel Dieu, Anesthésie-Réanimation, Nantes, France, ²CHU. Hôpital St Roch, Réanimation Polyvalente, Nice, France, ³CH, Réanimation Médicale, Chartres, France, ⁴Faculté de Médecine, Plateforme de Biométrie, Nantes, France, ⁵CHU Pitié-Salpêtrière, Service d'Accueil des Urgences, Paris, France, ⁶CHU. HGRL, Anesthésie-Réanimation, Nantes, France

INTRODUCTION. Hyperglycemia is a marker of poor prognosis in severe brain injuries. There are few data regarding the effects of intensive insulin therapy (IIT) on neurological recovery.

METHODS. A sub-group analysis of the randomized-controlled CGAO-REA study [1] (NCT01002482) in surgical intensive care units (ICU) of two university hospitals. Patients with a severe brain injury requiring an expected ICU length of stay ≥ 48 h were included. Patients were randomized between a conventional glucose management group (blood glucose target between 5.5-9 mmol.L⁻¹) and an IIT group (blood glucose target between 4.4-6 mmol.L⁻¹). The primary outcome was the day-90 neurological outcome assessed with the Glasgow outcome scale (GOS) evaluated via phone call [2]. Patients had a good neurological recovery when GOS was 1 (good recovery) or 2 (mild disability) [2]. Secondary outcomes were in-ICU morbi-mortality in the 2 groups.

RESULTS. 188 patients were included in this analysis. Ninety-eight (52 %) patients were randomized in the IIT group and 90 (48 %) in the control group. Forty-one (21.8 %) patients had traumatic brain injury, 60 (31.9 %) had aneurysmal subarachnoid hemorrhage, 22 (11.7 %) had intra-cerebral hemorrhage, 16 (8.5 %) had malignant stroke, 26 (13.8 %) had resuscitated cardiac arrest and 23(12.3 %) had miscellaneous diseases. The mean Glasgow coma score at baseline was 6 (3-11). Patients in the IIT group received more insulin [130 [68-251] UI versus 74 [13-165] UI in the control group, p = 0.01), had a significantly lower morning blood glucose level (5.9 [5.1-6.7] mmol.L⁻¹ versus 6.5 [5.6-7.2] mmol.L⁻¹, p < 0.001) in the first five days after ICU admission. The IIT group experienced more episodes of moderate hypoglycemia (46 (51 %) versus 19 (19 %), p < 0.001), but the number of episodes of severe hypoglycemia were comparable (6 (6.6 %) versus 4 (4 %), p = 0.5). In the IIT group, 24 (27 %) patients had a favorable neurological outcome compared to 31 (32 %) in the control group (p = 0.4). There were no differences between the 2 groups regarding the ICU length of stay, the number of ventilatory-free days, the day-28 mortality. The occurrence of hypoglycemia did not influence the outcome.

CONCLUSIONS. In this sub-group analysis of a large multi-center randomized trial, IIT did not appear to alter the day-90 neurological outcome or in-ICU morbidity in severe brain-injured patients.

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0910

VASOSPASM WORSENING RELATED TO SWITCH OF NIMODIPINE ADMINISTRATION IN SPONTANEOUS SUBARACHNOIDAL HEMORRHAGE

S. Valles Angulo¹, M.P. Gracia Arnillas¹, I. Dot Jordana¹, A. Zapatero Ferrandiz¹, I. Navalpotro Gomez¹, E. Cuadrado Godiva¹, A. Ois Santiago¹, G. Villalba Martinez¹, T. Sola Martinez¹, E. Vivas Diaz¹

¹Hospital del Mar, Barcelona, Spain

OBJECTIVES. To assess clinical and/or neurophysiological changes in vasospasm, due to switch in nimodipine way of administration, from intravenous to oral.

METHODS. This was a prospective register of patients diagnosed of spontaneous SAH admitted in our hospital from 2007 to 2013. The way of nimodipine administration was assayed, as well as worsening in vasospasm monitored by transcranial doppler. We also collected cardiovascular risk factors, radiology and clinical variables, date of treatment switch and associated symptoms.

RESULTS. 197 patients were included. In 81 of them (41.1 %) vasospasm was detected, 85 % first week of admission. In 30 patients (37 %) vasospasm worsened coinciding with

switching nimodipine way of administration from iv to oral, being asymptomatic in 18 of them (60 %). Intravenous treatment was reinitiated in 27 patients (90 %) improving vasospasm in 22 of them (81.5 %), and 5 cases (18.5 %) needed intraarterial nimodipine with good response. Just one patient (3.3 %) developed ischemic injury with vasospasm worsening. There were no demographic differences, neither in cardiovascular risk factors or in radiology images; just an association with smoking (63.3 % vs 37.9 %; $p = 0.045$). In relation with the date of switching treatment, it was earlier in those patients who got worse: 4.5 days (3-10) vs 10 days (5-19.25); $p = 0.01$.

CONCLUSIONS. Switching nimodipine from iv to oral causes vasospasm worsening in high percentage of patients. Accurate monitoring with transcranial doppler lets us identify this situation and take appropriate treatment adjustments. Early switch from iv to oral, seems to favour vasospasm worsening.

0911
HYPEROXIA IS ASSOCIATED WITH INCREASED CEREBRAL DAMAGE AFTER SEVERE TBI

H. Quintard¹, C. Patet¹, T. Suys¹, P. Marques-Vidal², M. Oddo¹

¹CHUV-Lausanne University Hospital, Intensive Care Medicine, Neuroscience Critical Care Research Group, Lausanne, Switzerland, ²CHUV-Lausanne University Hospital, Internal Medicine, Lausanne, Switzerland

OBJECTIVES. There is still substantial controversy as to whether hyperoxia may be beneficial or detrimental after traumatic brain injury (TBI). Here, we examined in patients with severe TBI whether incremental FiO₂ levels were associated with increased evidence of secondary brain injury, quantified by cerebral extracellular levels of glutamate, lactate and glucose.

METHODS. This was a retrospective analysis of a cohort of patients with severe TBI admitted to the Department of Intensive Care Medicine, Lausanne University Hospital (CHUV), between October 2009 and November 2013, who underwent advanced intracranial monitoring consisting of cerebral microdialysis (CMD), brain tissue oxygen (PbtO₂) and intracranial pressure (ICP), as part of standard patient care. Monitoring was placed in visually normal right frontal brain parenchyma. FiO₂ levels were categorized into 4 separate ranges (< 40 %; 41-60 %; 61-80 %; 81-100 %) and were associated with CMD concentrations of glutamate, lactate, and glucose, measured hourly. Associations were adjusted for main cerebral (PbtO₂, ICP, CPP) and systemic (PaO₂/FiO₂ ratio, PaCO₂, hemoglobin) physiological covariates, as well as for the severity of brain (Marsh CT score) and systemic (APACHE II) injury, using a regression model (Tukey's test).

RESULTS. Thirty-six severe TBI (40 ± 17 years, GCS < 8) were included. The delay and duration for intracranial monitoring were 24 (range 24-120) hrs and 4 (1-10) days. A total of matched 1379 samples were analyzed. Compared to FiO₂ < 40 %, higher levels of FiO₂ were all associated with a gradual and significant increase of CMD glutamate (from baseline 8.6 ± 1 to a maximum of 19.6 ± 4.6 μmol/L), CMD lactate (4.02 ± 0.1 to 4.86 ± 0.3 mmol/L) and a reduction of CMD glucose (1.47 ± 0.06 to 1.08 ± 0.15 mmol/L), independently from PbtO₂, ICP, CPP, PaO₂/FiO₂ ratio, PaCO₂ and hemoglobin (Figure 1, adjusted $p < 0.01$). The extent of secondary brain injury, as quantified by CMD markers, was greater in hyperoxic ranges (FiO₂ > 60 %), as compared to lower FiO₂ levels. This association remained significant in the subgroup of patients without lung injury (PaO₂/FiO₂ > 300 mmHg).

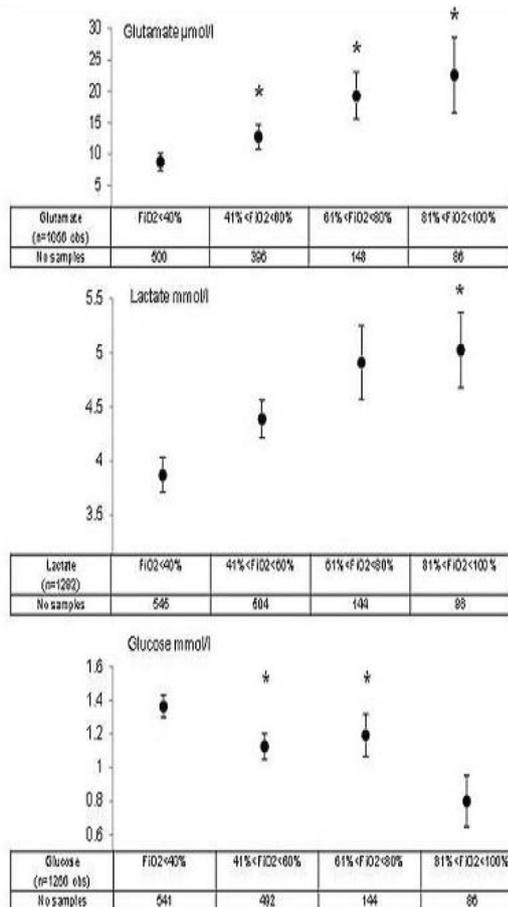


Figure 1. Cerebral microdialysis levels of glutamate, lactate and glucose, according to FiO₂ ranges (* $p < 0.01$ vs FiO₂ < 40%)

[Figure 1]

CONCLUSIONS. This clinical cerebral microdialysis study suggests that increasing FiO₂ may be associated with an exacerbation of secondary cerebral damage in patients with severe TBI. It supports the notion that hyperoxia may potentially be deleterious after severe TBI and argues against the systematic utilization of high FiO₂ levels in this setting.

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0912
HYPEROXIAEMIA IS ASSOCIATED WITH INCREASED ALL-CAUSE INTENSIVE CARE UNIT MORTALITY IN SPONTANEOUS SUBARACHNOID HAEMORRHAGE

B.A. Shuker¹, C.R. Bassford²

¹University of Warwick, Coventry, United Kingdom, ²University Hospital Coventry, General Critical Care, Coventry, United Kingdom

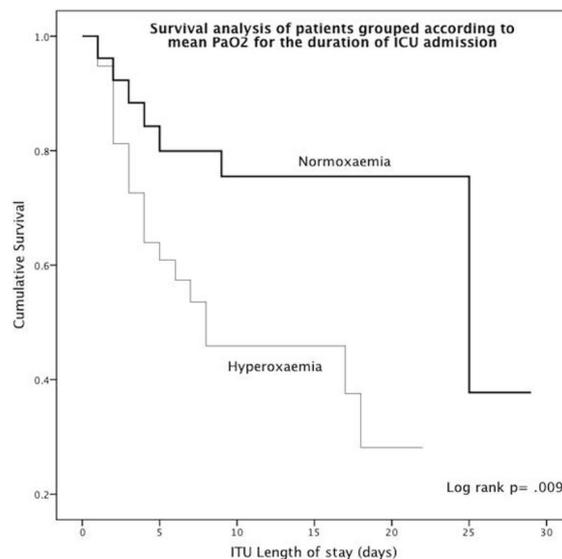
INTRODUCTION. Very high arterial oxygen tensions (PaO₂ > 39.9 kPa) in the first 24 h of admission to intensive care are associated with increased in-hospital mortality in stroke and spontaneous subarachnoid haemorrhage (SAH) [1]; the effects of moderate hyperoxaemia in spontaneous SAH have yet to be evaluated.

OBJECTIVES. To determine whether clinical outcomes in patients admitted to ICU with spontaneous SAH were associated with moderate levels of hyperoxaemia.

METHODS. 64 patients were identified in a single-centre retrospective observational study of spontaneous SAH patients admitted to the ICU over a 2-year period. The primary outcome was all-cause ICU mortality. Arterial blood gas (ABG) data were collected from routine patient records. ABG samples with missing values were excluded from analysis. Hyperoxaemia was defined as PaO₂ > 13.3 kPa [2]. Normoxaemia was defined as neither hyperoxaemia nor severe hypoxaemia (PaO₂ < 8 kPa). Clinical outcomes were compared when patients were grouped using mean PaO₂ during the first 24 h of admission, and when grouped using mean PaO₂ for the whole duration of ICU admission. Comparisons were made using odds ratios, independent samples t-tests, and log rank. Estimated survival was calculated using Kaplan-Meier.

RESULTS. There was no significant difference in clinical outcome (OR 1.34, CI 0.35 to 5.14, $p = 0.66$) or estimated survival ($X^2 = 0.034$, $df = 1$, $p = 0.854$) when patients were grouped using their mean PaO₂ during the first 24 h of ICU admission.

When patients were grouped using their mean PaO₂ for the whole duration of ICU admission we found that mortality was significantly higher in the hyperoxaemia group (OR 3.015, CI 1.028 to 8.84, $p = 0.044$), and that median survival was significantly shorter at 7 days compared with 24.4 days in the normoxaemia group ($X^2 = 6.882$, $df = 1$, $p = 0.009$).



[Figure 1 - Survival analysis]

Oxygenation group (grouped by mean PaO₂ for whole duration of ICU admission)

	Hyperoxaemia (n = 38)	Normoxaemia (n = 26)	P values
Age	53.86 ± 14.10	57.38 ± 14.22	0.334
Male (%)	11 (28.94)	9 (34.61)	0.641
APACHE II	16.60 ± 5.82	13.00 ± 3.16	0.002
Mean PaO ₂ first 24 h	17.98 ± 5.24	14.41 ± 2.54	< .001
Mean PaO ₂ whole ICU stay	16.95 ± 5.54	12.35 ± 0.78	< .001

[Table 1 - Patient characteristics]

CONCLUSIONS. An association has previously been demonstrated between very high arterial oxygen tensions in the first 24 h of ICU care and mortality for patients with spontaneous subarachnoid haemorrhage. This study has shown that this effect is present when patients are exposed to less extreme levels of hyperoxaemia for the duration of ICU care. These differences may be attributable to higher levels of oxygenation required for increased severity of illness, however it is not possible to exclude a causative link between high arterial oxygen tensions and worse clinical outcomes. The effect of hyperoxaemia on functional neurological outcomes may also be an important source of morbidity that has not

been detected by this investigation. Further work is needed to determine causation and potential biological mechanisms.

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Preventing delirium in critical illness: 0913-0917

0913

PROPHYLACTIC LOW-DOSE DEXMEDETOMIDINE DECREASES THE INCIDENCE OF DELIRIUM IN CRITICALLY ILL ELDERLY PATIENTS AFTER NONCARDIAC SURGERY: A RANDOMIZED CONTROLLED TRIAL

X. Su¹, Z.-T. Meng¹, Y.-Y. Feng¹, X.-H. Wu¹, F. Cui¹, D.-X. Wang¹

¹Peking University First Hospital, Department of Anesthesiology and Critical Care Medicine, Beijing, China

INTRODUCTION. Dexmedetomidine decreases the incidence of delirium when used as a sedative agent in mechanically ventilated patients. However, the use of sedative dose dexmedetomidine is associated with relatively high incidences of adverse events, especially hypotension and bradycardia, which prevent its wide-spread use.

OBJECTIVES. To evaluate whether prophylactic low-dose dexmedetomidine could decrease the incidence of delirium in critically ill elderly patients after noncardiac surgery.

METHODS. This was a randomized, double-blind, and placebo-controlled single-center clinical trial. Seven hundred patients 65 years or older who were admitted to ICU after noncardiac surgery were enrolled. Dexmedetomidine (intravenous infusion at a rate of 0.1 microgram/kg/hr, n = 350) or placebo (n = 350) was randomly administered from 5:00 pm to 8:00 pm on the day of surgery until 8:00 am on the first day after surgery. The primary end point was the incidence of delirium during the first 7 days after surgery. Delirium was assessed with the Confusion Assessment Method for the ICU.

RESULTS. The numeric rating scale (NRS) pain scores (0 indicates no pain and 10 indicates the worst pain) both at rest and with movement were significantly lower in the dexmedetomidine group than in the placebo group at 3, 6 and 24 h after surgery (P < 0.001). The NRS scores of subjective sleep quality (0 indicates the best possible sleep and 10 indicates the worst possible sleep) were significantly lower in the dexmedetomidine group than in the placebo group at 8:00 am on the 1st, 2nd and 3rd days after surgery (P < 0.001). The incidence of delirium within the first 7 days after surgery was significantly lower in the dexmedetomidine group than in the placebo group (8.0 % [28/350] vs. 22.3 % [78/350], P < 0.001). The incidence of nondelirium complications were significantly lower (10.6 % [37/350] vs. 16.5 % [57/350], P = 0.025), and the lengths of stay in ICU were significantly shorter (median 20.9 h [95 % CI, 20.4-21.4] vs. 21.5 h [95 % CI, 20.7-22.3], P = 0.026) in the dexmedetomidine group than in the control group. The incidences of tachycardia, hypertension, and hypoxia that occurred within 24 h after surgery were also significantly lower in the dexmedetomidine group than in the placebo group. There were no significant differences between the two groups with regards to the incidences of bradycardia and hypotension, as well as all-cause 30-day mortality.

CONCLUSIONS. Our study demonstrated that, in elderly patients admitted to ICU after noncardiac surgery, prophylactic low-dose dexmedetomidine significantly decreases the incidence of delirium during the first 7 days after surgery, possibly by ameliorating analgesia and improving sleep quality.

GRANT ACKNOWLEDGMENT. Wu Jieping Medical Foundation.

0914

FACTORS ASSOCIATED WITH RESTRAINT USE IN THE SLEAP TRIAL: A MULTICENTER RANDOMIZED TRIAL COMPARING PROTOCOLIZED SEDATION WITH DAILY SEDATION INTERRUPTION VERSUS PROTOCOLIZED SEDATION ALONE IN MECHANICALLY VENTILATED ADULTS

L. Rose¹, L. Burry², R. Mallick³, E. Luk⁴, D. Cook⁴, D. Fergusson⁵, M. Meade⁶, M. Herridge⁷, P. Dodek⁸, K. Burns⁹, J. Granton⁷, N. Ferguson⁷, J. Devlin¹⁰, M. Steinberg⁷, M. Tanios¹¹, R. Fowler¹², M. Jacka¹³, K. Olafson¹⁴, Y. Skrobik¹⁵, S. Mehta², SLEAP Investigators

¹University of Toronto, Toronto, Canada, ²Mt Sinai Hospital, Toronto, Canada, ³Ottawa Hospital Research Institute/Hospital Research Institute, Ottawa, Canada, ⁴McMaster University, Hamilton, Canada, ⁵Ottawa Hospital Research Institute, Ottawa, Canada, ⁶McMaster University Medical Centre, Hamilton, Canada, ⁷University Health Network, Toronto, Canada, ⁸University of British Columbia, Vancouver, Canada, ⁹St Michael's Hospital, University of Toronto, Toronto, Canada, ¹⁰North Eastern University, Boston, United States, ¹¹Memorial Medical Center, Long Beach, United States, ¹²Sunnybrook Health Sciences Centre, Toronto, Canada, ¹³University of Alberta, Edmonton, Canada, ¹⁴University of Manitoba, Winnipeg, Canada, ¹⁵Maisonneuve Rosemont Hospital, Montreal, Canada

INTRODUCTION. Physical restraints are commonly used in critically ill patients though use varies across countries from 0 to 100 %. Use of restraints has been associated with many adverse outcomes including delirium and unplanned extubation. The SLEAP trial, a prospective randomized study performed in 16 tertiary ICUs in Canada and the US compared protocolized sedation to protocolized sedation plus daily sedation interruption and found that most (328/430, 76 %) patients had restraints applied at least once during their ICU admission [1].

OBJECTIVES. To describe characteristics and outcomes of restrained and non-restrained patients, and to identify associations between patient and treatment factors and restraint use in critically ill, mechanically ventilated patients enrolled in the SLEAP trial.

METHODS. We used a Cox proportional hazards model with time varying covariates to evaluate the association of covariates with restraint use. Demographic and clinical variables were compared using Student's t-tests or Wilcoxon rank sum tests for continuous variables and Chi squared tests or Fisher exact tests for categorical variables.

RESULTS. We identified 328 patients restrained for a median (IQR) of 4 (1-7) days. Baseline characteristics were similar in restrained and non-restrained patients, except APACHE II score (lower in restrained patients, 23 vs 28, P < 0.001), history of a neurological condition (17 % vs 14 %, P = 0.05) and tobacco use (23 % vs 12 %, P = 0.05). Fewer restrained patients received renal replacement therapy (17 % vs 32 %, P = 0.002) or experienced coma (25 % vs 58 %, P < 0.001) but more restrained patients required reintubation (8 % vs 1 %, P = 0.01) and experienced unplanned device removal (26 % vs 3 %,

P < 0.001). Duration of ventilation, ICU, and hospital stay were similar for restrained and non-restrained patients. In a multivariable model adjusting for centre, factors associated with use of restraints were older age (hazard ratio [HR] 1.01, 95 % confidence interval [CI] 1.00, 1.02, P = 0.04); male gender (HR 1.24, 95 % CI 1.00, 1.53, P = 0.05); tobacco use (HR 1.38, 95 % CI 1.07, 1.79, P = 0.01); shorter duration of ventilation (HR 0.99, 95 % CI 0.98, 1.00, P = 0.001); increasing opioid total dose (HR 1.00, 95 % CI 1.00, 1.00, P = 0.001); unplanned extubation/device removal (HR 1.47, 95 % CI 1.19, 1.83, P = 0.0005); antipsychotic drug use (HR 1.42, 95 % CI 1.11, 1.81, P = 0.0005); and positive delirium screening (HR 1.31, 95 % CI 1.11, 1.54, P = 0.002). Admission category; APACHE II score; history of alcohol use, neurological or psychiatric disorder; presence of sepsis; total benzodiazepine dose and sedation strategy were not associated with restraint use.

CONCLUSIONS. In the SLEAP trial, non-modifiable patient factors (age, gender, smoking history), shorter duration of ventilation, indicators of agitation and delirium, and medications (antipsychotics and opioids) were associated with restraint use.

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0916

A PROSPECTIVE EVALUATION OF PSYCHOACTIVE MEDICATIONS AND DELIRIUM IN CANADIAN CRITICALLY ILL ADULTS: INTERIM RESULTS

L. Burry^{1,2}, S. Mehta³, D. Williamson⁴, M. Perreault⁴, I. Mantas⁴, D. Fergusson⁵, O. Smith⁶, A. Day⁷, M. Anan³, A. Cho¹, S. Dupuis⁴, E. Fan³, L. Rose⁷

¹Mount Sinai Hospital, Pharmacy, Toronto, Canada, ²University of Toronto, Toronto, Canada, ³Mount Sinai Hospital, Medicine/Critical Care, Toronto, Canada, ⁴University of Montreal, Faculty of Pharmacy, Montreal, Canada, ⁵University of Ottawa, Ottawa Hospital Research Institute, Ottawa, Canada, ⁶St. Michael's Hospital, Critical Care, Toronto, Canada, ⁷University of Toronto, Faculty of Nursing, Toronto, Canada

INTRODUCTION. Delirium is a serious condition characterized by an acute onset of fluctuating mental status, inattention, and altered level of consciousness. It is associated with poor outcomes including prolonged mechanical ventilation and hospitalization, long-term cognitive impairment, increased likelihood of transfer to a chronic care facility, and higher mortality.

OBJECTIVES. To describe the incidence of delirium and sub-syndromal delirium (SSD), exposure to psychoactive drugs and potentially deliriogenic environmental factors, prior to and during delirium development, and clinical outcomes.

METHODS. We conducted a prospective observational study in a mixed patient population from 6 Canadian ICUs (5 academic and 1 large community hospital) between June 2011 and June 2012. Patients were eligible if admitted to participating ICUs for > 24 h. We excluded patients: 1) unable to communicate in English or French; 2) comatose; and 3) ≤ 16 years old. We collected demographics, duration of mechanical ventilation, length of stay, and mortality; daily exposure in the ICU to psychoactive drugs and factors previously shown to be associated with delirium such as other drug classes (e.g. steroids, anticholinergics²) and environmental features (e.g. isolation). We categorized exposure as before or during delirium. Patients were screened daily with the Intensive Care Delirium Screening Checklist (ICDSC)²: delirium was defined as ICDSC score ≥ 4; SSD was defined as ICDSC 1-3 and never ≥ 4. In all ICUs, drug therapy was directed by the ICU team.

RESULTS. Of the 522 patients, 172 (33 %) had only SSD, and 251 (48 %) had delirium or delirium and SSD. Demographics and outcomes are presented in Table 1. Mean duration of delirium was 3.3 days (SD 3.0) for those with delirium alone and 7.6 days (SD 5.2) for those experiencing both SSD and delirium. Patients with SSD and delirium had the longest duration of mechanical ventilation and length of stay in both ICU and hospital. Patients only ever delirious (never SSD) had the highest mortality rate. Polypharmacy was common (mean of ≥ 12 medications/patient/day). Exposure to psychoactive agents prior to delirium development was common, particularly opioids (82 %), low potency anticholinergics² (81 %), and benzodiazepines (66 %) [Table 2]. More patients with delirium than without had physical restraints applied (63 % vs 11 %) and experienced accidental line/endotracheal tube removal (15 % vs 4 %). Few patients were mobilized (12 %) or had exposure to orienting environmental factors such as TV (17 %) or clock (44 %) prior to delirium development [Table 3].

CONCLUSIONS. Delirium and SSD were common in this multicenter cohort. Patients had substantial exposure to psychoactive agents previously shown to predispose and prolong delirium.

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GRANT. Research & Development grant, University of Toronto

N = 522	No delirium [ICDSC always 0] (n = 99)	SSD [ICDSC 1-3, never ≥ 4] (n = 172)	Both SSD and delirium (n = 202)	Delirium only [ICDSC ever ≥ 4, never 1-3] (n = 49)
Age, years, mean(SD)	57 (17)	60 (18)	61 (16)	64 (15)
APACHE II, mean (SD)	17 (6)	20(7)	21(7)	22(6)
Male	50 (51)	100 (58)	122 (60)	31 (63)
Mechanical ventilation (MV)	68 (61)	131 (77)	179 (90)	39 (80)
Duration of MV, median (IQR) days	1.0 (0.5, 2.1)	2.1 (1.2, 4.7)	6.4 (2.9, 12.8)	2.1 (1.0, 3.6)
ICU stay, median (IQR) days	2.9 (2.1, 4.4)	4.1 (2.8, 6.9)	10.2 (6.4, 18.0)	5.0 (3.0, 7.2)
Hospital stay, median (IQR) days	10.9 (6.0, 21.3)	16.2 (8.2, 34.2)	28.0 (16.2, 53.0)	12.8 (7.2, 32.0)
ICU mortality	1 (1)	15 (9)	26 (13)	13 (27)
Hospital mortality	7 (7)	35 (20)	48 (24)	20 (41)

[Table 1 Demographics and outcomes (n(%))]

Ever exposed	No delirium [ICDSC always 0] (n = 99)	SSD [ICDSC 1-3, never ≥ 4] (n = 172)	Delirium [ICDSC ever ≥ 1] (n = 251)	Exposure pre-delirium (n = 251)
Opioid	73 (74)	146 (85)	232 (92)	205 (82)
Anticholinergic activity - low potency (e.g. amantadine, baclofen)	75 (76)	148 (86)	236 (94)	204 (81)
Benzodiazepine	61 (62)	107 (62)	204 (81)	165 (66)
Anaesthetics, non-gases (i.e. propofol, ketamine)	47 (48)	87 (51)	167 (67)	142 (57)
Non-opioid analgesic (e.g. acetaminophen)	53 (54)	115 (67)	161 (64)	117 (47)
Corticosteroid	46 (47)	68 (40)	116 (46)	102 (41)
Antipsychotic	10 (10)	47 (27)	158 (63)	80 (32)
Anticholinergic activity - high potency (e.g. atropine, dimenhydrinate)	39 (39)	65 (38)	98 (39)	66 (26)
Maximum # of meds/day (polypharmacy), mean(SD)	12.6 (4.9)	14.1 (4.4)	16.6 (5.8)	13.7 (5.1)

[Table 2 Drug exposure [n(%)]]

	No delirium [ICDSC always 0] (n = 99)	SSD [ICDSC 1-3, never ≥ 4] (n = 172)	Delirium [ICDSC ever ≥ 4] (n = 251)	Exposure pre-delirium (n = 251)
Not mobilized	53 (54)	99 (58)	135 (54)	221 (88)
No TV	71 (72)	114 (66)	147 (59)	209 (83)
No clock	26 (26)	45 (26)	64 (25)	141 (56)
No window	19 (18)	22 (13)	22 (9)	125 (50)
Single room	68 (69)	139 (81)	202 (81)	110 (44)
Isolation	12 (12)	34 (20)	59 (24)	27 (11)
Epidural in situ	4 (4)	12 (7)	10 (4)	6 (2)
Maximum # IV catheters/day, mean (SD)	2.4 (0.9)	2.6 (1.0)	2.9 (0.9)	1.6 (1.5)

[Table 3 Negative environmental exposures [n(%)]]

0917

MELATONIN RECEPTOR AGONIST FOR THE PREVENTION OF POSTOPERATIVE DELIRIUM IN ELDERLY PATIENTS: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED TRIAL

Y. Yamaguchi¹, T. Mihara², M. Taguri³, O. Yamaguchi¹, T. Goto¹

¹Yokohama City University School of Medicine, Department of Anesthesiology and Critical Care, Yokohama, Japan, ²Kanagawa Children's Medical Center, Department of Anesthesiology, Yokohama, Japan, ³Graduate School of Medicine, Yokohama City University, Department of Biostatistics and Epidemiology, Yokohama, Japan

INTRODUCTION. Postoperative delirium is common in the elderly patients and is associated with increased morbidity and mortality [1, 2]. Ramelteon is a synthetic analog of melatonin that acts specifically on MT1 and MT2 melatonin receptors[3]. Several recent articles have reported the effectiveness of ramelteon in treating and preventing delirium, but it is unclear whether ramelteon has beneficial effects on postoperative delirium[4] [5].

OBJECTIVES. The aim of this study was to evaluate whether ramelteon prevents postoperative delirium and improves postoperative quality of recovery in the elderly patients undergoing total knee arthroplasty (TKA).

METHODS. In this single center, prospective, randomized, placebo-controlled, double blind trial, we randomly assigned 45 patients who were 70 years or older undergoing elective TKA to receive ramelteon (8 mg/day) or placebo every night for 4 days. The Mini-Mental Status Examination was used to exclude patients with preoperative cognitive dysfunction. Anesthetic management and postoperative analgesia were standardized. Delirium and subsyndromal delirium were defined as the Intensive Care Delirium Screening Checklist (ICDSC) score ≥4 and 1-3, respectively. Patients were assessed every 8 h from postoperative day (POD) 0 to 4 by trained nursing staff. Postoperative quality of recovery was evaluated by the quality of recovery 40 questionnaire (QoR-40) at 24 h after surgery.

RESULTS. A total of 22 patients were assigned to the ramelteon group, and 23 patients were assigned to the placebo group. The incidence of postoperative delirium in ramelteon group (0/21, 0 %) was not significantly different from that of the placebo group (2/21, 9.5 %; P = 0.48, Fisher's exact test). The incidence of subsyndromal delirium did not differ between the ramelteon (7/21, 33.3 %) and the placebo group (9/21, 42.9 %; P = 0.75, Fisher's exact test). To take into account the repeated measures, ramelteon tended to be associated with a lower incidence of subsyndromal delirium (odds ratio 0.374 (95 % confidence interval 0.131-1.067), p = 0.067, generalized estimating equations).The global QoR-40 scores at 24 h after surgery were median (IQR) of 165 (149-175) in the ramelteon group vs. 162.5 (135-176) in the placebo group (P = 0.53, Wilcoxon test).

CONCLUSIONS. Postoperative delirium did not occur in ramelteon group. Ramelteon has a tendency to reduce postoperative subsyndromal delirium in the elderly patients.

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Tissue perfusion in trauma: 0922

0922

IMMUNE PARALYSIS IN TRAUMA PATIENTS; IMPLICATIONS FOR PRE-HOSPITAL INTERVENTION

K. Timmermans^{1,2,3}, M. Kox^{1,2,3}, M. Vaneker¹, P. Pickkers^{2,3}, G.J. Scheffer^{1,3}

¹Radboud University Medical Center, Anesthesiology, Nijmegen, Netherlands, ²Radboud University Medical Center, Intensive Care Medicine, Nijmegen, Netherlands, ³Radboud University Medical Center, Nijmegen Institute for Infection, Inflammation, and Immunity (N4i), Nijmegen, Netherlands

INTRODUCTION. Recovery of multitrauma is frequently complicated by post-injury complications, such as opportunistic infections, caused by a severely suppressed immune system. In order to treat or prevent this so-called "immune paralysis", knowledge on its time course and pathophysiological mechanisms is essential.

OBJECTIVE. To determine factors that could identify and induce immune paralysis in multitrauma patients to ultimately find a target and timeframe for immunomodulatory therapy.

METHODS. Blood was obtained from adult multitrauma patients (n = 174) admitted to the emergency room (ER) of the Radboud University Medical Center by the Helicopter Emergency Medical Services (HEMS), at arrival at ER and at day 1, 3, 5, 7, 10 and 14 after trauma. Healthy controls (n = 20, samples obtained at a single time-point) were included for comparison. Plasma cytokines were determined by Luminex. Quantitative PCR was used to determine HLA-DR expression as well as plasma genomic and mitochondrial DNA. Whole blood was stimulated with 10 ng/ml LPS for 24 h ex vivo and cytokine production was quantified using ELISA. Clinical data, e.g. Injury Severity Score (ISS) were collected from electronic patient file.

RESULTS. Plasma IL-10, IL-8, and MCP-1 levels were increased in trauma patients compared with healthy controls. Plasma IL-10 concentrations at the ER were 16.5-fold increased compared with timepoint HEMS (p < 0.01). IL-6 an IL-8 concentrations also peaked at the ER, although the increase was much less pronounced compared with IL-10. ISS correlated positively with IL-10 plasma concentration at admission (R = 0.45, p < 0.0001).HLA-DR expression decreased following trauma (p < 0.0001), with minimum expressions found at day 1. Furthermore, a significantly lower HLA-DR expression was observed in trauma patients compared with healthy volunteers on all timepoints except HEMS. ISS correlated negatively with HLA-DR expression at ER (R = -0.38, p < 0.0001).Furthermore, plasma levels of IL-6, IL-8, IL-10, and MCP-1 correlated negatively with HLA-DR expression on most timepoints (Table 1). Interestingly, cytokine levels at the ER also showed strong negative correlations with HLA-DR expression on days 10 and 14, suggesting that a high initial cytokine response results in more pronounced immune paralysis in a later stage.Data on ex vivo cytokine production and plasma DNA are pending.

CONCLUSIONS. Immune paralysis, characterized by decreased HLA-DR expression and dysregulated cytokine production, is apparent within hours after trauma. Production of large amounts of anti-inflammatory IL-10 in the pre-hospital phase could play a crucial role in its pathogenesis. Patients with higher injury severity scores produce excessive amounts of IL-10 in this phase and exhibit lowest HLA-DR expression. Immunostimulatory strategies applied by the HEMS or early after hospital admission could represent a potential future approach to prevent immune paralysis in multitrauma patients in the intensive care unit.

Cytokine	HEMS		ER		Day 1		Day 3		Day 5		Day 7		Day 10		Day 14	
	IL-10	IL-8	IL-10	IL-8	IL-10	IL-8										
IL-10	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
IL-8	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
MCP-1	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

Table 1. Spearman Correlation between cytokines and HLA-DR at several time points.

[Table 1]

ICU outcomes: Beyond hospital mortality: 0923–0927

0923

ONE-YEAR MORTALITY RATE IN ELDERLY PATIENTS: THE PICTURE OF A NORTHERN ITALY ICU AND A COMPARISON WITH GENERAL POPULATION

F. Boni¹, F. Cipulli¹, L. Giuntoli², A. Giugni¹

¹Maggiore Hospital Emergency Department and Trauma Care, Bologna, Italy, ²Maggiore Hospital Anaesthesia and Intensive Care, Bologna, Italy

INTRODUCTION. The available literature on the outcome of elderly patients in Intensive Care Unit (ICU) is expanding, but what can be regarded as “good outcome” is yet to be defined.

OBJECTIVES. The aim of this paper was to study the 1-year age specific mortality rate (ASMR) in elderly patients (PTS) treated in our ICU and to compare it to ASMR of Italian population.

METHODS. The study was conducted at Bologna Maggiore Hospital, Italy: 700-bed hospital, 20 adult ICU beds, all facilities available except for cardiac surgery. In PTS admitted to ICU from 1/1/06 to 31/12/12 and discharged alive were included. In case of multiple admissions the last one only was included. Age, sex, admission type, SAPS II and clinical data were recorded in our database (DB). Mortality (M) after hospital discharge was obtained from the National Administrative Mortality Registry and crosschecked with our DB. The outcome variable was M after ICU discharge at 1-6-12 months. The association between M and risk factors was studied for PTS who were discharged alive with logistic regression analysis. Comparisons between groups were made with T-Student and Chi Square tests, calculating odds ratio and 95 % confidence interval. Long-term M was analysed using Kaplan–Meier survival curves. Data were analysed with Stata/IC 10.1.

RESULTS. 6073 PTS were admitted from 1/01/06 to 31/12/12, 782 (12.88 %) died during ICU stay.

5291 survivors represent the study cohort: one year after discharge 973(18.39 %) died while 4318 (81.61 %) were alive. 1-year ASMR increased from 6.58 % in PTS younger than 65 to 43.44 % in PTS older than 85 (figure 1a). Overall mortality rate decreased from 7.47 % in the 1st month after ICU discharge to 2.01 % in the 10th-12th month (figures 1b, 2).

Logistic regression analysis shows that mortality after ICU discharge increased independently with age, SAPS II, ICU readmissions and duration of MV (figure 1c).

1a

Discharged Alive from ICU	1 year survivors	1 year non-survivors	p*	OR (95% CI)	
Total	5291 (81.61%)	973 (18.39%)	<0.001		
Male Sex	3403 (80.92%)	603 (17.75%)	<0.001	OR: 0.88, CI: 0.76-1.03	
Female Sex	1888 (82.70%)	370 (19.80%)	<0.001	OR: 1.13, CI: 0.97-1.31	
Mean age	63.73 (12.28)	73.91 (12.32)	<0.001	OR: 0.12, CI: 0.116-0.124	
CI	1396(26.39%)	142 (10.00%)	<0.001	OR: 0.12, CI: 0.116-0.124	
RT*†	1396(26.39%)	142 (10.00%)	<0.001	OR: 0.12, CI: 0.116-0.124	
ICU stay	1245(23.53%)	152 (11.75%)	<0.001	OR: 1.29, CI: 1.20-1.39	
ICU admission	3430(64.83%)	194 (14.83%)	<0.001	OR: 3.84, CI: 3.58-4.13	
ICU readmission	3715	2945	779(20.73%)	<0.001	OR: 1.75, CI: 1.69-1.82
ICU admission from ED	1371	1369	202(14.76%)	<0.001	OR: 0.56, CI: 0.48-0.67
SAPS II (per 1000)	32,984(17.81)	30,861(18.94)	42,091(19.12)	<0.001	
LOS (days)	5,562(9.9)	5,430(9.9)	6,106(10.3)	<0.001	
Mortality	845(16.09%)	549	236(24.51%)	<0.001	OR: 1.79, CI: 1.51-2.13
Emergency Surgery	946(17.89%)	708	238(25.19%)	<0.001	OR: 1.45, CI: 1.39-1.56
Planned Surgery	2350(44.84%)	1566	489(19.13%)	<0.001	OR: 0.86, CI: 0.80-0.93
Trauma	1075(20.32%)	1060	117(10.96%)	<0.001	OR: 1.88, CI: 1.74-2.03
Non-trauma	1279(24.28%)	141	99(9.37%)	<0.001	OR: 3.21, CI: 3.42-3.23
Mechanical Ventilation	2792	2216	276(23.99%)	<0.001	OR: 1.88, CI: 1.78-1.99
Mechanical Ventilation days	3,036(5.7)	2,916(4.4)	3,631(7.4)	<0.001	

* This data represent SAPS II value on ICU admission; † Student's t test for normally distributed continuous variables, Chi-square test for categorical variables; two sided p values above 0.05 are given as not significant; ‡ Odds of regression; § Continuous variables are presented as mean ± standard deviation.

1b

Outcome	ICU	Non-ICU	Mortality Rate (%)	p	OR (95% CI)
Discharge	3201	389	12.1	<0.001	
Discharge	4086	389	13.4	<0.001	1.03 (0.94-1.13)
Discharge	3703	275	14.4	<0.001	0.85 (0.77-0.93)
Discharge	4032	112	2.7	<0.001	0.30 (0.27-0.34)
Discharge	4029	88	2.0	<0.001	0.23 (0.20-0.26)

Monthly rates of different times after ICU discharge; † Odds of regression; ‡ Chi-square test for categorical variables; § p values above 0.05 are given as not significant.

1c

OR	p	95% CI	
Age	1.07	<0.001	1.06-1.08
ICU admission: Medical, Emergency surgery, Planned surgery, Trauma	0.89	0.029	0.81-0.99
LOS	1.01	<0.001	1.01-1.02
Duration of Mechanical Ventilation days	1.01	0.011	1.01-1.02
ICU admission	2.33	<0.001	2.16-2.51

Results of logistic regression analysis; independent variables are identified by p<0.05. Data are expressed as Odds Ratio and 95% Confidence Interval (CI).

[Figure 1]

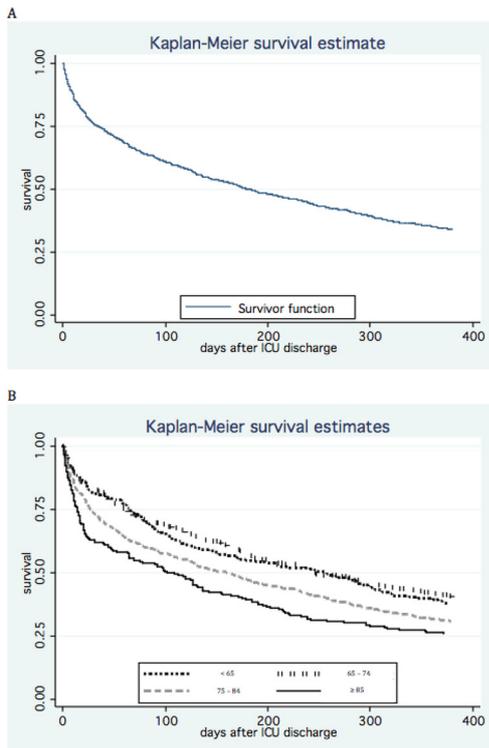
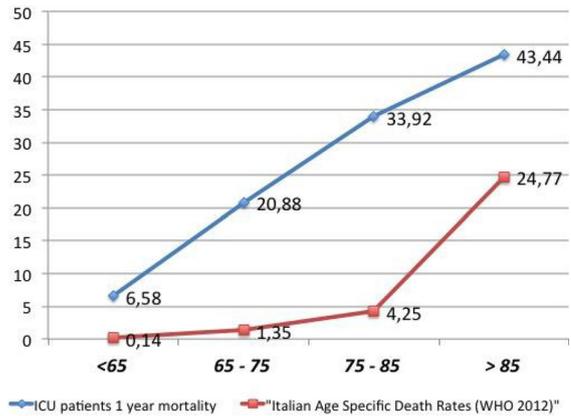


Fig 2: A) Kaplan Meier curve for all the population discharged alive from ICU. B) Kaplan Meier curve for all the population discharged alive from ICU for age classes. p<0.001 Log Rank test.

[Figure 2]

1-year ASMRs were compared to World Health Organization 2012 ASMRs of Italian population (figure 3).



[Figure 3]

CONCLUSIONS. Mortality of elderly patients is high, especially increasing in the 1st month after ICU discharge. ASMR in our ICU were greater than ASMR in Italian population, however this gap decreases with increasing age as if admission criteria could have a marked selection effect in PTS older than 85. The protective effect of ICU on 1-year mortality compared to general population seems to have more influence in PTS older than 85: further studies are needed to investigate their hospital discharge rate, the nursing home admission rate and their quality of life. Age and severity on admission are not modifiable risk factors in elderly PTS, whose frailty lasts after ICU discharge. In this scenario, intensive care outreach policies and dedicated paths might be considered to improve standards of care.

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0924 LONG-TERM MORTALITY AMONG ELDERLY SURVIVORS OF INTENSIVE CARE

A. Hill¹, D. Scales¹, R. Pinto¹, R. Fowler¹

¹Sunnybrook Health Sciences Centre, Toronto, Canada

INTRODUCTION. Demand for critical care is increasing, especially among the elderly. However, little is known about trends in long-term mortality for older intensive care unit (ICU) survivors. We sought to describe these trends and the association of age on outcomes.

METHODS. This population-based cohort study included patients 65 years or older that survived an index ICU admission between April 1, 2002 and March 31, 2012. The primary outcome was 6-month post-discharge mortality and secondary outcomes were 1-year and overall post discharge mortality. Changes in 6-month mortality over time were examined using logistic regression, adjusting for age (categorized as 65 - 74 years, 75 - 84 years and ≥ 85 years), sex, Charlson comorbidity index, mechanical ventilation during ICU admission, ICU length of stay, discharge disposition (classified as home, long-term care and other), location of residence (urban or rural) and neighbourhood household income quintiles. We tested for differences in temporal trends in post-discharge mortality by sex and age by including interaction terms in the models.

RESULT. During the study, 412,040 patients ≥ 65 years were admitted to ICU, and 342,031 (83 %) survived to hospital discharge. Mean follow-up for survivors was 7.3 years. Overall mortality post hospital discharge increased with older age. Among patients 65 - 74 years of age, 6-month, 1 year and overall mortality rates were 6.8, 10.5 and 36.1 %, whereas these rates among the oldest (≥ 85 years) patients were 18.6, 27.1 and 72.8 %, respectively (p < 0.0001). In the adjusted analysis using patients aged 65 - 74 years as the reference, 6-month mortality was higher among those aged 75 - 84 years (odds ratio (OR) 1.43, 95 % confidence interval (CI): 1.39, 1.47) and patients ≥ 85 years (OR: 2.44, 95 % CI: 2.36, 2.52). Overall, 6-month post-discharge mortality decreased over the period (OR: 0.98 per year, 95 % CI: 0.97, 0.98), with no significant differences across age groups (p = 0.17 for interaction between age and year).

CONCLUSION. Mortality post hospital discharge among ICU survivors increases with increasing age. However, we observed decreasing post-discharge mortality rates over time among these elderly patients.

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0925 3-MONTHS FOLLOW UP OF 289 ICU PATIENTS: EVALUATION OF EMOTIONAL DISORDERS AND HEALTH-RELATED QUALITY OF LIFE IN 24-HS VISITING POLICY UNIT

R.R.L. Fumis¹, O.T. Ranzani², P.S. Martins¹, G.P.P. Schettino¹

¹Hospital Sirio-Libanês, Intensive Care Unit, São Paulo, Brazil, ²Hospital das Clínicas, Respiratory Intensive Care Unit, São Paulo, Brazil

INTRODUCTION. Intensive Care Unit (ICU) can be stressful and traumatic for patients and can lead to various physical, psychological and others sequelae.

OBJECTIVES. To investigate the incidence of symptoms of anxiety, depression, post-traumatic stress disorders (PTSD), and the patient performance in pain, health status and activities of daily living (ADL) during and post-ICU (30 and 90 days after discharge).

METHODS. Prospective study was conducted in a private medical - surgical 22 beds ICU with a 24-hs visiting policy between March 2011 and March 2013. Patients with ICU stay ≥ 48 h were invited to participate. Hospital Anxiety and Depression Scale (HADS) was used to assess the symptoms of anxiety and depression during ICU stay, one month and

3-months after ICU. Patients classified their Physical Function related to their general health, pain, and social activity using a subscale of SF 36 and also classified their ADL. The Impact of Events Scale (IES) was also applied to evaluate PTSD. Patients were excluded if they had psychiatric problems, without clinical conditions to answer the questionnaire during ICU stay or with any difficulty to do the follow-up.

RESULTS. A total of 289 ICU patients were interviewed. Of these patients, 48 % were cancer patients, their age was 59.57 ± 16.14 years, 57.4 % were male and SAPS III score was 46.4 ± 15.1 points. Mean ICU LOS was 5.5 ± 7.4 days, ICU mortality was 1.4 %, 1-month mortality was 6.8 % and 3-months cumulative mortality was 10.2 %. We found that 24.6 % had symptoms of anxiety and 12.5 % had symptoms of depression during ICU stay but these symptoms almost disappeared after ICU discharge. Symptoms of PTSD were found in 7.0 % and 1.6 % at 30 and 90 days respectively. Regarding their general health, pain, and social activity and their level of independence (ADL) we could observe that all domains had important improvement at 30 and at 90 days after ICU discharge ($p < 0.001$ for all, Mc Nemar Test). From a linear mixed model, age ($b = -0.006$, $p = 0.002$), female gender ($b = 0.130$, $p = 0.043$), ICU LOS ($b = 0.009$, $p = 0.031$), anxiety and depression symptoms ($b = 1.269$, $p = 0.001$) and renal replacement therapy ($b = 0.455$, $p < 0.001$) were independent predictors of worse IES score at 30 days.

CONCLUSIONS. Patients during ICU stays burned by emotional symptoms and suffer with PTSD at 30 days after ICU but the majority of them return to usual major activity after ICU discharge without emotional symptoms at 90 days.

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0926

LONG TERM MORTALITY IN CHILDREN ADMITTED TO PEDIATRIC INTENSIVE CARE IN SWEDEN 2008-2010

H. Kalzen¹, B.A. Larsson¹, S. Eksborg¹, L. Lindberg¹, C.-E. Edberg¹, C. Frostel¹

¹Astrid Lindgren Children's Hospital, Karolinska Institute, Karolinska University Hospital, ECMO/PICU, Stockholm, Sweden

INTRODUCTION. In a previous cohort study¹, focused on outcome after admission of children between 6 months and 16 years of age to a Swedish intensive care unit, also long term mortality (up to 5 years post ICU admission) was described. Tools for predicting the risk of dying in a PICU, using data gathered at admission (such as PIM2 - pediatric index of mortality 2), exist since over 20 years. However there is presently little information about long term mortality after a PICU admission.

OBJECTIVES. To identify factors predicting long term mortality risk (2 - 5 years post-PICU admission).

METHODS. A new cohort of all PICU-treated children in Sweden during 36 months (2008, 2009 and 2010) with a valid Swedish identity number was formed. Data (including PIM2) on a total of 4938 admissions made by 3655 children aged from a newborn up to 16 years of age were collected from the three PICUs in Sweden. All patients were followed for at least two years (maximum five years). Admissions and patients were divided into different age- and diagnostic groups according to the definitions used by the ANZPIC registry². The mortality in PICUs and cumulative mortality up to the time point of follow up was collected from the National Files of Registration by matching personal identity number with survival.

RESULTS. PICU-mortality was 2.0 %, with a standardized mortality rate below 0.5 using PIM2 scoring. Long term mortality for patients with one or more than one admission is described in the table below (ppt - patients; boys 56 % of total).

CONCLUSIONS. Having more than one admission recorded in the PICUs during the time of study was associated with an increase in long term mortality risk in all the diagnostic groups but Injury and Post op. Mortality at 2 years post ICU more than doubled if patients had been admitted 2 or more times. Such information can be used to select children for centralization to a PICU rather than allowing them to remain in a general (adult) ICU as is often the case in Sweden. There is a need to further clarify causes of late deaths after PICU care in this cohort.

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0927

EARLY PREDICTION OF NEW-ONSET PHYSICAL DISABILITY AFTER INTENSIVE CARE UNIT STAY

A. Schandl^{1,2}, M. Bottai³, U. Holdar¹, E. Heggren¹, P. Sackey¹

¹General Intensive Care Unit, Karolinska University Hospital Solna, Anaesthesiology, Surgical Services and Intensive Care Medicine, Stockholm, Sweden, ²Karolinska Institutet, Neurobiology, Care Science and Society, Division of Nursing, Huddinge, Sweden, ³Karolinska Institutet, Environmental Medicine, Unit of Biostatistics, Stockholm, Sweden

INTRODUCTION. To improve long-term outcomes, different ICU follow-up programs have been suggested for patients with long ICU length of stay or for those deemed in need according to expert opinion-based recommendations. So far, the appropriateness of such patient selections, as well as the efficacy of interventions after ICU discharge to improve outcome are uncertain. Including patients at high risk for new-onset morbidity after ICU stay, rather than all available patients in interventional studies, would increase the chance of revealing treatment effects. Currently, little is known of how to assess the individual patient's risk for disability following critical illness.

OBJECTIVE. The purpose of the study was to develop a method for early prediction - already at ICU discharge - of the individual patient's risk for new-onset physical disability.

METHODS. Twenty-three potential predictors for physical disability were assessed before individual ICU discharge. Two months after ICU discharge, 148 ICU survivors completed the activity of daily living (ADL) staircase questionnaire.

RESULTS. Forty-seven percent of questionnaire responders suffered from new-onset physical disability, defined as worsened ADL. Four independent predictors were identified: Low educational level (odds ratio [OR] = 6.8), impaired core stability (OR = 4.6), fractures (OR = 4.5) and ICU length of stay > two days (OR = 2.6). The predictors were included in a screening instrument. The regression coefficient of each predictor was

transformed into a risk score. The sum of risk scores was related to a predicted probability for physical disability in the individual patient. The cross-validated AUC for the screening instrument was 0.80.

CONCLUSIONS. Educational level is the single most important predictor for new-onset physical disability two months after intensive care unit stay, followed by impaired core stability at ICU discharge, the presence of fractures and prolonged ICU stay. A simple screening instrument based on these predictors can be used at ICU discharge to determine the risk for new-onset physical disability. The instrument may help clinicians to identify patients in need of support, but needs external validation prior to wider clinical use.

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Poster Corner Sessions

Quality assessment & patient-centered outcomes: 0928-0941

0928

COMPARING FAMILY SATISFACTION WITH CARE BETWEEN THE INTENSIVE CARE AND HIGH DEPENDENCY UNITS IN A UNIVERSITY HOSPITAL

M. Cadd¹, K. Regan²

¹Brighton and Sussex Medical School, Critical Care, Brighton, United Kingdom, ²Brighton and Sussex University Hospitals, Critical Care, Brighton, United Kingdom

INTRODUCTION. Care and compassion in medicine has become increasingly high profile in England since the publication of the Francis Report into failings of care in the Mid Staffordshire NHS Foundation Trust in 2013¹. While patients in critical care may be sedated and unable to make decisions about their own care, family and friends may be able to offer insights into provision of ICU care. We used a validated questionnaire to probe differences in family satisfaction between our Intensive Care Unit (ICU) and High Dependency Unit (HDU).

OBJECTIVES. To ascertain the differences in perceived provision of care between the ICU and HDU.

METHODS. The Family Satisfaction ICU-24 questionnaire was developed for use in Canadian ICUs and has since been used extensively worldwide². The questionnaire examines aspects of symptom management, emotional support, communication, staff competency and relative involvement in decision-making. The 24-point questionnaire was distributed to a relative or a friend of all patients aged 18 and over who were admitted to the RSCH ICU and HDU for more than 48 h between 1st November and 31st December 2013. The designated relative had to have visited the unit more than once. The questionnaire comprised of 24 Likert scale questions and 3 qualitative questions for relatives to provide written feedback.

RESULTS. A total of 203 (ICU: 99, HDU: 104) family members received questionnaires; 105 (ICU: 54, HDU: 51) were returned, a response rate of 51.7 % (ICU: 54.5 %, HDU: 49.1 %). The majority of respondents were satisfied with the overall care on both units (% of excellent responses, ICU: 83.3 %, HDU: 70.6 %, $p = 0.12$). There were significant differences in the responses between the ITU and HDU for pain management (ICU: 75.9 %, HDU: 56.9 %, $p = 0.04$) and breathlessness management (ICU: 72.2 %, HDU: 50.9 %, $p = 0.03$). Family members were least satisfied with frequency of communication with doctors (ICU: 40.0 %, HDU: 30.2 %, $p = 0.29$) Narrative comments from relatives were largely positive, although a number of relatives wanted improved communication with doctors.

CONCLUSIONS. The study has shown that while families are mostly satisfied with their relatives' treatment our critical care units, there are issues with communication between medical staff and families and these may be greater in HDU, compared with ITU. The findings of the survey were fed back to medical and nursing staff on the units.

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0929

COMMUNICATION WITH PRIMARY CARE DOCTORS: A SURVEY OF UK INTENSIVE CARE PRACTICES

R. Gray¹, J. Highgate¹, O. Boyd¹

¹BSUH, ICU, Brighton, United Kingdom

INTRODUCTION. Survivors of Intensive care (ICU) may suffer from significant symptoms following ICU discharge that will impact on quality of life. Such symptoms include post-traumatic stress disorder and anxiety¹. Patients may also have decreased health related quality of life from physical symptoms such as muscle weakness². Following discharge home these patients are likely to attend their family or primary care doctors (General Practitioner - GP). A regional survey found that GPs valued communication from ICUs to assist long term management of these patients³.

OBJECTIVES. To establish UK ICUs communication practice with primary care GPs.

METHODS. The survey was constructed using SurveyMonkey© and circulated via the UK Intensive Care Society, regional critical care networks and training deaneries. Structured questions and free text answers were used to illicit practices and individual opinion. Duplicate IP addresses were removed to control for more than one respondent per ICU.

RESULTS. There were 41 respondents, 96 % were from general ICUs. All respondents reported completing discharge summaries on discharge of the patient to the ward. A standardised discharge proforma was used in 95 % of ICUs with 98 % of these reporting that a hard copy of the discharge summary is sent to the receiving ward. Only 19.5 % of respondents report sending a copy of this discharge summary to the patients GP. A separate discharge summary for the GP was done by 9.7 % of units. 87.8 % of respondents reported that they felt communication with the GP was important, but despite this only 19.5 % felt that GPs received accurate information reflecting the problems patients may have after their critical illness. The free text comments found that many respondents were concerned that GPs do not receive accurate or sufficient information from ICUs and therefore may find it difficult to help with symptoms, especially of anxiety. It was also highlighted that GPs may

not be fully aware of the longer term sequelae following a critical care admission and therefore may not be best placed to follow up these patients. There was also concern that many GPs only receive the hospital (not critical care) discharge summary which tends to be done by junior staff and may not truly reflect the critical care admission.

CONCLUSIONS. Although the majority of respondents agreed that GP communication was important, less than 30 % of respondents communicated directly with the GP. Following critical care admission patients may be left with troubling symptoms. Primary care is likely to be the patients' first point of contact and GPs need information to be able to effectively help these patients.

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0930

CALL 4 CONCERN: PATIENT AND FAMILY ACTIVATED CRITICAL CARE OUTREACH

M. Odell¹

¹Royal Berkshire NHS Foundation Trust, Critical Care, Reading, United Kingdom

INTRODUCTION. Rapid Response Systems (RRSs) were an international response to deteriorating patients not being recognised or acted upon^{1,2,3}. RRSs consisted of early warning scoring systems that triggered if the patient deteriorated. Ward teams would refer the patient to expert critical care clinicians who would assess and manage the patient. The contribution that patients and relatives make in the detection of deterioration has only recently been recognised. The University of Pittsburgh Medical Centre introduced Condition (H) help enabling patients and their families to directly contact the Rapid Response teams if they had concerns⁴.

Condition H inspired the Call 4 Concern (C4C) service implemented by the Critical Care Outreach team in a UK hospital⁵. The C4C service has now been running hospital wide for over 3 years and is thought to be the 1st such service in the UK.

OBJECTIVES. To describe and evaluate 3 years data regarding the Call 4 Concern (C4C) service, a UK based patient and family activated Critical Care Outreach (CCO) service.

METHODS. Data on all referrals made to the C4C service were put into a Microsoft AccessTM database. 3½ years of data between 2010 and 2013 have been evaluated for: feasibility in a UK setting, impact on the CCO team workload, referral patterns, patient and referrer demographics and user satisfaction.

RESULTS. During the audit period, 216 C4C referrals were made. The referrals were categorised into 9 main groups. The majority of referrals were to do with a perceived lack of care. It is relatives more than patients that make referrals and it takes considerable motivation before a call is made. The results show that there can be a considerable breakdown of communication between patients and their families and the clinical teams looking after them.

CONCLUSIONS. The patient and their family members can play an important part in the detection of deterioration. Providing a service like C4C empowers the patient and provides valuable information to clinicians about the issues that are really important to patients and their families.

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0931

USING PHONE SURVEYS FOR GATHERING POST ICU FEEDBACK AS A MANAGEMENT TOOL

T. van Galen¹, S.F.M. Evelein-Brugman², J. Krull³

¹Nursing Staff Manager, VU University Medical Center (VUmc), Intensive Care, Amsterdam, Netherlands, ²Intensivist, VUmc, Amsterdam, Netherlands, ³ICU Nurse, VUmc, Amsterdam, Netherlands

INTRODUCTION. Already for some time the ICU of VU University medical center (VUmc) interviews patients or their relatives about the quality of care they've received. This feedback can be used to increase awareness of patient needs or for process improvement^{1,2}. For (post) ICU patients participation is often not possible due to the mental and/or physical condition². Up to 2011 we facilitated an outpatient clinic for research on the physical and mental condition after ICU discharge. This visit was also used for gathering feedback. Due to low attendance the given feedback was minimal. Also written and online surveys were used. Again with a low response rate. Since 2013 the ICU of VU medical center (VUmc) uses phone surveys³ to improve feedback compliance.

METHODS. First step was to determine our ambition and aims and to determine a better way of gathering feedback. The chosen format was to use a phone survey which is applied by a trained nurse talking to a patient (or relative) through each question. If raised during conversation specific issues can be explored in depth or an ICU visit can be planned. Second step was to determine the questionnaire (*what do we want to know?*) and the target population (*who do we want to speak?*). This was set at a 72 h ICU LOS. People are called after 7 days of hospital discharge. The ward investment was two days preparation time and scheduling two focus group nurses for one (partial) day each month.

RESULTS. VUmc started in June 2013 with phone surveys. One phone call lasts from a 15 min minimum up to 45 min. After 10 months 86 out of 300 discharged patients (or relatives) were reached. The quantity of received feedback tripled in a 50 % shorter time period. We received feedback for improvement on ward processes concerning communication, disclosure of information, transfers and handoffs, behavioral attitudes and the performance of medical and nursing tasks. In general patients are satisfied with delivered care and also with the offered ICU after care and attention. Feedback is shared between all ICU employees on a regular base.

CONCLUSIONS. Implementing phone based feedback resulted in multiple positive revenues. The ward investment on feedback decreased and the ROI increased in quantity and quality. Feedback is given instantly during direct communication. This also offers the

possibility to provide more information if needed. Besides the advantages for the hospital the contact after discharge is appreciated very positive. We have future plans to adjust the surveys towards other ICU related topics such as EOL treatment and proper patient and family communication during this ICU stages.

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0932

QUALITY OF ANTHROPOMETRIC MEASUREMENTS IN SPANISH INTENSIVE CARE UNITS (CAMIES STUDY). PRELIMINARY RESULTS

M.Á. García-Martínez¹, A. Arrascaeta Llanes¹, T. Cherednichenko¹, Y. Hidalgo Encinas¹, A.I. Catalá Espinosa¹, E. Herrero Gutiérrez², I. Flores Lucas¹

¹Hospital de Torrevieja, Intensive Care Unit, Alicante, Spain

INTRODUCTION. Some of the organ support techniques used in intensive care need to be adjusted for weight [1]. In some patients there is also the need to accurately measure the weight changes during ICU stay. These treatments are costly and not without side effects, which could get worse if weight is overestimated. Thus the expected benefit may decrease if weight is underestimated [2].

Measuring weight and height is not always an easy task and often they are estimated [1], limiting the analysis of everyday practice. There is not specific recommendation for anthropometric measurements in guidelines.

OBJECTIVES. Primary objective is to describe usual anthropometric measures in Spanish ICUs.

Secondary objectives are to evaluate how important anthropometric measuring is for healthcare personnel, and its differences among healthcare professional groups.

METHODS. We conducted a nationwide survey in Spain enrolling 295 public healthcare system hospitals. We use computer assisted self interviewing and computer-assisted telephone interviewing. The survey questionnaire was also applied to the Spanish Critical Care Society members mailing list. At the end of the eleventh month we had recruited the 83.4 % of the sample. We analyzed if there were weight and height measure protocols, the adherence to them, the availability of measuring tools, the modality of measures and perception of importance of measures, which were analyzed with Likert type questions.

RESULTS. 481 questionnaires from 175 hospitals were obtained. 36.7 % were physicians, 23.4 % nurse's supervisors and 39.9 % nurses. The work experience Mean was 13.8 years (SD 9.2). There were protocols for register height in 28.4 % and for weight in 48.9 %. 62.8 % of sample considered appropriate the adherence to protocols. There were no tools for measuring height and weight in 23.3 % and 65.9 % respectively.

24.8 % of nurses and 37.5 % of physicians considered weight and height are not widely used in therapeutic decision-making.

There were no different predisposition towards the use of anthropometry, but higher reliability attributed to water balance calculated by nurses. The physicians were more prone than nurses to use anthropometric measures (28.8 % vs. 11.2 %).

CONCLUSIONS. Less than half of surveyed hospitals had anthropometric protocols, and there is not wide adherence to them. Only few hospitals have measures tools even having protocols. The estimated measures were the most frequent modalities.

Physicians are more prone to include anthropometry in clinical practice, despite they don't perceive it as important for therapeutic decision-making.

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0933

SATISFACTION OF PATIENTS' FAMILIES WITH CARE RECEIVED DURING STAY IN CARDIOTHORACIC INTENSIVE CARE UNIT: A SURVEY OF PRACTICE

A. Vlachou¹, C. Chamos¹, A. Roshdy¹, C. Vaity¹, A. Crerar - Gilbert¹

¹St George's Healthcare NHS Trust, London, United Kingdom

INTRODUCTION. Service users satisfaction is the most important and cost effective measure of service quality. Satisfaction of intensive care patients may be difficult to assess due to their medical status however patients' families satisfaction can be reliably measured using validated questionnaire (Ref 1).

METHODS. The questionnaire (Ref 1) was used in a 17 bed tertiary cardiothoracic unit (CTICU) with mixed population of cardiothoracic, vascular, cardiology, and general intensive care patients. The questionnaire was distributed to the next of kin of patients with at least 48 h of CTICU stay, after the patient's discharge to the ward. Questionnaires were anonymous, collected in sealed envelopes, but included patients' and next of kin's information.

Relatives who did not speak English, had communication problems and those of patients that died, were excluded.

RESULTS. Over 18 months time (from April 2013 to April 2014) 100 questionnaires were collected.

The patient were 24 % medical and 76 % surgical, with age range between 18 and 81 years, while the length of stay in CTICU varied from a minimum of 2 up to a maximum of 99 days.

Age of relatives was between 25 and 83 years (median of 51) while the racial background was predominantly White British (63 %) and Indian (10 %). The 51 % of the relatives were Christians, 20 % had no religion and 16 % had other religion or did not answer.

Eighty percent of responders were completely and very satisfied with overall care of the family. Satisfaction with spiritual support was not applicable in 65 %; thirty-one percent were satisfied and 2 % were very dissatisfied.

Ninety-two percent of relatives were completely or very satisfied with the overall care received by the patient, 4 % mostly satisfied, 1 % very dissatisfied and 3 % did not answer. 85 % were completely and very satisfied with communication from nurses and 81 % with communication from doctors. Seventy-seven percent were completely and very satisfied with their participation in decision making regarding patients' care. Eighty-eight percent were completely and very satisfied with the atmosphere on the unit. On the other hand only the 47 % were completely and very satisfied with the facilities of the waiting area.

CONCLUSIONS. Majority of responders were completely or very satisfied with the treatment that families and patients received. On the contrary, families were least satisfied with participation in decision making. Although a satisfactory level of communication between relatives and staff (doctors and nurses) was stated, improvements are still achievable.

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0934

HOW LARGE IS THE PROPORTION OF PATIENTS THAT SHOW A SIGNIFICANT IMPROVEMENT IN HEALTH RELATED QUALITY OF LIFE AFTER EXTENDED PERIOD OF CRITICAL ILLNESS?

L. Orvelius¹, C. Mårdh², C. Agvald-Öhman³, C.-J. Wickerts³, S. Walther⁴, F. Sjöberg⁵

¹University Hospital of Linköping, Dep of Intensive Care, Clin and Experimental Med, The Swedish Intensive Care Registry, Linköping, Sweden, ²Kristianstad University, The Swedish Intensive Care Registry, Kristianstad, Sweden, ³Stockholm University, The Swedish Intensive Care Registry, Stockholm, Sweden, ⁴Linköping University, The Swedish Intensive Care Registry, Dep of Medicine and Health Sciences, Linköping, Sweden, ⁵Linköping University, Dep of Intensive Care, Clinical and Experimental Medicine, The Swedish Intensive Care Registry, Linköping, Sweden

INTRODUCTION. Sweden has several established quality registries and one of these is the Swedish Intensive Care Registry (SIR), established in 2001. Beside clinical data it is of importance to include patient reported outcome measures (PROM) variables in such registries, amongst which health-related quality of life (HRQoL) is thought most important. Since 2009 SIR has used the HRQoL questionnaire, SF-36, and registering the patient perceived HRQoL data 2, 6 and 12 months after discharge from the Intensive care unit (ICU). Today almost all (n = 87) ICUs in Sweden participate to the registry and the database can provide a larger population of patients with an extended ICU time, something which is difficult to attain.

OBJECTIVES. The objective of the study was to evaluate whether and to what extent the patients with long duration of ICU time (> 96 h) is affected by intensive care short time (two months) after discharge from the ICU, and if there are any changes over time (up to 12 months). Significant improvement was defined as an improvement in all eight dimensions of SF-36.

METHODS. HRQoL data (SF-36) from SIR were examined at 2, 6, and 12 months after discharge from the ICU. The changes in HRQoL over time were examined and divided in three groups: improvement (in all eight dimensions), impairment (in all eight dimensions) or both (a mix of improvement in some dimensions and impairment in some dimensions). To analyse the impact of background- and ICU-related factors, clinical data from the database were extracted.

RESULTS. Data included 847 patients on all three occasions (mean age 62 years). Between 2 and 6 months 232 (27 %) of the patients had improved, and 46 (5 %) patients had impaired HRQoL. Six patients (0.7 %) had unchanged HRQoL. Between 6 and 12 months 182 (22 %) patients had improved and 86 (10 %) of the patients had impaired HRQoL. For the patients with a mix of improvements and impairments (n = 563) the most improved dimension between 2 and 6 months where physical function and the most impaired dimension were general health. Between 6 and 12 months the corresponding results were seen in vitality and mental health.

CONCLUSIONS. The results shows that for the patients with a length of stay > 96 h most of the patients (n = 563, 66 %) perceived a mix of improvements and impairments in their HRQoL up to 12 months after discharge from ICU. Interestingly approximately 25 % of the patients showed improvement in all dimensions and this prevailed beyond 2 months and the way up to 12 months post ICU.

0935

THE POST INTENSIVE CARE SYNDROME: PRIMARY RESULTS FROM AN ICU FOLLOW-UP CLINIC

R. Drexhage¹, F.J. Schoonderbeek², E. Letert², S. Vink², A.F.C. Schut²

¹Ikazia Hospital, Internal Medicine, Rotterdam, Netherlands, ²Ikazia Hospital, Intensive Care, Rotterdam, Netherlands

INTRODUCTION. Many ICU-survivors experience physical, cognitive and emotional impairment after ICU-discharge, a condition known as the post-intensive care syndrome (PICS).¹ PICS results in severely diminished quality of life and significant disease and economic burden.^{2,3}

OBJECTIVES. Our aim was to investigate in our post-ICU population the incidence of PICS-symptoms. We initiated an ICU follow up clinic for patients who stayed in the ICU for more than 72 h. These patients were seen three months after ICU-discharge by an intensivist and a trained ICU-nurse.

METHODS. Patients and their spouses were asked to fill out internationally validated questionnaires: MVI-20(multidimensional fatigue index),CISS-21(coping inventory for stressful situations),HADS(hospital anxiety and depression scale),TSQ(truma screening questionnaire),SF-36(short-form health questionnaire). Based on these questionnaires patients were interviewed about their physical, emotional and social wellbeing.

RESULTS. In the first year of this study, 30 patients were seen at ICU follow up clinic (response rate 88 %). Thirty-five to 45 % of patients experienced physical symptoms such as extreme fatigue, sleep disturbances, feelings of anxiety and diminished concentration. Emotional problems in the form of disturbing memories, nightmares, reliving, increased irritability and awareness of imminent dangers were present in up to 25 % of patients. About 15 % of patients met the criteria of post-traumatic stress disorder (PTSD). Physical and emotional impairments were not correlated with length of ICU stay, neither with the use of inotropic or vasopressic agents or dialysis. Patients who suffered from a delirium and those who were mechanically ventilated suffered more emotional and physical impairments. However, 45 % of all patients scored their health as good or excellent three months after discharge.

CONCLUSIONS. Overall, patients were satisfied with the offer to visit the ICU follow-up clinic according to the high response rate of 88 %. Over 50 % of patients suffered from new physical and/or emotional impairments after ICU stay. Presence of a delirium and mechanical ventilation during ICU stay seemed to increase the risk of PICS in our population, which has also been reported in recent literature.⁴ The high incidence of health problems after ICU-stay urges us to focus more on quality of surviving by means of bundling best practices in order to prevent PICS.

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0936

EARLY REALITY-ORIENTING ASSURING AND SLEEP ASSURANCE FOR DELIRIUM IN INTENSIVE CARE UNIT(ICU): A QUALITY IMPROVEMENT(QI) PROJECT

S.Y. Park¹, H.S. Kim², Y.H. Choe¹, S.R. Kim¹, S.J. Park¹, Y.C. Lee¹, H.B. Lee¹

¹Chonbuk National University Hospital, Department of Internal Medicine, Jeonju, Republic of Korea, ²Chonbuk National University Hospital, Department of Nursing, Jeonju, Republic of Korea

INTRODUCTION. Delirium is a global disturbance in cognitive function that is characterized by impaired attention associated with changes in the level of consciousness, disorganized thinking, and a fluctuating course. It occurs in up to 60 ~ 80 % of the ICU patients and has been associated with poor hospital outcomes, including increased morbidity, mortality prolonged length of stay and functional decline.

OBJECTIVES. We conducted the present study to assess the efficacy of reality-orienting assuring and sleep assurance for delirium prevention in ICU patients.

METHODS. From March 2013 to September 2013, we retrospectively reviewed patients in surgical ICU of Chonbuk National University Hospital in Korea. The patients were stratified into pre- or post- QI groups according to whether the QI projects was applied or not. The patients with confounding clinical features(less than -2 RASS or more than +2 RASS at admission, pre-existing dementia, and neurologic impairments) were excluded. The primary end point was the incidence of delirium during ICU stays longer than 48 hrs. Delirium was assessed using the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) in intensive care patients and related the findings to the level of sedation, as assessed with RASS score daily.

RESULTS. A total of 130 patients, 88 pre-QI and 42 post-QI patients, were assessed. The mean age of subjects was 56.6 ± 18.6 (Pre-QI group : 56.9 ± 19.2, Post-QI group: 55.9 ± 17.5), and 54(41.5 %) was female. The mean ICU stay was 5.1 ± 4.3 days (Pre-QI group: 5.1 ± 4.5, Post-QI group: 5.1 ± 3.9).

The primary end point was decreased from 34.1 % to 19.0 % (P = 0.078), but was marginally significant.

CONCLUSIONS. Our data suggest that early reality-orienting assuring and sleep assurance appear to be relatively effective preventive option for delirium in critically ill patients.

0937

USE OF META-ANALYSES TO SUPPORT CLINICAL DECISION MAKING IN THE ICU: POOR TECHNICAL KNOWLEDGE OF META-ANALYSES LEADS TO LOWER THAN EXPECTED USE

P.T. Heighes¹, G.S. Doig¹

¹University of Sydney, Northern Clinical School Intensive Care Research Unit, Sydney, Australia

INTRODUCTION. Published hierarchies for accessing pre-appraised evidence propose clinicians should seek evidence based clinical practice guidelines and systematic reviews in preference to randomised clinical trials (RCTs) when looking for evidence to guide clinical practice⁽¹⁾ with major credible bodies further advocating systematic reviews as representing the highest level of evidence to support clinical decision making⁽²⁾.

OBJECTIVES. We conducted a survey of Intensive Care Specialists in Australia and New Zealand to determine which types of evidence they prefer to guide clinical decision making in the Intensive Care Unit (ICU).

METHODS. We developed and administered a direct mail out survey following the principles of The Dillman Total Design Method⁽³⁾, allowing for anonymous responses with repeated mail-outs to non-responders. We sent survey packages containing a cover letter, questionnaire and reply paid mail envelope to 238 randomly selected Intensive Care Specialists from the sampling frame of the 685 currently (Jan 2011) registered members of the College of Intensive Care Medicine (CICM).

RESULTS. The overall response rate to our survey was 55.9 % (133/238). In response to the question "How often do you use the following information sources to guide decisions in your clinical practice?" respondents ranked Meta Analyses 6th out of 9 possible types of evidence. Furthermore, respondents scored an average of 1 correct out of 3 on questions concerning technical knowledge of meta-analyses compared to an average score of 1.9 out of 3 for technical knowledge of RCTs.

CONCLUSIONS. Systematic Reviews and Meta-analyses of focused clinical questions are reliable and important sources of evidence, which should be used to guide clinical decisions^(1,2,4). Strategies to improve knowledge regarding technical aspects of the conduct of meta-analyses may help improve their use in clinical practice within the ICU.

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0938

CENTRAL VENOUS CATHETER INSERTION PRACTICES: ARE WE STILL MATCHING MICHIGAN? - A NATIONAL PILOT PROJECT ACROSS 9 HOSPITALS OF THE WESEX REGION

A. Wong^{1,2}, H. Wilkins¹, Southeast Perioperative Audit and Research Collaboration (SPARC-ICM)

¹Queen Alexandra Hospital, Dept of Critical Care, Portsmouth, United Kingdom, ²SPARC-ICM, Wessex, United Kingdom

INTRODUCTION. Bloodstream infections associated with the insertion and subsequent care of central venous catheters (CVCs) are a significant cause of morbidity/mortality. Implementation of a guideline to support best practice for insertion and ongoing care can reduce the incidence of infective and other complications associated with CVCs.

Matching Michigan¹ is arguably the most prominent quality improvement programme in ICUs linking technical and non-technical interventions such as leadership; teamwork and

culture change have been shown to reduce central venous catheter bloodstream infections (CVCBSIs). This quality improvement programme, introduced by the National Patient Safety Agency (NPSA) in 2009 has had high levels of participation across English Intensive Care Units. Amongst the technical interventions is the use of a CVC insertion bundle. Since then, there have been several guidelines/bundles of care covering CVC insertion from a variety of organisations internationally.

OBJECTIVES. Audit the compliance of CVC insertion practices against published guidelines². This audit will also serve as the pilot for the development of the UK's first National ICM Audit Recipe Book.

METHODS. Prospective audit of documentation for all new central lines managed on the ICU for 7 days across the Wessex region. Data was collected regardless of where the line was initially inserted (e.g. Emergency department, theatres, other hospital).

Units were also asked if they are still collecting Matching Michigan data and if so, what their CVCBSI rates were.

RESULTS. Practice in 12 units across 9 hospitals in the Wessex Region were audited. The units ranged from general ICUs but also included a neuro, cardiac and paediatric ICU. Only 61.4 % of lines inserted were fully compliant with the bundle. Highest areas of non-compliance were the use of hat and mask.

Only half of the units still monitored their CVCBSI rates.

CONCLUSIONS. CVC are arguably the most common invasive procedure performed on ICUs. Yet compliance with CVC insertion bundle was variable. Compliance could be improved through an education programme and continual auditing rather than a snapshot. As not all units monitored their CVCBSI rates, it is difficult to assess the impact of non-compliance. Interestingly, units that did monitor their rates were also not fully compliant with the bundle. CVC insertion bundles need to be complemented with a management bundle and an active surveillance of infection rates. This would allow early intervention and assessment of interventions targeted at reducing CVCBSI.

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0939

CHEST COMPRESSION EVALUATION WITH TRUE CPR® DEVICE

I. Fernández Simón¹, S. Alcántara Carmona¹, M. Valdivia de la Fuente¹, H. Villanueva Fernández², D. Palacios Castañeda¹, J. Palamidessi Domínguez¹

¹Hospital Univ. Puerta de Hierro, Madrid, Spain

INTRODUCTION. Studies indicate that the quality of CPR is an important contributor to successful outcome¹. Because of this, CPR feedback/prompt devices are being used increasingly to guide CPR performance in clinical practice².

OBJECTIVE. To evaluate the quality of the chest compression applied by the intensive care unit (ICU) staff of a tertiary hospital in order to study the efficacy of CPR.

METHODS. We evaluated residents and certified intensive care specialist of a tertiary hospital ICU (Hospital Universitario Puerta de Hierro Majadahonda, Madrid, Spain) during a two minute period of basic CPR applied over a dummy. The quality of CPR compressions was assessed by the TRUE CPR® device which provides accurate compression depth analysis by measuring changes in magnetic fields strength between a backpack and chestpad, and enables us to study also deflection, CPR rate and effective compression time.

RESULTS. We evaluated a total of thirteen physicians, seven intensive care specialists and six residents, all with at least one board certified CPR course. The median of ICU experience was six years (range 1 - 37). The mean correct compressions depth was 58 ± 30.8 %, deflections were 87 ± 29.2 %, CPR rate was 111 ± 12.7 compression per minute and effective compression time was 88 ± 6.69 %.

CONCLUSION. Overall, CPR quality was good except for compression depth. TRUE-CPR® and similar devices could help us guide CPR quality, efficacy and identify faults with the objective to improve CPR.

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0940

DEGREE OF ADHERENCE TO RECOMMENDED ANTIVIRAL TREATMENT DURING THE PANDEMIC AND POST-PANDEMIC PERIODS OF INFLUENZA A (H1N1) PDM09 IN 148 UCIS IN SPAIN

L. Canadell¹, I. Martín-Iocheches², E. Díaz², S. Trefler³, S. Grau⁴, J.C. Yebenes⁵, A. Rodríguez⁶, GETGAG/SEMICYUC

¹Hospital Universitari Joan XXIII, Pharmacy, Tarragona, Spain, ²Hospital de Sabadell, Critical Care Center, Corporació Sanitària Universitària Parc Taulí, CIBER Enfermedades Respiratorias, Critical Care, Sabadell, Spain, ³Hospital Universitari Joan XXIII, Critical Care, Tarragona, Spain, ⁴Hospital del Mar, Pharmacy, Barcelona, Spain, ⁵Hospital de Mataró, Critical Care, Mataró, Spain, ⁶Joan XXIII University Hospital/URV/IISPV/CIBERES, Tarragona, Spain

INTRODUCTION. Adherence to guidelines for community-acquired pneumonia treatment is usually low. However, the degree of adherence to treatment guidelines during the pandemic influenza A period is not known.

OBJECTIVES. To assess the degree of adherence to antiviral treatment and its impact on the mortality in critical ill patients affected by influenza A(H1N1)pdm09.

METHODS. Secondary analysis of prospective study in patients with influenza A (H1N1) pdm09 in the 2009 pandemic (PM) and 2010-11 post-Pandemic (PP) periods. Adherence was classified as:

- 1) Total (AT);
- 2) partial in doses (PD);
- 3) partial in time (PT) and
- 4) non-adherence (NA).

Viral pneumonia, obesity and mechanical ventilation were considered severity criteria (SC). The analysis was performed using t-test or "chi" square. The association with mortality was analyzed by Cox regression. P-value < 0.05 were considered significant.

RESULTS. We included 1058 patients, 661 (62.5 %) in PM and 397 (37.5 %) in PP periods. Global adherence was 41.6 % and it was higher in PM (43.9 %) than PP (38.0 %), p = 0.07 periods. Patients with SC were more frequent in the PP (68.5 %) regarding PM period (62.8 %; p = 0.06). Among SC patients, the AT was 54.7 % for PM and it diminished to the 36.4 % in PP (p < 0.01). The NA (19.7 % vs. 11.3 %; p < 0.05) and PT (20.8 % vs. 9.9 %, p < 0.01) were more frequent in PP period. The mortality rate was higher in PP period (30 % vs. 21.8 %, p < 0.001). APACHE II (HR = 1.09), hematologic

disease (HR = 2.2) and treatment adherence (HR = 0.47) were variables associated independently with mortality.

CONCLUSIONS. We observed a low degree of adherence to the antiviral treatment in both periods. Adherence to antiviral treatment recommendations is associated with lower mortality and should be recommended in each winter period

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0941

SHOULD YOU HAVE A LIBRARIAN ON YOUR WARD ROUND? - EXPERIENCE AND IMPACT

A. Kaliappan¹, T. Ellis², L. Hunwick², S. Lanney²

¹Basildon and Thurrock University Hospital, Critical Care, Basildon, United Kingdom,

²Basildon and Thurrock University Hospital, Basildon Healthcare Library, Basildon, United Kingdom

INTRODUCTION. Doctors, nurses and other healthcare professionals are highly committed to practising evidence based medicine. However, due to the busy and highly acute nature of the clinical work, it can be difficult to find the time to search for evidence when a question arises in the clinical environment. Lack of time is the biggest barrier for clinicians to practice evidence based medicine. We sought to facilitate clinical practice based on the best available evidence by providing a clinical librarian service.

METHODS. In May 2013 we embarked on a pilot of a Clinical Librarian service in the Critical Care Unit. Hospital librarians attended the critical care ward round on a rotational basis 3 times per week. Equipped with a wi-fi enabled ipad they facilitated access to all major quality healthcare resources and databases and were able to search these for answers to any clinical questions that arose at the patient's bedside. Searches were conducted and results delivered at the bedside and these were used in clinical decision making and teaching. The results were also emailed to the clinicians. They also responded to queries related to service improvement and continued professional development. This service is available to intensivists, microbiologists, doctors from other specialities, nurses, pharmacists, dieticians and physiotherapists working in critical care.

RESULTS. During the pilot period 87 queries were recorded across 100 attendances at the ward round of which more than three quarters were requested by intensive care consultants. 75 % of the total number of queries can be directly attributed to individual patient care. Clinicians reported that their decision was influenced by the evidence that was provided to them at the bedside on the ward round. The librarians also helped in getting published guidelines, and looking up rare conditions. The librarian also provided formal and informal teaching on search techniques and databases.

In addition, librarians answered queries from junior doctors, microbiologists, pharmacists, and nurses which ranged from finding guidelines and evidence to drug interactions and were regularly approached about organising library inductions and training for new staff. The search results were used for doctors teaching after the ward rounds and journal clubs. A survey was conducted to assess the effectiveness of the service after the pilot period. 81 % of the staff who responded said that the service was useful with regards to patient care and that they desired it to continue.

CONCLUSIONS. The implementation of a Clinical Librarian service on the Critical Care Unit has enabled access to the best evidence at the point of need to enhance decisions about patient care, stimulated opportunities for the training of clinicians, contributed to service improvements and individual professional development.

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0942

METFORMIN-ASSOCIATED LACTIC ACIDOSIS - CAUSE AND POTENTIAL TREATMENT WITH CELL-PERMEABLE SUCCINATES

F. Sjövall^{1,2}, S. Piel^{1,2}, J. Ehinger^{1,2}, R. Ford³, H. Fliri³, E. Elmér^{1,2}, M.J. Hansson^{1,2}

¹Lund University, Mitochondrial Medicine, Lund, Sweden, ²Neuro Vive Pharmaceutical, Lund, Sweden, ³Selcia Ltd, Ongar, United Kingdom

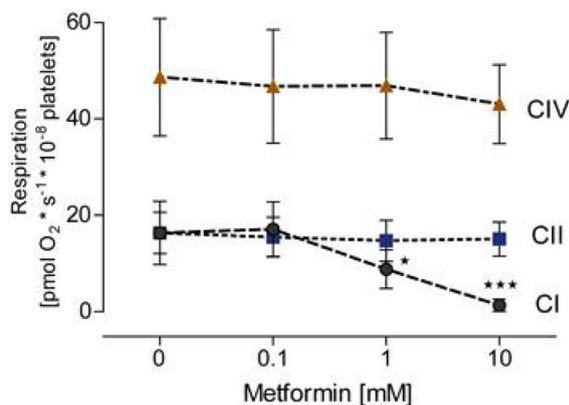
INTRODUCTION. Metformin is considered as one of the first-line treatments for type 2 diabetes due to its ability to reduce hemoglobin A1c values as well as secondary complications including diabetes-related death. However, metformin-associated lactic acidosis (MALA) is an uncommon but severe side effect with an attributed mortality of up to 50 % in severe cases requiring admission and treatment at an intensive care unit. MALA has been linked to drug-induced inhibition of complex I (CI) of the mitochondrial electron transfer system with the possibility to restore ATP production by the addition of succinate, bypassing CI. However, succinate cannot pass intact plasma membranes and is therefore unable to restore ATP production in intact cells even with parenteral administration.

OBJECTIVES. The aim of this study was to confirm the CI inhibitory effect of metformin and evaluate if metformin-induced lactate accumulation can be prevented by treatment with a group of newly developed cell-permeable complex II (CII) substrates.

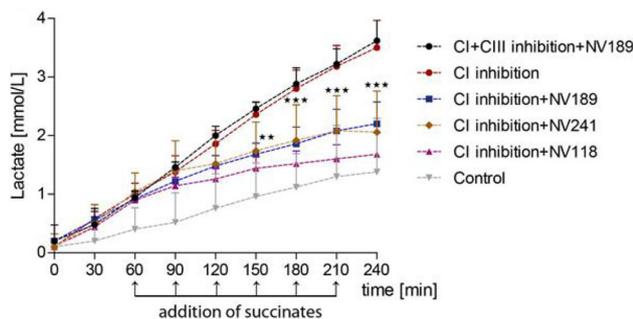
METHODS. Mitochondrial respiratory function of human platelets and peripheral blood mononuclear cells was assessed at different concentrations of metformin. Respiratory capacity was analyzed using high-resolution respirometry in intact and permeabilized cells. Additionally, metformin's effect on switching cellular metabolism from oxidative phosphorylation to glycolysis was investigated by measuring lactate accumulation in suspensions of intact human platelets. Three cell-permeable prodrugs of succinate specifically designed and synthesized to bypass CI dysfunction and support mitochondrial respiration and ATP-production through CII were evaluated for their capability to restore aerobic metabolism and reduce metformin-induced lactate accumulation.

RESULTS. Metformin inhibited mitochondrial function of human peripheral blood cells at CI in a time- and dose-dependent fashion at concentrations relevant for metformin intoxication (Fig. 1). Metformin further caused a significant increase in lactate production in intact platelets over time. The three cell-permeable prodrugs of succinate significantly reduced lactate production in metformin-exposed intact platelets whereas exogenously applied succinate had no effect on the metformin-induced production of lactate (Fig. 2).

CONCLUSIONS. Metformin induces CI specific mitochondrial inhibition and an increase in lactate production pointing towards mitochondrial inhibition as causative mechanism for development of lactic acidosis in metformin-intoxicated patients. Treatment of platelets with cell-permeable CII substrates alleviated metformin-induced production of lactate. Thus, substrate circumvention of CI potentially provides a strategy for pharmacological intervention in patients with MALA and other disease processes and conditions where CI dysfunction is implicated.



[Metformin and mitochondrial respiration]



[Succinates and lactate production]

0943

VANCOMYCIN IS UNDERDOSED IN PATIENTS WITH HIGH ESTIMATED GLOMERULAR FILTRATION RATE

J. Weigel¹, M. Egal¹, A. Lima¹, B. Koch², N.G. Hunfeld^{1,2}, T. van Gelder², J.W. Mouton³, A.B.J. Groeneveld¹

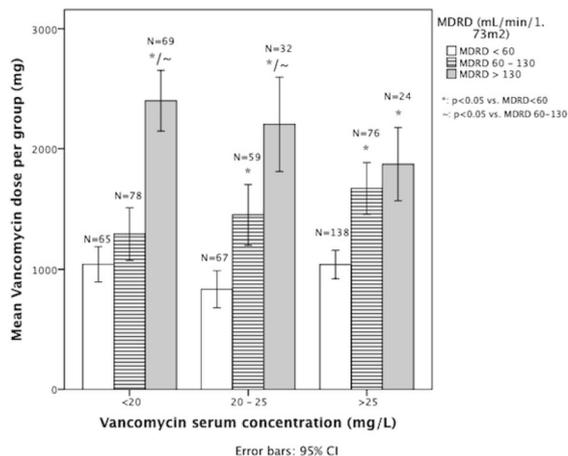
¹Erasmus MC, Intensive Care, Rotterdam, Netherlands, ²Erasmus MC, Hospital Pharmacy, Rotterdam, Netherlands, ³Erasmus MC, Medical Microbiology and Infectious Diseases, Rotterdam, Netherlands

INTRODUCTION. Vancomycin is the most commonly prescribed glycopeptide for nosocomial infections due to gram-positive bacteria. Subtherapeutic serum concentrations of vancomycin can result in treatment failure. This phenomenon could be explained by augmented renal clearance (ARC), MDRD > 130 mL/min/1.73 m².

OBJECTIVES. To investigate the hypothesis that ARC measured by MDRD leads to subtherapeutic serum vancomycin concentrations (SVC).

METHODS. We retrospectively included all patients without continuous renal replacement therapy in our general ICU with continuous vancomycin infusion during ICU admission between June 2012 and December 2013. Standard vancomycin loading dose of 20 mg/kg of body weight was given. TDM was performed and the maintenance infusion rate was adjusted to a target SVC of 20-25 mg/L. Patients were grouped according to eGFR, which was calculated using MDRD formula. We compared vancomycin dose to SVC in the different eGFR groups using One-Way ANOVA analysis with Bonferroni correction.

RESULTS. We evaluated 608 SVC measurements from 287 patients with a mean age of 54.9 years, and 69 % were male. Subtherapeutic SVC were more frequent in patients with MDRD > 130 compared with patients with MDRD < 130 (55.2 % vs 29.3 %; p < 0.001). Figure 1 shows mean vancomycin dose per group stratified by SVC in the three MDRD groups. Mean vancomycin dose is higher in the MDRD > 130 group.



[Fig 1]

CONCLUSIONS. High eGFR is associated with subtherapeutic SVC. In patients with ARC a higher standard maintenance dose of vancomycin is needed to reach therapeutic SVC. Pharmacokinetic models taking ARC into consideration are needed.

0944

PHARMACISTS' INTERVENTIONS IN THE INTENSIVE CARE UNIT

J. Landa¹, C. McKenzie¹, A. Jones¹, R.S. Bourne², M. Tomlin³, I. Bates⁴, R. Shulman⁵, on behalf of the PROTECTED-ICU UK Investigators

¹Guy's and St Thomas' NHS Foundation Trust and Kings College London, Pharmacy and Intensive Care, London, United Kingdom, ²Sheffield Teaching Hospitals NHS Foundation Trust, Pharmacy, Sheffield, United Kingdom, ³University Hospital Southampton NHS Foundation Trust, Pharmacy, Southampton, United Kingdom, ⁴School of Pharmacy, University College London, London, United Kingdom, ⁵University College London Hospital NHS Foundation Trust, Pharmacy, London, United Kingdom

INTRODUCTION. It is recognised that critically ill patients require the multidisciplinary team to receive optimum care. Specialist clinical pharmacists (SCPs) have been shown to improve clinical and economic outcomes of patients contributing to their care by reducing medication errors, rationalising therapy, identifying drug interactions or suggesting alternative therapies. [1,2] **OBJECTIVES.** To describe SCP activity and interventions across a range of intensive care units throughout the United Kingdom (UK). To provide essential data on rate of Intensive Care Unit prescribing error and prescription optimisation, to identify the mechanism and impact of each intervention in the prevention of harm and improve patient therapy.

METHODS. A prospective observational study was undertaken in 21 critical care units in the UK from 5-18th Nov 2012. A data collection web portal was designed for the SCP to record all interventions. Each intervention was classified as either: prescribing error, optimisation or consult. In addition, a clinical impact scale was used to code the interventions. Interventions were scored as low, moderate, high impact and life saving. The final coding was moderated by blinded independent multidisciplinary trialists.

RESULTS. 20,740 prescriptions were reviewed with 3,390 interventions recorded by the SCPs. This resulted in an overall intervention rate of 16.3 %: 6.8 % were classified as prescribing errors, 8.3 % optimisations and 1 % consults. The interventions were classified as: low impact (33.6 %), moderate impact (47.1 %) high impact (19.3 %) and one case was life saving.

CONCLUSIONS. This observational study demonstrated that both prescribing error and optimisation rates were high. Almost 1 in 6 prescriptions required an intervention from the SCP. The error rate was similar to an earlier UK prescribing error study (EQUIP) [3]. Two-thirds of the interventions were of at least moderate impact. SCPs embedded within the critical care team provide a valuable contribution, reducing patient harm from medication errors and optimising pharmacotherapy.

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0945

STUDY OF PATIENTS ADMITTED TO THE INTENSIVE CARE UNITS FOR INTOXICATION

I. Macías-Guarasa¹, M.D. Arias-Verdu¹, E. Banderas-Bravo¹, R. Gutierrez-Rodriguez¹, E. Aguilar-Alonso², R. Rivera-Fernández¹

¹Carlos Haya University Hospital, Intensive Care Unit, Málaga, Spain, ²Baza Hospital, Intensive Care Unit, Baza, Granada, Spain

OBJECTIVE. To evaluate the gravity and mortality of those patients admitted to the ICU, intensive care unit, for intoxication.

METHODS. A multi-centre study, carried out between 2008 and 2013, on all patients admitted for intoxication in different Spanish intensive care units, in Málaga, Cabra and Jaen. Those patients suffering intoxication who were admitted for other reasons were excluded from the study. Information was gathered on the type of intoxication, data needed for calculating different prognosis scores, need for mechanical ventilation, and mortality. Mean and typical deviation were used for quantitative variables and frequency and proportions for qualitative variables. T student and Logistical Regression were used for the multivariable analysis. p < 0.05 was considered statistically significant.

RESULTS. 119 patients were admitted: 76 in Málaga, 21 in Cabra and 22 in Jaen. Intoxication causes were: medication in 92 patients (77.3 %), caustics in 11 (9.2 %) and alcohol in 20 (16.8 %). 78.3 % were attempted suicides. The mean age was 44.42 ± 13.85. Mean GCS score was 8.39 ± 4.51, in 72.5 % it was ≤ 8 points. 69.7 % needed mechanical ventilation. Patients who died were older 59 ± 10.64 vs 43.35 ± 13.49 years (p < 0.001), and had more gravity evaluated by SAPS-3 63.25 ± 17.16 vs 53.51 ± 10.6 (p = 0.018). Mortality predicted by SAPS-3 (by general equation) was 26.8 %, but observed mortality was only 6.7 %.

The mortality of 11 patients admitted for ingestion of caustics was, 54.5 %, and the rest non-caustic, 1 % (P < 0.001). The mortality of 92 patients admitted for ingestion of medicines was 1.1 %, and the rest, non-medicines, 27.9 %, and those patients admitted for alcohol intoxication, N: 22, was 0 %, and the others non-alcohol 99.8 %. All differences between groups were significant, except for patients with alcohol intoxication (P : 0.188). The multivariable analysis carried out with Logistical Regression showed that with SAPS-3 equal gravity, OR: 1.19 (1.02-1.39), the mortality of patients who had ingested caustics was far higher OR: 560.34 (11.64-26973.83), than the rest. Drug-induced and alcoholic intoxication variables were not included in the model.

CONCLUSIONS. Admission to ICU for intoxication is rare. Levels of consciousness are affected in a high percentage of cases, as indicated by the low GCS score and a high number of needed mechanical ventilation. SAPS-3 predicted mortality was significantly higher than observed mortality. Mortality of patients admitted for caustic poisoning was much higher compared to the patients admitted for intoxication by other products.

0946

APPRAISAL OF LATE PHASE ENDOSCOPY IN CAUSTIC POISONING

J. Go¹, O.H. Kim¹, Y.S. Cha¹, K.H. Lee¹, H. Kim¹

¹Wonju Severance Christian Hospital, Department of Emergency Medicine, Wonju City, Republic of Korea

INTRODUCTION. Endoscopy has been recommended as the primary procedure for determining the extent of damage and the prognosis in patients with caustic ingestions. Endoscopy within the first 24 h has been suggested, but such immediate endoscopy is not always possible.

OBJECTIVES. we wanted to evaluate complications of endoscopy performed more than 24 h after the ingestion of caustic substances.

METHODS. From January 2005 to May 2013, 125 patients were diagnosed with caustic poisoning in the emergency department of Wonju Severance Christian Hospital. Of these, 115 consecutive patients underwent endoscopy. Thirty-five patients were excluded from the analysis as a result of insufficient data; therefore, 80 patients were ultimately included in the study. We defined late endoscopy as endoscopy which was performed from 24 to 96 h after the ingestion event.

RESULTS. Thirty-one patients (39.2 %) were diagnosed with acid ingestion. Sodium hypochlorite was the most commonly ingested substance (37 patients, 47.4 %). Forty patients (51.3 %) had been intentionally exposed to caustic agents, and median endoscopy time was 17.8 (IQR 9.2-36.9) hours. The late endoscopy group consisted of 29 patients (36.3 %). There were no complications, such as perforation, bleeding, or interactions with sedative medications in either the early or late endoscopy groups. Also, there was no difference in ingested materials, endoscopy grade, or late sequelae between the two groups.

CONCLUSIONS. Endoscopy may be considered for corrosive agent ingestion as late as 24 to 96 h following the event.

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0947

PREVALENCE OF DRUG INTERACTIONS AT INTENSIVE CARE UNIT ADMISSION

P.A. Lopéz Garzón¹, J.C. Suarez-Montero¹, P. Riera Armengol², E. Martínez Fernández de Gamarra², I. Morán Chorro¹

¹Hospital de la Santa Creia i Sant Pau, Intensive Care Department, Barcelona, Spain, ²Hospital de la Santa Creia i Sant Pau, Pharmacy Department, Barcelona, Spain

OBJECTIVE. Drugs interactions (DI) can behave as acute intoxication. We studied the prevalence of potential DI and identified and described the drugs involved, the severity and the clinical measures applied.

METHODOLOGY: A prospective, single-center cross-sectional study, conducted in a medical-surgical intensive care unit (ICU). The pharmacy department routinely works closely with us. We included all patients over 18 years, consecutively admitted to the ICU for 6 months. We analyzed all drugs prescribed during the first complete natural day of ICU hospitalization. The main variables studied were: number and type of DI and clinical decisions taken. The severity assessment of the potential DI and the quality of the available documentation about them was analyzed basing on the Micromedex Drug Reax database.

RESULTS. We included 152 patients (60 % male); mean age 64.5 ± 15 years, SAPS II 45.5 ± 16.2. It was prescribed 9.3 ± 3 (range 2-16) drugs per patient. Potential DI was detected in 74.3 % of patients (113/152). We found 349 potential DI (2.3 per patient) (Table 1). Of these, 197 were classified as potentially severe DI. 36 % (71/197) corresponding to the combination of midazolam and morphine (desired clinical synergy). Only 14 of severe potential DI were classified by Micromedex as contraindicated DI. These DI involved 8 pairs of drugs (Table 2). However, only the cyclosporine-simvastatin (myopathy and rhabdomyolysis) was documented with excellent quality. However, this adverse effect was not been detected in our patient. The rest of possible DI detected had poor quality documentation and showed no clinical repercussion.

DESCRIPTION OF THE POTENTIAL DRUG INTERACTIONS (DI) FOUND

Severity of DI	N (%)	Types of DI	Quality of documentation		
			Excellent	Good	Poor
Mild	14 (4 %)	13	0	11	2
Moderate	124(35,5 %)	69	9	33	27
Severe	71 (36 %)	Midazolam and Morphine desired clinical synergy			
Contraindicated	14(4 %)	8	1	1	6
Total	349	169	15	84	70

* Classification of Drug Interactions (DI) based on Micromedex Drug Reax database [Table 1]

DRUG INTERACTIONS CLASSIFIED AS CONTRAINDICATED BY MICROMEDEX DRUG REAX®

	N = 14	CLINICAL FEATURES	DOCUMENTATION QUALITY
Fluconazole-Granisetron	2	Prolonged QT interval	Poor
Metoclopramide-Haloperidol	1	Extrapyramidal symptoms Neuroleptic malignant syndrome	Poor

DRUG INTERACTIONS CLASSIFIED AS CONTRAINDICATED BY MICROMEDEX DRUG REAX®

	N = 14	CLINICAL FEATURES	DOCUMENTATION QUALITY
Extrapyramidal symptoms Neuroleptic malignant syndrome	Poor		
Amitriptyline-Metoclopramide			1
Extrapyramidal symptoms Neuroleptic malignant syndrome	Poor		
Escitalopram-Metoclopramide			1
Extrapyramidal symptoms Neuroleptic malignant syndrome	Poor		
Calcium Gluconate-Ceftriaxone	1	Precipitation	Good
Cyclosporine - Simvastatin	1	Myopathy and Rhabdomyolysis	Excellent

[Table 2]

CONCLUSIONS. ICU patients are undergoing many complex treatments with a theoretical high potential risk of DI. In our study, none of the potential DI detected had an assistance reflex or was associated with changes in clinical prescriptions or management.

0948

ADULT SUICIDAL ORGANOCOMPOUND POISONING. HOW DO THEY FARE? EXPERIENCE FROM AN INDIAN MULTIDISCIPLINARY ICU

T.T.S. Paary¹, A.S. Arunkumar², M.S. Kalaiselvan^{2,3}, M.K. Renuka³

¹Sri Ramachandra Hospital, Chennai, India, ²Sri Ramachandra Hospital, Critical Care Medicine, Chennai, India, ³Sri Ramachandra Medical College, Critical Care Medicine, Chennai, India

INTRODUCTION. India being a predominantly agrarian economy, pesticides like organo-compounds are widely and easily available leading to its misuse for suicidal purpose resulting in significant morbidity and mortality^{1,2}.

OBJECTIVES. To analyze the mortality and morbidity of patients admitted with suicidal organocompound poisoning to a multidisciplinary ICU.

METHODS. This is a retrospective analysis of consecutive patients admitted with organocompound poisoning during the year January 2011 to December 2013. Primary outcome analyzed was hospital mortality. Secondary outcomes analyzed included intermediate syndrome, duration of hospital stay, ICU free days and ventilator free days. Data collected included demographic data, type of compound ingested, APACHE II, SOFA scores, presenting symptoms, antidote usage, use of mechanical ventilation, and complications during hospital stay. Statistical analysis was done using student t-test, Mann-Whitney Test and multivariate logistic regression to identify predictors of mortality.

RESULTS. 47 patients were included in the study with male a preponderance (70.2 % n = 33). The mean age was 29.9 (± 9.5) yrs (Mean ± SD). In 42 % of patients we were unable to identify the exact organo compound they had consumed. Among the others monocrotophos was the most common (14.9 %).

Muscle fasciculation's	68 % (n = 32)
Salivation	66 % (n = 31)
Bronchorrhea	42 % (n = 20)
Muscle weakness	46 % (n = 20)

[Presenting symptoms % (n) (table 1)]

Mean admission APACHE II score was 11 ± 7.8 and SOFA score was 6.8 ± 3.5. (Mean ± STD deviation).

28 patients (59.6 %) required mechanical ventilation for respiratory failure and low GCS and 47 patients (23.4 %) required vasopressors for hemodynamic instability. All patients received atropine and pralidoxime. Mean Atropine dose was 152 (± 268) mg and that of pralidoxime was 46.4 (± 47.38) gms (Mean ± Std Deviation). Patients received atropine for a mean of 3.2(± 2.64) days and pralidoxime for 3.1(± 2.43) days.

Mortality (%)	23.4 % (n = 11)
Duration of hospital stay in days(mean ± SD)	7.76 ± 5.4 (mean ± SD)
ICU free days in days(mean ± SD)	3.2 ± 2.8 (mean ± SD)
Ventilator free Days in days(mean ± SD)	2.3 ± 1.84 (mean ± SD)
Intermediate syndrome.(%)	14.9 % (n = 7) (mean ± SD)

[Outcome data (table 2)]

Most common complications encountered in our patients were aspiration in 17 (36.2 %) patients, secondary infections in 8 (17 %) patients and intermediate syndrome in 7 (14.9 %) patients.

Comparison of survivors and non survivors using univariate analysis showed the results in "table 3 "to be associated with mortality.

	SURVIVERS(n = 36)	NON-SUR-VIVERS (n = 11)	p VALUE(< 0.05-SIGNIFICANT)
respiratory failure (n)	13	9	0.008
coma (n)	6	9	0.000
bronchospasm (n)	3	4	0.027
vasopressors (n)	2	9	0.000
GCS (mean ± SD)	10.72 (± 3.62)	6.0 (± 1.84)	0.000
APACHE II score(mean ± SD)	7.81(± 4.92)	21.45(± 6.5)	0.000
SOPA score (mean ± SD)	5.42(± 2.29)	11.45(± 3.20)	0.000
ICU length of stay (mean ± SD) (days)	5.47(± 3.35)	2.45(± 2.85)	0.009
ventilator free days (mean ± SD) (days)	1.2(± .98)	2.6(± 1.9)	0.006

[Predictors of mortality (table 3)]

However a multivariate logistic regression model failed to identify any significant predictors of mortality

CONCLUSIONS. Organo compound poisoning was associated with significant mortality in our study.

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0949

DO SEROTONIN REUPTAKE INHIBITORS WORSEN OUTCOME OF PATIENTS REFERRED TO THE EMERGENCY DEPARTMENT FOR DELIBERATE MULTIDRUG EXPOSURE?

S. Beaune¹, E. Curis¹, E. Casalino², P. Juvin³, B. Mégarbane⁴

¹INSERM U 1144, Paris-Descartes University, Paris, France, ²APHP, Bichat Hospital, Paris, France, ³APHP, George Pompidou Hospital, Paris, France, ⁴Lariboisière Hospital, INSERM U 1144, Paris-Diderot University, Paris, France

INTRODUCTION. Incidence of poisonings with serotonin reuptake inhibitors (SRIs) is growing. SRI toxicity is considered low, but its actual impact in multidrug poisonings remains unclear.

OBJECTIVES. Our objective was to evaluate the consequences of SRI exposure in patients referred to the emergency department (ED) for deliberate multidrug exposure.

METHODS. We conducted a retrospective study including all patients admitted for multidrug exposure involving at least one SRI in a university hospital ED from January 2009 to December 2012. These patients were matched with patients who did not ingest any SRI, according to age, gender, type of drug, and ingested doses (after calculation of the dose equivalence between drugs in each pharmacological class). Features of serotonin syndrome according to Sternbach's criteria and Hunter's serotonin toxicity criteria were evaluated from patients' records. Comparison between SRI- and non-SRI-exposed patients was carried out using conditional logistic regression

RESULTS. In 4 years, 148 SRI-exposed patients were included and compared to 296 matched controls. The SRIs mainly involved were escitalopram (22 %), venlafaxine (20 %), fluoxetine (19 %), citalopram (15 %) and paroxetine (11 %). Serotonin syndrome was diagnosed in one patient by the physicians in charge, but actually occurred in five SRI-exposed patients based on the retrospective evaluation of records. Twenty patients (14 %) exhibited one or more serotonin syndrome criteria. At least 2/11 of Sternbach's criteria and 2/9 of Hunter serotonin toxicity criteria were missing in each chart. Using a conditional logistic regression analysis, seizures (p = 0.04) and serotonin syndrome (p = 0.01 based on Sternbach's criteria and p = 0.004 based on Hunter serotonin toxicity criteria) more frequently occurred in SRI-exposed patients. Requirement for mechanical ventilation was also significantly increased (p = 0.03), although admission to the intensive care unit was not.

CONCLUSIONS. In multidrug-poisoned patients admitted to the ED, exposure to SRIs significantly increases the risk of seizures and requirement for mechanically ventilation. Diagnosis of serotonin syndrome by emergency physicians remains insufficient justifying improved education and training.

0950

LITHIUM POISONING IN THE INTENSIVE CARE UNIT: A DESCRIPTIVE STUDY AND ANALYSIS OF THE PREDICTIVE FACTORS OF HEMODIALYSIS

D. Vodovar¹, E. Curis², S. El-Bakhli¹, I. Malissin³, N. Deye³, F. Baud³, B. Mégarbane¹

¹Lariboisière Hospital, INSERM U 1144, Paris-Diderot University, Paris, France, ²INSERM U 1144, Paris-Descartes University, Paris, France, ³Lariboisière Hospital, Paris-Diderot University, Paris, France

INTRODUCTION. Hemodialysis is the treatment of choice of severe lithium poisoning. However, despite increased lithium clearance, features are not always improved.

OBJECTIVES. Our purposes were

- 1) to describe lithium-poisoned patients admitted to the intensive care unit (ICU),
- 2) to assess poisoning impact on renal function, and
- 3) to identify predictive factors for dialysis in lithium poisoning.

METHODS. We included all lithium-poisoned patients admitted to our ICU over 20 years (1992-2012). Renal function was assessed according to the RIFLE classification. Results are expressed as median [interquartile range] or percentages when appropriate. Univariate analysis was performed using Mann-Whitney, t-student, and χ^2 -tests, as appropriate. Significant variables at a 5 %-threshold in the univariate analysis were entered in a stepwise multivariable logistic regression model.

RESULTS. 144 lithium-poisoned patients (88F/56 M; 45 years [33-75]; IGS II: 31 [19-46]) were included. Lithium intoxication patterns were as follow: acute poisoning (10 %), acute-chronic poisoning (65 %) and chronic overdose (25 %). The ingested dose was 15 g

[5-24] with extended-release lithium formulation (65 %) and polyintoxication (52 %). Delay between poisoning and admission was 8 h [4-28]. Glasgow coma score was 13 [10-15] on admission and the worst value 6 [3-12]. Complications included aspiration pneumonia (33 %), shock (17 %, predominantly vasoplegic) and seizures (8 %). Lithium concentration on admission and peak were 2.3 mmol/l [1.3-3.7] and 2.8 mmol/l [1.7- 4.9] respectively. Management included whole bowel irrigation (25 %), mechanical ventilation (40 %), and dialysis (15 %, 12 cases with intermittent dialysis, 6 cases with continuous hemofiltration, and 4 cases with both techniques). ICU length of stay was 4 days [2-9]. Four patients died (2 asystoles, 2 nosocomial infections). Admission, worse, and discharge creatinine concentrations were 87 μ mol/l [70-140], 96 μ mol/l [72-171] and 59 μ mol/l [39-70] respectively. After hydration, 24 h-urine output was 1.2 ml/kg/h [0.7-1.9]. According to the RIFLE classification, patients presented kidney failure (11 %), kidney injury (8 %), and kidney failure (10 %). No patients developed end-stage renal disease. By multivariate analysis, lithium concentration > 3 mmol/l was the only predictive factor of dialysis (Odds ratio, 5.6; 95 %-confidence interval [2.5-25.2]).

CONCLUSIONS. Lithium poisonings are rare but frequently associated with altered kidney function. Hemodialysis decision is mainly based on lithium concentration.

0951

DESIGNER DRUGS - NEW CHALLENGES: AN UPDATE ON MANAGEMENT OF NOVEL PSYCHOACTIVE SUBSTANCE TOXICITY IN THE CRITICAL CARE SETTING

C.D. Smith¹, S. Robert²

¹Whipps Cross Hospital Barts Health NHS Trust, London, United Kingdom, ²Homerton University Hospital NHS Foundation Trust, Intensive Care Unit, London, United Kingdom

INTRODUCTION. Use of novel psychoactive substances ('legal highs', 'designer drugs') is increasing worldwide. The misuse of such substances can cause severe or prolonged side-effects requiring critical care review and organ support. Furthermore, complications in this emerging field can be life-threatening, especially if misdiagnosed or mismanaged. Given that many of these substances were unheard of only a few years ago, a current potential gap exists in the knowledge of management and potential complications across both critical care physicians and other hospital specialties alike.

OBJECTIVES. We provide an overview of the management of some of the most commonly encountered and more dangerous novel substances, including side-effects and complications related to each class of drug based on a review of current literature.

METHODS. A literature search was carried out using Medline, Embase, Google Scholar and Cochrane databases. Where possible MeSH search terms were used - 'designer drugs' / to (toxicity)/po (poisoning)/ae (adverse effects) and keywords (for non-Medline databases), A total of 274 relevant results were further reviewed in detail.

RESULTS. Substances showing common and/or harmful side-effects requiring admission to hospital were identified from current literature. These substances include the novel cathinones, piperazine compounds, ketamine derivatives and synthetic cannabinoids. Given that mephedrone toxicity has a similar mechanism of action to MDMA toxicity, complications can be predicted and management extrapolated from existing knowledge. This similarly applies to piperazine compounds. However, other novel substances present unique challenges. For example, there is a significant risk of potentially lethal and rapid withdrawal in users presenting with GHB/GBL overdose if misdiagnosed or mismanaged. Other seemingly harmless substances, e.g. herbal incense (synthetic cannabinoids) have the potential to cause multi-organ failure.

CONCLUSIONS. Novel psychoactive substances present an increasing problem to intensive care physicians - their use is increasing, the drugs used are frequently changing and they have the potential to cause severe and unforeseen complications. Here we present guidance based current literature to inform clinicians of the potential complications and management of novel psychoactive substance toxicity. Given that this is an ever-changing field it is essential that intensivists keep up to date with this emerging area of medicine. Additionally, new or rare complications seen in clinical practice should be reported to national toxicology services to add to the current limited body of knowledge in this area.

0952

CHRONIC EFFECTS OF ACUTE ORGANOPHOSPHATE POISONING IN ENDOCRINE SYSTEM

R. Coskun¹, K. Gundogan¹, M. Sevim², F. Tanriverdi³, I. Bahar¹, G. Elay¹, H. Mumcuoglu¹, Y. Srmsek³, F. Kelestemur³, M. Sungur¹, M. Guven¹

¹Erciyes University Faculty of Medicine, Internal Medicine Intensive Care Unit, Kayseri, Turkey, ²Erciyes University Faculty of Medicine, Department of Internal Medicine, Kayseri, Turkey, ³Erciyes University Faculty of Medicine, Department of Endocrinology, Kayseri, Turkey

INTRODUCTION. Organic phosphate (OP) poisoning is quite common in the developing world due to the extensive use and accessibility of these compounds. OP compounds, leading to the accumulation of acetylcholine at synapses in acute phase known to cause hormonal changes but long term effects of acute organophosphate poisoning on hypothalamic-pituitary-adrenal axis are not known.

OBJECTIVES. To investigate long term effects of acute organophosphate poisoning on hypothalamic-pituitary-adrenal axis.

METHODS. We included 30 patients admitted to Erciyes University Medical Intensive Care Unit due to acute organophosphate poisoning between 2007 and 2012. One patient discharged from the study upon learning that he had head trauma history. Data were acquired from electrical data system and patient files. Basal pituitary hormones were measured. Then, glucagon stimulation test and insulin tolerance test (ITT) were performed. Growth hormone (GH) and Adrenocorticotropic hormone (ACTH) deficiency was diagnosed according to ITT and glucagon test with lower than normal cut off values.

RESULTS. Analyses were completed with 29 patients (Male: 16, 55 % and Female: 13, 45 %). Mean age was 42 ± 16 years (min:18-max:69), mean body mass index was 26 ± 4 kg/m² (min:21- max:35), and mean time after poisoning was 44 ± 16 months (min:11-max:68). Basal levels of pituitary hormones were within normal limits. Cut off values for ACTH deficiency was 10.74 μ g/dl of cortisol with glucagon stimulation test and 18 μ g/dl of cortisol with ITT. There was only one patient with ACTH deficiency according to these criteria. Peak GH level of 1,18 μ g/L was accepted as normal response in glucagon test. There were 6 patients with decreased GH response with glucagon test. Peak GH level of 3 μ g/L was accepted as normal response in ITT. There were 10 patients with decreased GH response with ITT. There were 3 (10.3 %) patients diagnosed as GH deficiency with decreased GH response with both glucagon test and ITT. Pituitary MRI of these three patients were normal.

CONCLUSIONS. ACTH and GH deficiency was found to be higher compared to normal population in our study. Patients with acute OP poisoning should be screened for pituitary hormone deficiency in long term.

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0953

CLINICAL ASPECTS OF DRUG POISONING IN CHILDREN AND ADOLESCENTS WHO VISIT EMERGENCY DEPARTMENT

Y. Kim¹

¹Catholic University, Yeouido St. Mary's Hospital, Emergency Department, Seoul, Republic of Korea

INTRODUCTION. The most common cause of death in children and adolescent is by suicide and it is considerable that the proportion is getting increased for years. As drug poisoning in young ages is largely unintentional and not fatal, few clinicians have focused on the characteristics of drug poisoning in this age group so far.

OBJECTIVES. We examined the clinical aspects of children and adolescent who visit emergency department for drug poisoning especially intentionally and investigated the difference between male and female in some clinically meaningful points. We also compared the prognosis of both male and female patients, respectively, and tried to find a way to protect suicide attempt in young ages.

METHODS. Retrospective medical records review of 115 patients who visited emergency department of St. Vincent Hospital, the Catholic University of Korea, for drug ingestion from March 2010 through March 2013 was accomplished. Unintentional ingestion or ingestion by others was excluded. Of the 115 patients treated in the emergency department for drug poisoning, 65 patients who overdosed by accident were excluded. Therefore, 50 patients were examined for the study.

RESULTS. Over two-thirds of the patients (n = 37, 74 %) were female. 36 patients (72 %) complained of minor symptoms and discharged home after observation at emergency department for several hours but 14 patients (28 %) were admitted for further evaluation. Over one-third of the patients (n = 18, 36 %) had previous psychiatric history but 32 patients (72 %) had no documented psychiatric problems. 70 % (n = 35) of the patients obtained drugs from the drug store by themselves. Over half (n = 29, 58 %) of the drugs ingested were acetaminophen-containing analgesics, especially from the drug store by patients themselves (n = 28, 56 %).

CONCLUSIONS. Females in their young ages tend to ingest drugs intentionally for suicide attempt more than males of the comparable ages do. Most of the patients had minor symptoms and discharged home or needed admission for several days but none of them were fatal. Many patients previously experienced psychiatric problems and lacked of careful attention and proper management. The drugs they ingested were, in many cases, from the drug store nearby with ease and remarkably most of the drugs they obtained in that way were acetaminophen-containing, which is possibly life-threatening. This suggests that some guideline or control might be necessary in pharmacy that restrict children or adolescents from getting drugs potentially or possibly life-threatening with no limit. And also young age with psychiatric history should be carefully treated with more concern as time passes.

0954

TRAMADOL HYPOCHLORIDE POISONING

H. Ben Ghezala¹, H. Lariani², T. Hafedh³

¹Ministry of Public Health, Intensive Care Medicine, Zaghawan, Tunisia, ²Ministry of Public Health, Pharmacology, Tunis, Tunisia, ³Ministry of Public Health, Poisoning Center, Tunis, Tunisia

INTRODUCTION. Tramadol hydrochloride has been extensively prescribed last two decades for the treatment of pain. That is why, there are more and more cases of tramadol poisoning in the recent literature. In Tunisia, tramadol poisoning has not been reported yet and we have no data about it. For this reason, we decided to perform a study in the poison center of Tunis.

OBJECTIVE. The aim of our study was to describe the epidemiology, the clinical features, the treatment and the prognosis of tramadol poisoning.

METHODS. It was a retrospective study performed from January 2010 to June 2013. The study included all adult patients consulting the emergency department of the poison center of Tunis for tramadol poisoning or overdose.

RESULTS. Seventy-four patients were included in our study. The mean age was 30 ± 10 years. The sex ratio was 0.17. Capsules were the only galenic form observed. The mean consultation time was 3 ± 2 h. Polydrug poisoning was very common (n = 65, 88 %). The mean dose of tramadol was 600 ± 200 mg with a maximum of 350 and a minimum of 1000 mg. It was a suicide attempt in most cases (n = 63, 85 %). The most common clinical signs were miosis (n = 10, 13 %), drowsiness (n = 8, 11 %), vertigo (n = 15, 20 %), headache (n = 13, 18 %), nausea and vomiting (n = 20, 54 %), epigastralgia (n = 18, 24 %). Two patients ingested 1000 mg of tramadol; they were comatose and required endotracheal intubation with mechanical ventilation. Hypokalemia (n = 2) and hyperleukocytosis (n = 3) were the most common biological abnormalities. Ten patients were admitted to the intensive care unit. The mean hospitalization time was 24 ± 12 hours. A patient was treated by naloxone as an antidote. All patients recovered totally and were discharged from hospital.

CONCLUSION. Tramadol poisoning has become one of the most common causes of admissions to the emergency department of poison center in Tunis. We observed very different symptoms. The most common symptoms were digestive and neurologic signs. Treatment is essentially symptomatic and supportive.

0955

PREVALENCE OF IATROGENIC HYPERKALEMIA IN THE EMERGENCY DEPARTMENT ICU

Z. Kálmán¹, A. Szakáll¹, K. Csupor¹, A. Juhász², N. Fülöp¹, C. Varga¹

¹Somogy County Kaposi Mór Teaching Hospital, Center of the Emergency Health Services, Kaposvár, Hungary, ²Somogy County Kaposi Mór Teaching Hospital, Department of Medical Laboratory, Kaposvár, Hungary

INTRODUCTION. The European Society of Cardiology 2012 Guideline for Heart Failure recommended the use of mineralocorticoid receptor or aldosterone antagonists. The major side effects of these drugs are hyperkalemia and renal failure.

OBJECTIVES. Our goal was to assess the prevalence of life threatening iatrogenic hyperkalemia among the patients of the Emergency Department Intensive Care Unit.

METHODS/PATIENTS: Retrospective analysis of medical records of patients admitted to the Emergency Medicine Department in 2013 was performed. Out of 35494 visits in the 675 cases we found elevated potassium levels and 186 patients had moderate/severe hyperkalemia with an average age of 71 years (51 % female).

RESULTS. The medication of 31 patients (17 %) included mineralocorticoid receptor antagonist and 23 patients (12 %) used aldosterone antagonist. ACE inhibitors or angiotensin receptor blockers were prescribed simultaneously in 66 %. 18 patients (33 %) had arrhythmias. 9 patients had preexisting renal failure. Renal replacement therapy was only needed in 4 cases. 1 patient died despite all our efforts.

CONCLUSION. Mineralocorticoid receptor/aldosterone antagonists are an effective treatment for heart failure, on the other hand precaution has to be taken, regular control of serum creatinin and potassium levels are necessary to avoid fatal side effects.

REFERENCE. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: European Heart Journal (2012) 33, 1787-1847

Peri-operative intensive care: 0956–0969

0956

THE POSSIBILITY OF USING L-CARNITINE FOR ORGAN PROTECTION DURING TOTAL INTRAVENOUS ANESTHESIA: DOUBLE-BLIND, RANDOMIZED CLINICAL TRIAL

A. Ovezov¹, M. Lobov², A. Lugovoy¹, S. Bragina¹, P. Prokoshev¹, M. Panteleva², A. Knyazev², E. Nad'kina¹

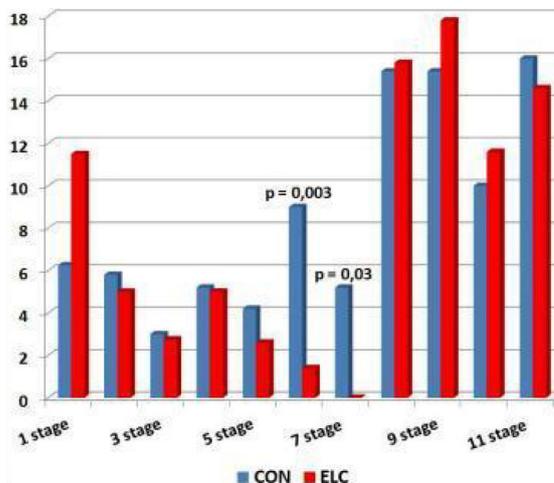
¹The Moscow Regional Research Clinical Institute, Anesthesiology, Moscow, Russian Federation, ²The Moscow Regional Research Clinical Institute, Neurology, Moscow, Russian Federation

INTRODUCTION. Despite the known benefits of endoscopic interventions above the open surgery, they can be the cause of intraoperative disorders, especially the cardiovascular system. Furthermore, General Anesthesia may cause some side effects due to the direct action of anesthetics on the central nervous system, for example: post-operative cognitive dysfunction. This requires performing intraoperative Organ Protection.

OBJECTIVES. The aim of study was examine the possibility of using L-carnitine for intraoperative organ protection in patients with concomitant cardiovascular diseases during total intravenous anesthesia (TIVA) based on propofol and fentanyl.

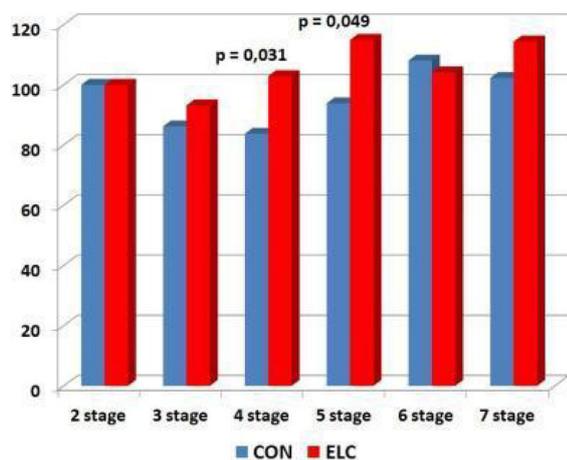
METHODS. In double-blind, randomized clinical trial (see 24118, www.randomization.com), after approval by the LEC, were examined 30 patients (ASAIII, age 56-70 years) who underwent laparoscopic cholecystectomy under TIVA. The induction and maintenance of anesthesia was standard in all patients. In the study group (ELC, n = 15) we used L-carnitine (Elcar[®], PIK-PHARMA, Russia) 1000 mg dissolved in 200 ml 0.9 % NaCl, and in the control group (CON, n = 15) used only 200 ml 0.9 % NaCl. Blinding: Anesthesiologist received ready solution before surgery from a third party, without knowledge of its composition. Infusion of solution (of the same color and volume in all cases) began immediately after the imposition of carboxyteritoneum. Monitoring: Harvard Standard, Stroke Volume Index (SVI), Bispectral Index (the value of BIS in all patients were maintained in the range 40-60), Perfusion Index (PI), Heart Rate Variability (HRV), Electrodermal Activity (EDA). Record of monitoring results was subjected to internal medical audit. Index of Frequency of Critical Incidents (IFCI) was calculated on 11 research stages. Neuropsychological study (including MoCA-test and Hospital Anxiety and Depression Scale) was performed the day before, in the 1st day after surgery and at discharge. Results are presented as average (M) and standard deviation (SD), statistical significance was determined using Wilcoxon-Mann-Whitney's criterion (u).

RESULTS. Dosage of propofol and fentanyl was equal in both groups. In all patients, anesthesia was adequate. However, the use of L-carnitine reduces the level of sympathocotonia, promoting stabilization of autonomic responses.



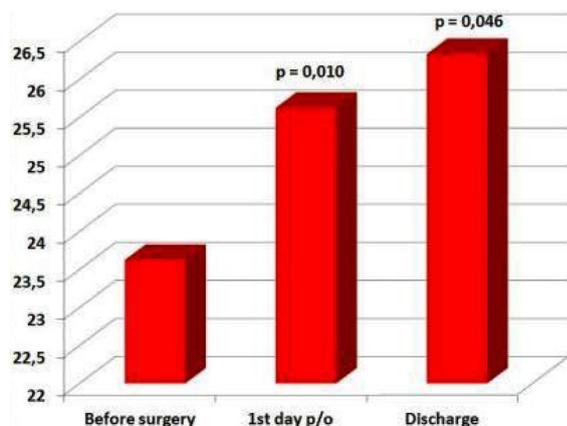
[Changes of Electrodermal Activity]

L-carnitine improved the parameters of central hemodynamics, mostly - SVI.



[Changes of Stroke Volume Index (in percentage of b)]

Medical audit showed that organ protection with L-carnitine significantly decrease IFCI at 1.43 times ($p = 0,043$), reducing the average number of critical incidents by 30% ($p = 0,038$), which increases the safety of anesthetic management. The dynamics of values MoCA-test showed an improvement the cognitive status of patients in group ELC.



[Changes of MoCA-test]

CONCLUSIONS. This study shows that L-carnitine has an organ protective effects and increases the safety of TIVA in patients with concomitant diseases of the cardiovascular system. There is a need to continue the study.

0958

POSTOPERATIVE MANAGEMENT OF PNEUMONECTOMY IN ICU

V. Olea-Jiménez¹, M.E. Banderas-Bravo¹, E. Curiel-Balsera¹

¹Carlos Haya University Hospital, Intensive Care Unit, Málaga, Spain

INTRODUCTION. Postoperative complications after pneumonectomy are relatively frequent and potentially significant.

OBJECTIVE. Description of the clinical profile of patients with pneumonectomies, and your ICU evolution.

METHODS. Retrospective study of all consecutive patients admitted in our ICU after pneumonectomy between January 2009 and December 2012. We recorded clinical and demographical data, surgical aspects and complications. We expressed results in mean \pm standard deviation or median and interquartile ranger for quantitative variables, and frequencies for qualitative variables. For statistical analysis, we used the Fisher exact test and the Mann-Whitney with a significance level of 0.05.

RESULTS. We analyzed 682 patients admitted in ICU after thoracic surgery, of which 5.5% had pneumonectomy ($n = 38$). 84.2% were men. The mean age was 66.2 ± 23.7 years. APACHE II 22 ± 3.79 . The underlying disease that caused the surgery was lung carcinoma in 97.4% of cases, and we had a case of mesothelioma. 65.8% had a history of smoking, 50% were hypertensive, 26.3% had diabetes and 23.7% had chronic obstructive pulmonary disease (COPD). The patients had a mean preoperative FEV1 of 55 ± 37 . The most (71.1%) were left pneumonectomies. The mechanical ventilation time in ICU was short (2.6 ± 1.8 h). Complications were rare, occurred in only 18.4% of patients (7): 7.9% (3) bronchial fistula requiring reoperation, 7.9% (3) arrhythmias, 5.3% (2) hypotension and 5.3% (2) postpneumonectomy edema. Median hospital stay was 1 day (IQR 1-2) and the ICU mortality was 2.6%. Neither age ($p = 0.81$), APACHE ($p = 0.09$), FEV1 ($p = 0.5$), gender ($p = 0.9$) or any of the antecedents, were associated with the development of postoperative complications. Patients who developed complications had neither increased ICU stay ($p = 0.07$) or more hours of mechanical ventilation ($p = 0.79$). In the group of the complications, there were more reoperations ($p = 0.0001$).

CONCLUSIONS. Patients with pneumonectomy are middle-aged men with multiple antecedents and high severity on admission (APACHE II 22). The mechanical ventilation time after surgery and the ICU stay are short. The morbidity of this surgery is high, and although in our series the complication rate is not insignificant, not cause greater mortality or are related to patient comorbidities.

0959

INFLUENCE OF TIME OF ADMISSION AND MORTALITY RISK IN A SURGICAL POPULATION AT A LARGE TERTIARY CENTRE

S. Abbas¹, J. Bannard-Smith¹, J. Eddleston¹, C. Fullwood^{2,3}, S. Ingleby¹, S. Jones¹, G. Cook

¹Manchester Royal Infirmary, Department of Critical Care, Manchester, United Kingdom,

²University of Manchester, Institute of Population Health, Faculty of Medical and Human Sciences, Manchester, United Kingdom,

³Central Manchester University Hospitals NHS Foundation Trust, Manchester Academic Health Sciences Centre, Manchester Biomedical Research Centre, Manchester, United Kingdom

INTRODUCTION. Evidence exists that mortality rates for weekend hospital admissions on both sides of the Atlantic are higher.^{1,2} This has led to calls for clinical services to be provided equitably across a 7 day week instead of the current model which usually only delivers 5 day working. Consequently the NHS Medical Direct or established the Seven Days a week Forum. The Forum recommends the adoption of 10 clinical standards to describe the level of urgent and emergency care patients should expect to receive seven days a week. Embedded in these standards is the key role played by senior decision makers in a patient's clinical pathway and the importance of timely recognition of deterioration in health and appropriate intervention.³ At our institution we have an automated Early Warning Score (EWS) which delivers timely measurement of observations, calculation of an aggregated score and generation of an alert via the bleep system. The alerts match responder to absolute score.

OBJECTIVES. This study aimed to explore if out-of-hours effects previously observed are still evident with our EWS. We investigated whether the primary outcome hospital mortality and length of stay were affected by time of admission, once adjusting for other factors.

METHODS. A retrospective analysis of hospital data for the period 2011-2012, conducted at a Tertiary University Hospital to evaluate a surgical population. Hospital outcome was recorded, alongside predictors including age, sex, time of admission, elective status, primary operation and EWS records. Patients were grouped according to time of admission. Out-of-hours was defined as outside 9am-5 pm Monday to Friday. Statistical analysis included descriptive statistics and logistic regression for hospital mortality.

RESULTS. Considering each predictor, older, female, emergency patients, already receiving support, admitted out-of-hours were most at risk of death. On a daily basis differences varied, but admission at weekends had a significantly higher risk of death compared to Monday. In multivariate regression the predominant predictors were age, gender, elective status and whether the admission was out-of-hours. Hospital length of stay was significantly longer if admitted out-of-hours after adjusting for elective status. EWS scores varied from 0 to 16, with 9.5% scoring at least 1.

CONCLUSIONS. Odds of death for surgical patients admitted out-of-hours once adjusting for age, gender and elective status is 1.36. Having an automated system does not override the need for sound clinical management and decision making.

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0960

RISK FACTORS FOR ACUTE KIDNEY INJURY POST OFF PUMP CORONARY ARTERY BYPASS GRAFT (OP-CABG) SURGERY AND ITS IMPACT ON SHORT-TERM MORTALITY

T.C. Barnes¹, C. Hernandez-Caballero¹, A.I. Hurtado-Doce¹, D. Hall¹

¹Royal Brompton and Harefield Hospital NHS Foundation Trust, London, United Kingdom

INTRODUCTION. Acute kidney injury (AKI) after off pump coronary artery bypass grafting (OP-CABG) is associated with significant morbidity and mortality.

OBJECTIVES. Assess risk factors for post-operative AKI after OP-CABG and the impact of renal function on short-term survival among all AKI subgroups using the AKIN classification.

METHODS. Retrospective observational study including every patient admitted to Harefield Hospital Intensive Therapy Unit (ITU) after OP-CABG in 2013. Twenty-one pre-, intra- and postoperative variables that were repeatedly identified in previous studies as independent AKI risk factors after cardiac surgery were included in this analysis. Each patient was categorized by maximal Acute Kidney Injury Network (AKIN) criteria based on creatinine changes within the first 48 h after OPCABG. In ITU and in hospital mortality rates for each of these groups were calculated.

RESULTS. Of the 169 patients that underwent off pump coronary artery bypass graft surgery in Harefield during 2013, 46 (27.21%) developed AKI. (50% AKI stage 1, 30.43% AKI stage 2, 19.56% AKI stage 3). The basal characteristics are collected at Table 1.

Sex Male	140 (82.8%)
Hypertension	137 (81.1%)
Diabetes mellitus insulin-dependent	21 (12.4%)
Pulmonary hypertension	6 (3.6%)
Contrast prior surgery (< 7 days)	26 (15.4%)
Extracardiac arteriopathy	39 (23.1%)
LVEF < 35%	18 (10.6%)
Recent myocardial infarct < 3 weeks > 3 weeks < 9 weeks	35 (20.7%) 8 (4.7%)
Preoperative: ACEI Diuretics	90 (53.3%) 32 (18.9%) 39 (23.1%)
Metformin IABP Postoperative: IABP Noradrenaline Adrenaline	13 (7.7%) 19 (11.2%) 111 (65.7%) 18 (10.7%)
Emergency surgery	11 (6.5%)

[Basal characteristics]

The mean length of stay was 2.3 ± 2 with a median of 2 days. In the CRRT group was 4 ± 2.3 days.

CONCLUSIONS. The development of AKI after cardiac surgery is an independent risk factor of mortality. If CRRT is required there is an increase of the mortality in that group. The use of contrast preoperatively (< 7 days), the use of diuretics, Left ventricular ejection fraction (LVEF) < 35 %, Diabetes mellitus insulin-dependent, emergency surgery and the presence of extra cardiac arteriopathy have been shown to be associated with an increase of length of stay and increase of the mortality in ITU.

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0961

CARDIAC SURGERY IN DIALYSIS-DEPENDENT CHRONIC RENAL FAILURE PATIENTS

F. Ampatzidou¹, M. Sileli¹, C.-P. Koutsoyiannidis², K. Diplaris², T. Karaiskos², A. Baddour², G. Drossos²

¹General Hospital 'G. Papanikolaou', Cardiac Surgery Intensive Care, Thessaloniki, Greece,

²General Hospital 'G. Papanikolaou', Cardiac Surgery, Thessaloniki, Greece

INTRODUCTION. Dialysis-dependent renal failure patients who undergo cardiac surgery represent a high risk group because of many serious co-morbidities existence.[1] Postoperative mortality and complications are still high despite the recent improvements in short term results.[2]

OBJECTIVES. Aim of this study is to evaluate the early postoperative outcome in dialysis-dependent renal failure patients after cardiac surgery in our hospital.

METHODS. Our clinic's prospectively collected database was used from August 2012 to March 2013. During that period, a total of 759 consecutive patients underwent cardiac surgery procedures. The study involved 16 cardiac surgical patients on preoperative dialysis therapy - Group A (mean aged 60.5 ± 12.03). Postoperative variables of group A included mortality, mechanical ventilation hours, re-intubation rate, multiple organ dysfunction syndrome (MODS), reexploration for bleeding, are reported and compared to that of the rest of the cohort - Group B (mean aged 65.05 ± 10.29). Chi square test was used for statistical analysis.

RESULTS. Compared to Group B, Group A patients had higher Euroscore II (median, 4.016 vs. 1.35), mechanical ventilation hours (median, 16 vs. 8 h) and in hospital mortality (25 % vs. 2.8 %, p < 0.001). Group A had also higher incidence of postoperative complications compared to Group B (re-intubation rate 12.5 % vs. 2.2 %, p = 0.007, multiple organ dysfunction syndrome 25 % vs. 2.3 %, p = 0.006, re-exploration for bleeding 25 % vs. 4.9 %, p < 0.001).

CONCLUSIONS. The obtained data demonstrate that dialysis-dependent renal failure patients who undergo cardiac surgery, require special attention because of the high incidence of postoperative mortality and morbidity rates.

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0962

CARDIAC SURGERY IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE

F. Ampatzidou¹, M. Sileli¹, C.-P. Koutsoyiannidis², K. Diplaris², N. Michail², A. Nenta¹, G. Drossos²

¹General Hospital 'G. Papanikolaou', Cardiac Surgery Intensive Care, Thessaloniki, Greece,

²General Hospital 'G. Papanikolaou', Cardiac Surgery, Thessaloniki, Greece

INTRODUCTION. Chronic obstructive pulmonary disease (COPD) and cardiovascular diseases commonly co-exist. COPD (especially in severe stage) is associated with increased postoperative mortality in cardiac surgical patients.[1,2]

OBJECTIVES. Our study aimed to investigate the impact of COPD on postoperative mortality and morbidity, in a cohort of 795 consecutive cardiac surgical patients.

METHODS. Our department's electronic database was searched for patients who underwent cardiac surgery from June 2012 to March 2014, with the following preoperative spirometric values: FEV₁/FVC ratio < 70 % and FEV₁ less than 80 % of predicted (Group A). The clinical outcome was compared to that of the rest of the cohort - Group B. Chi square test was used for statistical analysis.

RESULTS. Of the 795 patients studied, 90 patients (15 females) had COPD, diagnosed by preoperative spirometry - Group A. In group A, FEV₁ was < 50 % in 4 patients while 86 COPD patients had FEV₁ between 50 - 80 % of predicted. Mean age, median Euroscore II and median mechanical ventilation hours of Groups A and B were 67.4 vs. 64.6y and 1.75 vs. 1.34 and 9 vs. 8 h, respectively. Mortality was 4.4 % for Group A and 2.8 % for B, p = 0.4. Morbidity variables between the groups were also compared. Group A had higher incidence of re-intubation (7.8 vs. 1.6 %, p < 0.001), pneumonia (6.7 vs. 1.4 %, p = 0.001), prolonged mechanical ventilation > 48 h (14.4 vs. 5.1 %, p = 0.001), non invasive ventilation application (30 vs. 13 %, p < 0.001), Acute Kidney Injury(AKI) (24.4 vs. 14.8 %, p = 0.018), sternal wound infections (4.4 vs. 1.1 %, p = 0.015) compared to Group B.

CONCLUSIONS. In our study, COPD patients who underwent cardiac surgery had significantly higher rates of postoperative pneumonia, re-intubation, prolonged mechanical ventilation, NIV usage, AKI (defined by the RIFLE criteria) and sternal wound infections. Mortality had no statistical significant difference between the 2 groups.

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0963

EFFICIENCY OF HEART RATE VARIABILITY MEASUREMENT IN ASSESSMENT OF NOCICEPTION IN INTENSIVE CARE UNIT PATIENTS

C. Broucqsaull¹, J. De Jonckheere², M. Jeanne², C. Lemaire¹, S. Nseir³

¹Hôpital Victor Provo, Réanimation, Roubaix, France, ²INSERM CIC-IT 807, Loos, France, ³CHRU de Lille, Réanimation, Lille, France

INTRODUCTION. The Analgesia Nociception Index (ANITM) assesses in real time the ventilatory influence on heart rate variability and so allows a quantitative measurement of the parasympathetic tone activity, which reflects patient's well-being. This monitoring device has been validated during short anesthesia, and the aim of our study was to determine its applicability in ICU patients.

MATERIALS AND METHODS. This prospective, observational study was performed in 36 sedated and mechanically ventilated patients. Primary objective was to determine ANI's efficiency in assessing nociception in critically-ill patients. Secondary objective was to determine the impact of norepinephrine on ANI's reliability. In all patients, ANI was recorded during a nociceptive stimulation (mobilization), and at rest for at least 5 min before and after the stimulation. Depth of sedation was assessed by the ATICE scale; during the stimulation a behavioral pain score (Payen score) was also determined. Medical staff was blinded to ANI monitoring. Data were analyzed post hoc to determine average ANI during 3 periods: before, during and after the painful stimulation. Friedman test and Wilcoxon test for repeated measures were used for comparisons, with a Bonferroni correction. p < 0.05 was considered statistically significant.

RESULTS. In the whole population, average ANI was significantly lower during the painful stimulation, compared with before the stimulation (p < 0.001). After the end of the stimulation, it increased significantly (p < 0.001). Similar results were found in patients with (n = 16) or without (n = 20) norepinephrine.

In patients with norepinephrine, baseline ANI and ANI during stimulation were significantly higher, compared with patients without norepinephrine (p = 0,041 and p = 0,002 respectively). However, ANI's decrease during the stimulus was comparable in the two groups. During the painful stimulation, no correlation was found between average ANI and Payen score.

CONCLUSION. We showed ANI's capacity to detect painful stimuli in critically-ill patients which seems to be also applicable to patients receiving norepinephrine. Complementary studies would be of interest to assess expected clinical benefit of this analgesia monitoring device.

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0964

EFFECTS OF PROLONGED SEDATION ON THE DELAY OF ENTERAL NUTRITION IN PATIENTS FOLLOWING EMERGENCY DIGESTIVE SURGERY IN ICU

R. Gutierrez-Rodriguez¹, I. Macias-Guarasa¹, F.J. de Miguel-Aparicio¹, R. Rivera-Fernandez¹

¹Carlos Haya University Hospital, Intensive Care Unit, Malaga, Spain

OBJECTIVES. study of the effects of prolonged sedoanalgesia on the delay of an enteral diet among other foreseeable co-morbidities following digestive surgery.

METHODS AND MATERIALS. descriptive, retrospective comparative study of ICU patients following emergency digestive surgery between 2009-2010 and 2011-2012. Variables: demographics (sex, age, hospital and ICU mortality), associated co-morbidity according to Charlson Index, gravity according to APACHE II and SOFA. Sedoanalgesic scale, RAMSAY. Date of commencement of parenteral or enteral nutrition, calorific deficit on the tenth day following surgery, pulmonary complications, nosocomial infections, renal dysfunction according to RIFLE, positive balance of fluids, number of days of mechanical ventilation. Significance rated at P < 0.05. X2 for analysis of qualitative variables and T Student for quantitative variables.

RESULTS. We analyzed 150 patients following emergency digestive surgery, the majority secondary ton sepsis of biliary or urinary origin. 62 were admitted 2009-2010, the rest, 88, 2011-2012. Mean age was 59 ± 16, scores, SOFA 2.4 ± 3.1, APACHE II 20.4 ± 7.3 y Charlson index 1.2 ± 2.5. Average stay 15.5 ± 3 days. Hospital mortality 16 %, in ICU 20 %. Among the 2009-2010 group the mean number of days sedoanalgesia was received for a RAMSAY 6, 6.29 ± 7.3 days, calorific deficit on the 10th day -8033 ± 2000 kcal, in the 2011-2012 group, the mean number of days of sedation was 8.3 days ± 14, the calorific deficit was 1974 kcal ± 3300, significant difference between groups, P < 0.05. The extended period of deep sedation in the last group did not entail a greater calorific deficit, in contrast to the first group, due to the delay in commencement of nutrition in the first group, the majority on the 4th day, compared to the second group in which 100 % stated nutrition on the 2nd day of admission. 38 % presented more than a week of deep sedation. In the univariable analysis this group was linked significantly with the incidence of nosocomial infections, 68 % vs 29 %, respiratory complications, 87 % vs 32 %, highly positive balance, 100 %, prolonged mechanical ventilation, 93 % vs 16 %, and a greater incidence of renal deficiency, 75 % vs 32 % P < 00001.

CONCLUSIONS. prolonged sedation in digestive surgery increased observed morbidity, new protocols for evaluation of the degree of sedoanalgesia are needed for their control.

0965

THE USE OF PROCALCITONIN (PCT) FOR IDENTIFICATION OF POSTOPERATIVE COMPLICATIONS AFTER CORONARY ARTERY BYPASS SURGERY WITH CARDIOPULMONARY BYPASS (CPB)

A. Baysal¹, M. Dogukan², H. Toman³

¹Kartal Kosuyolu High Speciality Research and Training Hospital, Anesthesiology and Reanimation, Istanbul, Turkey, ²Adiyaman University, Anesthesiology and Reanimation, Adiyaman, Turkey, ³Canakkale Onsekiz Mart University Faculty of Medicine, Anesthesiology and Reanimation, Çanakkale, Turkey

INTRODUCTION. Serum C-reactive protein (CRP) and procalcitonin (PCT) values increase during the postoperative period after cardiac surgery. The systemic inflammatory response syndrome (SIRS) after cardiopulmonary bypass (CPB) occurs due to several issues and these include; extended blood contact with foreign surfaces, hypothermia, myocardial ischaemia, reperfusion, and surgical trauma manifested by two or more of the following conditions:

- 1-Temperature > 38 °C or < 36 °C,
- 2-Heart rate > 90 beats/min,
- 3-Respiratory rate > 20 breaths/min,
- 4-PaCO₂ < 32 mm Hg,
- 5-WBC count > 12,000/mm³, < 4000/mm³, or > 10 % immature (band) forms.

OBJECTIVES. The values of CRP and PCT were investigated to determine their effects on postoperative complications (circulatory failure, pneumonia, respiratory insufficiency, sepsis, reoperation, hemorrhage, tamponade, inotropic support, myocardial infarction, acute kidney injury), in patients with or without systemic inflammatory response syndrome (SIRS). According to the definition of SIRS by the American College of Chest Physicians/ Society of Critical Care Medicine (ACCP/SCCM), concentrations of procalcitonin 0.5 to 1.1 ng/mL is considered as indicative of SIRS and above 1.1 ng/mL of sepsis (1,2).

METHODS. In 183 patients, in a prospective observational study, serum CRP and PCT values were collected every day starting on postoperative Day 1 thru day 5. The ability of PCT to predict sepsis and other postoperative complications were determined by performing receiver operative characteristic (ROC) curve analysis.

RESULTS. All patients were divided post hoc into patients with SIRS (Group 1, n = 86) and patients without SIRS (Group 2, n = 97). A PCT threshold value of 4.27 ng/ml on postoperative day 2 was able to discriminate postoperative complications in patients with or without SIRS with a sensitivity of 82.5 % and a specificity of 73.5 % (area under curve : 0.76, p < 0.01).

CONCLUSIONS. In summary, 1- Serum PCT values increased significantly after cardiopulmonary bypass (CPB) in SIRS group in comparison to patients without SIRS on postoperative day 1 and remain elevated till postoperative day 5. 2- Serum CRP values also follow a similar pattern however, a CRP threshold value was not obtained to differentiate between postoperative complications in patients with or without SIRS. A PCT threshold value of 4.27 ng/ml on postoperative Day 2 is a valuable marker to discriminate between patients with postoperative complications and patients with SIRS.

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0966

INTERNAL ENVIRONMENT DISTURBANCES AFTER HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY (HIPEC), INTENSIVE CARE UNIT (ICU) MANAGEMENT

M. Fuentes Salazar¹, F. Afamefule¹, A. Escribá Bárcena¹, M.Á. de la Torre Ramos¹, C. Velasquez del Amo¹, J. Álvarez Rodríguez¹

¹Hospital Universitario de Fuenlabrada, Intensive Care Unit, Fuenlabrada, Spain

INTRODUCTION. Cytoreductive surgery (CRS) combined with HIPEC has become a relevant therapeutic option for selected patients with peritoneal carcinomatosis. The use of HIPEC can result in considerable changes in the internal environment (temperature, electrolytes, volemia, acid-base balance).

OBJECTIVES. To describe disturbances in the internal environment after HIPEC and their management the first 2 days after surgery in the ICU.

METHODS. Retrospective observational study that include all the patients that underwent HIPEC in 2013 and were admitted in the ICU of Fuenlabrada University Hospital. The variables collected were demographics data; comorbidities; anthropometrics data; treatment before CRS (surgery and/or chemotherapy); primary tumor diagnosis; APACHE II; peritoneal carcinomatosis index (PCI); intraperitoneal chemotherapy agents; duration of surgery and HIPEC; fluid balance, analytical data, glycemia, temperature, electrolyte and insulin input in the first 2 days in ICU; hospital and ICU length of stay (LOS) and mortality.

RESULTS. 36 patients (25 women, 11 men) were included.

	N(%)	Median (Q3-Q1)
Age (years)	36	58 (68,5-48,25)
APACHE II	36	12 (15-8)
BMI (kg/m ²)	36	26,52 (28,98-24)
Preoperative PCI	30	12,5 (25,5-4,5)
Previous cancer surgery	23 (63,9)	
Previous systemic chemotherapy	24 (66,7)	
Primary tumor diagnosis		
Pseudomyxoma peritonei	11 (30,56)	
Colorrectal adenocarcinoma	11 (30,56)	

[General characteristics]

	N(%)	Median (Q3-Q1)
Duration of HIPEC (min)	33	60 (90-30)
Duration of surgery (hh:mm)	36	6:41(8:08-5:07)
Fluid balance in the operating room(ml)	36	1253 (2025-595)
No residual tumor by Sugarbaker completeness of cytoreduction classification (CC-0)	27(75)	

Chemotherapy solution

Oxaliplatin (alone or with 5FU + leucovorin)	18(50)
Doxorubicin + cisplatin	8(22,22)
Mitomycin C	4 (11,11)

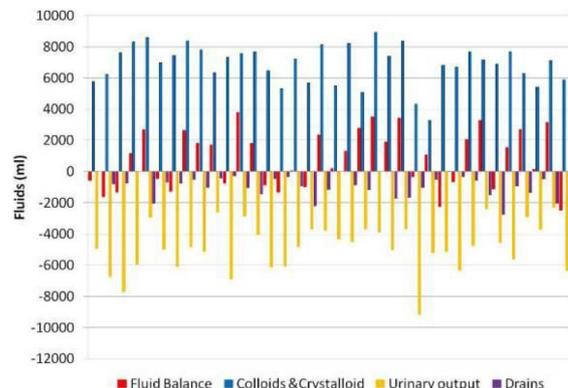
[Surgery characteristics]

	N	Median (Q3-Q1)
Fluid balance first 2 days ICU (ml)	36	1109,5 (2555,5-(-835,25))
Diuresis first 2 days ICU (ml)	36	4810 (6025,25-3691)
K administered in ICU (mEq)	36	82,7 (111,75-47,44)
Ca administered in ICU (mEq)	36	9,98 (19,92-4,89)
Mg administered in ICU (mEq)	36	26,73 (39,89-12,15)
P administered in ICU (mEq)	36	20,2 (32,51-13,45)
Glycemia at ICU admission (mg/dl)	36	187,58 (73,04)*
Temperature at ICU admission (°C)	36	36,3 (36,77-35,62)
Insulin administered in ICU (UI)	36	36,4 (34,28)*

*Mean (SD)

[Day 1-2 ICU postoperative process]

86,11 % patients were normothermic and presented lactic acidosis at admission in ICU. The most of all requires large amounts of crystalloids and colloids solution and electrolyte replacement with positive balance in the first 2 days of stay.



[Fluids]

Stand out hyperglycemia, higher in patients that received oxaliplatin as chemotherapeutic agent (at admission: mean 216,5 vs 158,67, p 0,015; mean glycemia: mean 148,49 vs 137,47, p 0,060), that made necessary the use higher dose of insulin (mean 46,22 vs 26,58, p 0,086). This may be related to the use of dextrose 5 % as solvent of oxaliplatin, instead of peritoneal dialysis fluid, that were used with the rest of agents. The metabolic disturbances improved during the ICU stay, with occurrence of mild coagulopathy without blood loss or leucopenia. Hospital mortality was 5,6 %.

CONCLUSIONS. The main internal environment disturbances are hyperglycemia, lactic acidosis, electrolyte deficits and fluid loss. A special guided insulin protocol for these patients may improve the glycemia control and reduce the hyperglycemia impact. Restoring normovolemia and electrolyte disturbances requires large amount of intravenous fluids with positive fluid balances.

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0967

DEPTH OF ANAESTHESIA DURING ENDOTRACHEAL INTUBATION IN AN INTENSIVE CARE UNIT

B. Lobo-Valbuena¹, M.A. Romera-Ortega¹, N. Martínez-Sanz¹, I. Fernández-Simón¹, B. Balandin-Moreno¹, J. Palamidessi Domínguez¹, M.A. Pérez-Lucendo¹, P. Matía-Almudevar¹, M. Valdivia-de la Fuente¹, J.J. Rubio-Muñoz¹, P. Galdós-Anunciabay¹

¹Hospital Universitario Puerta de Hierro, Intensive Care Unit, Madrid, Spain

INTRODUCTION. Bispectral index (BIS)-guided induction of general anaesthesia is commonly used at the operating theatre. However, the use of BIS to guide or assess appropriate levels of anaesthesia during induction at the intensive care unit (ICU) is not frequently applied. Therefore, it is not clear if we over- or under-sedate the critically ill patient during endotracheal intubation (ETI).

OBJECTIVES. The main objective of this study was to assess the depth of anaesthesia with our usual sedation protocol, which includes the use of etomidate 0.15-0.3 mg/kg and rocuronium 0.6-1 mg/kg, using BIS.

METHODS. Prospective blind study conducted from 15/12/2012 to 30/06/2013. Details of BIS value were unknown by the operator. We analysed BIS and burst suppression (BS) (BIS monitors XP and VISTA), after administration of the anaesthetic and neuromuscular blockade, before laryngoscopy (pre-ETI), during laryngoscopy (ETI) and 3-5 min after ETI (post-ETI). Heart rate (HR), mean arterial pressure (MAP) and oxygen saturation (SpO₂) were measured at the same time. Data are expressed as mean ± standard deviation (and in the case of drug doses, as median and interquartile range).

RESULTS. Forty-five patients were included. Sex: 16 (35.5 %) women. Age: 53.3 ± 20.1 years old (range 16-83). APACHE II: 16.4 ± 9.2. Main diagnosis on ICU admission: non-traumatic brain injury in 17 patients (38 %), respiratory failure 11 (24 %), shock 9 (20 %), trauma 4 (9 %), other 4 (9 %). Indications for ETI: respiratory failure 26 (57.8 %), low level of consciousness 8 (17.8 %), invasive procedure 7 (15.5 %), agitation 3 (6.7 %) and reintubation after non-programmed extubation 1 (2.2 %). Anaesthesia with etomidate in 93 % (0.3 mg/kg [0.30-0.30]). Opioid was used in 41 patients (90 % fentanyl, 1.1 mcg/kg [0.74-2.23]). All patients were intubated with rocuronium (0.74 mg/kg [0.7-1.1]). During ETI, Cormack I-II in 40 patients (88.9 %), III-IV in 5. Eleven patients received norepinephrine (NE) during the procedure, 8 patients received NE before ETI.

(*p < 0,001 between BIS pre-ETI and ETI or post-ETI. ** p = 0,032 between BS pre-ETI and BS ETI)	pre-ETI	ETI	post-ETI
BIS	52,2 ± 22,4*	35,4 ± 11,6	35,0 ± 10,7
BS (%)	2,8 ± 7,95**	6 ± 11,3	3,15 ± 9,1
HR (lpm)	98,9 ± 25,8	107,5 ± 23,8	105,5 ± 25,9
MAP (mmHg)	86,6 ± 16,9	88,7 ± 23,3	87,9 ± 18,1
SpO2 (%)	94,2 ± 6,9	94 ± 7,9	96,6 ± 4,5

[Table 1]

CONCLUSIONS. With the protocol used, all patients reached levels that ensured the absence of anaesthetic awareness but with a tendency to oversedation. Probably, the most common dose of etomidate (20 mg IV) is excessive in critically ill patients.

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INCIDENCE AND OUTCOMES OF CARDIAC SURGERY-ASSOCIATED ACUTE KIDNEY INJURY (CSA-AKI) REQUIRING CONTINUOUS RENAL REPLACEMENT THERAPY (CRRT)

A.L. Hurtado-Doce¹, T.C. Barnes¹, C. Hernandez-Caballero¹, D. Hall¹

¹Royal Brompton and Harefield Hospital NHS Foundation Trust, London, United Kingdom
INTRODUCTION. Postoperative kidney function deterioration has been shown to be an important predictor of morbidity and mortality. In addition, the mortality rate in CSA-AKI when continuous renal replacement therapy (CRRT) is required is considerably higher than for patients not requiring CRRT. The Kidney Disease Improving Global Outcomes Guideline (KDIGO Guideline 2013) on renal support for AKI suggests initiating CRRT when life-threatening changes in fluid, electrolyte, and acid-base balance exist.

OBJECTIVES. To determine the incidence and short-term prognosis of CSA-AKI requiring CRRT in a tertiary cardiac surgery centre.

METHODS. A total of 512 consecutive patients admitted to ITU after cardiac surgery during 2013 were retrospectively studied. AKI was defined by the AKIN staging criteria. Data regarding both the incidence of CSA-AKI requiring CRRT, and the indication for initiation of renal replacement therapy were collected. The association of postoperative AKI and in-ITU mortality was evaluated.

RESULTS. 60 of the 512 patients admitted to Harefield Hospital ITU after cardiac surgery in 2013 required CRRT for AKI. 71.7 % of the patients were male with a median age of 54 ± 11. The most common surgery in the CRRT group was 1 valve replacement + coronary artery bypass graft (21.7 %, 13 patients), followed by replacement of more than 1 valve (20 %, 12 patients). The bypass-time observed was significantly longer in the CRRT group. The most prevalent indication for initiation of CRRT was metabolic acidosis (46.7 %), followed by oliguria and fluid overload (35 %). The mortality in the CRRT group was significantly higher (10 %, 6 patients of 60) than in the group that did not require CRRT (3.3 %, 17 patients of 452). The global mortality observed was 4.5 % (23 patients of 512).

CONCLUSIONS. There are no significant differences in the demographic characteristics between patients that require CRRT after cardiac surgery compared with those not requiring CRRT. The most prevalent indication for CRRT is metabolic acidosis. There is significantly increased mortality observed in the CRRT group, and the incidence of CSA-AKI is significantly related to longer bypass-time. The results of this study are in keeping with previous studies in that the CSA-AKI is related to an increase in mortality in all groups, with a higher mortality if CRRT is required.

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Sepsis miscellanea: 0970–0983

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PATHOGEN IDENTIFICATION IN SEPTIC PATIENTS: CLINICAL IMPORTANCE OF PCR AND BLOOD CULTURES

V. Vrsajkov¹, J. Pejaković¹, Z. Dragić¹, B. Radanović¹

¹Clinical Centre of Vojvodina, Emergency Centre, Novi Sad, Serbia

INTRODUCTION. Sepsis is a serious medical condition and leading cause of death among ICU patients. Rapid and adequate antibiotic treatment is crucial. Conventional, culture based methods take days for pathogen identification which delays antimicrobial therapy adjustments.

OBJECTIVE. The aim of our study was to compare pathogen detection by PCR and blood culture (BC), their impact on antibiotic adjustment and outcome.

METHODS. Blood samples were taken from every patients with presumed sepsis. Patients with PCT value ≥ 2 ng/ml were classified as septic. We analyzed 109 septic patients with 157 blood samples. Whole blood was collected for simultaneous PCR testing and blood culture analysis, before initiating antibiotic therapy.

RESULTS. We obtained 60 PCR positive samples (38 %) while 36 samples (23 %) were positive in BC (p = 0.001). Positive PCR and BC analysis had 14 % and 53 % had both negative which makes concordance of 67 %. PCR showed accordance of 80 % to additional microbial samples (bronchial lavage n = 4, tracheal aspirate n = 12, urine n = 6, wound swab n = 3, CVK n = 1). Fourteen samples (9 %) had positive only BC (coagulase-negative Staphylococcus spp. n = 6, Acinetobacter spp. n = 5, Pseudomonas aer. n = 3). Positive BC was confirmed from presumed site of infection in 86 % of samples. In PCR positive group we detected 76 microorganisms and in BC group 41 microorganisms. Positive PCR brought to antibiotic adjustment in 52 % of cases. The PCR- positive in comparison with PCR-negative patients had significantly higher

procalcitonin (46.94 ± 76.91 vs 21.61 ± 35.30 p = 0.003) C-reactive protein (261.3 ± 378.20 vs 183.06 ± 85.29 p = 0.019) and APACHE II score (19.52 ± 9.48 vs 15.46 ± 7.97 p = 0.028). In PCR positive group mortality was insignificantly higher (41 % vs 34 %).

CONCLUSION. In septic patients, concordance between PCR and BC is moderate. PCR results are more frequently positive, correlated with disease severity even if BC remained negative and may result in earlier adjustment of antibiotic.

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DOES STAFF EDUCATION STILL REDUCES VAP WITHOUT TOP MANAGEMENT SUPPORT AND DEFICIENT SUPPLIES IN EGYPT?

A.M. Elmenshawy¹, T.H. Elbadawy², H.A.A. Abu Khobar³, S.F. Hafez⁴, E.E.M.H. Ibrahim⁵, A.M. Fayed⁶

¹Alexandria University/Alexandria Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt, ²Alexandria University/Alexandria Faculty of Medicine, Cardiology and Angiology, Alexandria, Egypt, ³Alexandria University/Alexandria Faculty of Medicine, Anesthesia and Surgical Intensive Care, Alexandria, Egypt, ⁴Alexandria University/Alexandria Faculty of Medicine, Medical Microbiology and Immunology, Alexandria, Egypt, ⁵Alexandria University/Alexandria Faculty of Medicine, Chest Diseases, Alexandria, Egypt, ⁶Alexandria University, Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt

INTRODUCTION. Most of VAP staff education recommendations require full availability of supplies and leadership support for maximum benefit. (1-2) However, we failed several times to obtain top management support or funding bodies for VAP staff education in our units.

OBJECTIVES. To determine the efficacy of VAP staff education with deficient supplies and lack of top management support with peculiar circumstances in Egypt.

METHODS. Quasi-experimental study with before and after prospective cohort in 2 ICUs of Alexandria university affiliated hospitals during the period from September 2007 till May 2013. The intervention phase included provision of a portion of necessary supplies, education for physicians and nurses followed by a VAP taskforce for educational modules and campaigns.

RESULTS. A 599 patients were enrolled in the study. The baseline and VAP risk stratification were similar except for cardiac and surgical diagnosis. The compliance to expanded VAP bundle significantly increased (p < 0.001) and VAP rate decreased by 35 % (from 66.5 to 43 per 1000 MV days) with p = 0.002 and CI 9.73 - 37.15 in spite of highly significant increase of ventilator utilization ratio (p < 0.001 in the post-intervention phase. The incidence of clinically defined (from 50.2 to 41 %, p = 0.028), laboratory confirmed (from 44 to 34.6 %, p = 0.018) early onset and (from 12.9 to 6.3 %, p = 0.032) decreased significantly in the post-intervention phase, whereas the incidence of poly-microbial VAP (from 13.3 to 26.3 %, p < 0.001) increased significantly and single and multiple VAP episodes decreased insignificantly (from 38 to 31.9 % and 12 to 9.3 % respectively with p = 0.730). The MV, antibiotic and ICU days did not change significantly in the post-intervention phase. The fluctuation of hand hygiene supplies significantly decreased hand hygiene compliance in intervention phase. The distribution of organisms did not differ significantly (p = 0.465). The sensitivity of most of carbapenems and β-lactam/β-lactamase inhibitors to acinetobacter, klebsiella and pseudomonas decreased significantly in the post intervention phase whereas the sensitivity of vancomycin to staphylococcus aureus remained the same.

CONCLUSIONS. In spite of lack of top management support and fluctuating supplies, VAP staff education was still efficient in reducing VAP.

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SEVERE COMMUNITY-ACQUIRED PNEUMONIA (SCAP): 15 YEARS EXPERIENCE IN A SINGLE CENTER

N. Bacejar Martínez¹, E. Diaz¹, P. Saludes¹, I. Martín-Loeches¹, M.J. Burguenio¹, J. Lema¹, A. Artigas¹, J. Valles¹

¹Hospital de Sabadell, Critical Care Center, Corporació Sanitaria Universitaria Parc Tauli, CIBER Enfermedades Respiratorias, Sabadell, Spain

CONTEXT. SCAP is a major cause of mortality in intensive care unit (ICU) patients. However, no studies have been examined the prevalence and prognosis of SCAP over a 15 years period.

OBJECTIVE. To analyze the evolution of characteristics and prognosis of patients with SCAP admitted to the ICU in tertiary university hospital during 15 years period.

METHODS. Retrospective analysis of SCAP patients admitted to ICU over the last consecutive 15 years, in periods of 5 years: P1 (1999-2003), P2 (2004-2008) and P3 (2009-2013). The severity of pneumonia was classified according to 2009 ATS/IDSA major criteria (MC). Recorded variables: co-morbidities, need of mechanical ventilation (MV), septic shock, bacteremia, appropriate empiric antibiotic treatment received and mortality in ICU. Qualitative variables were analyzed using Chi-square or Fischer test and the quantitative variables through Student's t test. Logistic regression was performed to identify variables independently associated with mortality.

RESULTS. A total of 459 SCAP episodes were included, showing during the three periods a progressive increase in the incidence and severity. The mean age was 61.3 ± 16.2 years, without differences among the three periods. There were no significant differences in the number of patients with > 2 co-morbidities. The need of MV, bacteremia, appropriate empiric antibiotic therapy and the mortality were significantly, different with a trend for septic shock.

Variables	P1	P2	P3	p
Incidence (Episodes/1000 admissions)	29.8	34.5	53.0	<0.05
Severity (> 1MC of ATS-IDSa)	64.2	72.8	82.5	0.01
Mechanical ventilation	56.9	63.0	72.0	0.02
Septic shock	38.2	44.8	50.0	0.12
Bacteremia	32.5	22.7	19.2	0.02
Appropriate empiric antibiotic treatment	78.3	92.7	97.7	<0.001
Mortality in ICU	41.5	20.8	20.3	<0.001

[Results]

The microbiologic diagnosis was achieved in 71.9 %, and *S. pneumoniae* (57.5 %), *Legionella* sp (8.7 %), virus (7.5 %) and Gram negative bacilli (6, 9 %), were the most common pathogens. The prescription of empiric antibiotic therapy was appropriate in 91 % of cases with known etiology. The incidence of combined treatment (cephalosporin + macrolide/quinolone) was in P1 61 %, in P2 81.8 % and 81.3 % in P3 ($p < 0.001$). The multivariate analysis identified that, age (OR 1.02, 95 % CI 1.02 to 1.04, $p = 0.005$), septic shock (OR 1.98, 95 % CI 1.11 to 3.59, $p = 0.02$), admission to the ICU in the P1 (OR 2.57, 95 % CI 1.28 to 5.17, $p = 0.008$) and the appropriate empiric antibiotic treatment (OR 0.31, 95 % CI 0.10-0.98, $p = 0.04$) as independent factors associated with mortality.

CONCLUSIONS. Both the incidence of SCAP and severity of illness have been substantially increased over the last 15 years. However, the mortality has been reduced since P2. Within this period, the rate of appropriate empiric antibiotic treatment has been increased with a decrease of bacteremia episodes

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TUBERCULOSIS IN THE INTENSIVE CARE UNIT: A RETROSPECTIVE COHORT STUDY

V. Moneti¹, N. Luis¹, L. Pássaro², C. Silva², S. Paulo², C. Mimoso Santos²

¹Egas Moniz Hospital, Lisbon, Infectious Diseases Department, Lisbon, Portugal, ²Santa Maria Hospital, Intensive Care Unit of Infectious Diseases, Lisbon, Portugal

INTRODUCTION. Portugal is an endemic country for tuberculosis and HIV epidemics has contributed to a rise in the incidence in the last 30 years. Mortality among patients with tuberculosis requiring admission to the intensive care unit (ICU) is still high and fatality risk factors have not been completely elucidated.

OBJECTIVES. To describe clinical features and determine predictive factors of in-hospital mortality among patients with criteria for ICU stay due to tuberculosis.

METHODS. Retrospective observational study including a cohort of patients admitted to the ICU, between January 2002 and March 2014, due to confirmed tuberculosis, despite the clinical presentation. A logistic regression model was used to identify risk factors for mortality.

RESULTS. During the study period, 70 patients were identified with tuberculosis diagnosis, only 38 were admitted due to tuberculosis and included in the analysis. Mean age was 47.8 years (± 13.9) and 29 patients were males (76.3 %). Patients required mechanical ventilation in 65.7 % (25/38) of the admissions. The overall mortality rate was 31.6 % (12 patients). No difference between survivors and nonsurvivors according to clinical presentation (pulmonary, meningal, and disseminated) was found. Comorbidities (AIDS, alcohol abuse, chronic obstructive pulmonary disease, diabetes and neoplasia) did not influence mortality. However, mechanical ventilation duration ($p = 0.05$) and length of stay ($p = 0.01$) were significantly lower in the nonsurvivors group. Eight patients did not start antituberculous therapy, the majority (6 patients, half of the fatalities) due to death before clinical suspicion (4.6 mean days of ICU stay). Seven patients started therapy before ICU admission and, in all the remaining patients, the median time to start antituberculous therapy was 1 day (1; 4 percentiles). Neither APACHE II nor SAPS II could differentiate between survivors and nonsurvivors in our cohort. However, SOFA maximum was statistically higher among nonsurvivors ($p = 0.02$).

	All patients (n = 38)	Survivors (n = 26)	Nonsurvivors (n = 12)	p
Age, mean (\pm SD)	47.8 (± 13.9)	50.7 (± 14.9)	41.8 (± 9.2)	$p = 0.07$
Sex, male ratio (%)	29 (76 %)	18/26 (69 %)	11/12 (92 %)	$p = 0.13$
Comorbidities				
HIV infection, n (%)	19 (50 %)	13/19 (69 %)	6/19 (31 %)	$p = 1$
Alcohol abuse, n (%)	11 (29 %)	6/11 (55 %)	5/11 (45 %)	$p = 0.24$
Neoplasia, n (%)	4 (11 %)	2/4 (50 %)	2/4 (50 %)	$p = 0.4$
Chronic pulmonary disease, n (%)	3 (8 %)	3/3 (100 %)	0/3	$p = 0.22$
Diabetes, n (%)	1 (3 %)	0/1	1/1 (100 %)	$p = 0.14$
Autoimmune disease, n (%)	1 (3 %)	1/1 (100 %)	0/1	$p = 0.49$

[Characteristics of patients with tuberculosis]

	All patients (n = 38)	Survivors (n = 26)	Nonsurvivors (n = 12)	p
Clinical presentation				
Pulmonary, n (%)	23 (61 %)	16/23 (70 %)	7/23 (30 %)	$p = 0.85$
CNS, n (%)	11 (29 %)	8/11 (73 %)	3/11 (27 %)	$p = 0.72$
Disseminated, n (%)	14 (37 %)	9/14 (64 %)	5/14 (36 %)	$p = 0.68$
ICU Scores, management and outcome				
APACHE II, mean (\pm SD)	23.1 (± 7.9)	21.8 (± 7.3)	26.4 (± 8.7)	$p = 0.12$
SOFA max, mean (\pm SD)	9 (± 5.2)	8.2 (± 4.7)	12.7 (± 5.1)	$p = 0.02$
Duration MV, mean days (\pm SD)	9.7 (± 9.3)	12.7 (± 10.1)	5.5 (± 6.2)	$p = 0.05$
Length of ICU stay, mean days (\pm SD)	13.7 (± 13.4)	17.3 (± 14.3)	5.7 (± 6.0)	$p = 0.01$

[Characteristics of patients with tuberculosis (2)]

CONCLUSIONS. Mortality in ICU due to tuberculosis was not influenced by HIV status or other comorbidities. Although pulmonary tuberculosis was the more frequent clinical presentation, mortality was similar compared to other forms of the disease. Considering ICU scores, SOFA maximum seems to best correlate with mortality in our sample. While half of nonsurvivors died before starting specific therapy, survivors had a median time to start treatment of 1 day. Mechanical ventilation duration and days of stay in the ICU were significantly different between survivors and nonsurvivors. The latter observation may be explained by the severity of the clinical presentation, a lower degree of clinical suspicion and consequent delay in starting antituberculous therapy.

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VALIDATION OF A NEW SENSITIVE POINT OF CARE DEVICE FOR RAPID MEASUREMENT OF PROCALCITONIN IN EMERGENCY DEPARTMENT PATIENTS

A. Kutz¹, M. Alan¹, E. Grolimund¹, P. Hausfater², C. Gast², C. Alonso³, C. Wissmann³, M. Oppert⁴, C. Kuehn⁴, M. Bernard⁵, P. Schuetz⁶

¹Kantonsspital Aarau, Internal Medicine, Aarau, Switzerland, ²Hôpital Pitié-Salpêtrière and Univ-Paris 06, Emergency Department, Paris, France, ³BRAHMS GmbH, Clinical Diagnostic Division of Thermo Fisher Scientific, Hennigsdorf, Germany, ⁴Klinikum Ernst von Bergmann, Emergency and Intensive Care Medicine, Potsdam, Germany, ⁵Hôpital Pitié-Salpêtrière, Biochemistry Department, Paris, France

INTRODUCTION AND OBJECTIVE. Procalcitonin (PCT), a highly sensitive and specific biomarker for bacterial infections, is increasingly being used in the emergency department (ED) for the diagnostic work up of patients in septic conditions. Recently, PCT direct[®], a new point of care (POC) reader, has been developed for a fast PCT measurement of venous or capillary blood samples with a measuring range of 0.1 - 10 µg/L. The objective of this clinical study was to evaluate the diagnostic accuracy and clinical performance of the PCT direct[®] test versus the reference method (Kryptor[®] or Elecsys[®]).

PATIENTS AND METHODS. This is a prospective international multicenter study conducted in 3 European EDs in consecutive patients with suspicion of bacterial infection undergoing routine care PCT measurement. For each patient, pertinent clinical information was collected and a double determination of PCT was performed on 2 distinct PCT direct[®] readers on capillary (fingertip) and venous whole blood (EDTA), and compared to the reference method. The imprecision was evaluated by the coefficient of variation (CV) of double determination.

RESULTS. 211 patients were included over a 3-month consecutive period. 38 % were women and 62 % were men with a median age of 66.5 years. 45 % of the patients had a final diagnosis of bacterial infection, 76 % were hospitalized and 6 % were admitted to the intensive care unit. The correlation between capillary or venous whole blood and the reference method was excellent: $r^2 = 0.98$ and 0.99 , sensitivity 0.85 and 0.93 , specificity 0.96 and 0.98 , concordance 0.92 and 0.96 respectively at a 0.25 µg/L threshold. No significant bias was observed (0.042 and 0.022 for capillary and venous whole blood respectively compared to reference method) although there were some outliers. The imprecision was higher in capillary than in venous blood samples. Clinical data showed that by using PCT direct[®] the median time to result was reduced from 125 to 25 min as compared to the reference method.

CONCLUSIONS. This study found a high diagnostic accuracy and a fast time to result of the new, sensitive POC device for rapid measurement of procalcitonin in the ED setting. Due to the remaining imprecision at the usual clinically relevant biomarker thresholds, results must be interpreted in the clinical context of the patient.

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COMMUNITY-ACQUIRED PNEUMONIA IN INTENSIVE CARE - A SINGLE CENTERS 4-YEAR EXPERIENCE

E. Espada¹, E. Florova¹, S. Pires¹, I. Mocanu¹, A. Figueiredo¹, F. Barros¹, A. Ramos¹

¹HPP Hospital de Cascais Dr. José de Almeida, UCI/UCIP, Alcabideche, Cascais, Portugal

INTRODUCTION. Community-acquired pneumonia (CAP) is a common diagnosis prompting admission to the Intensive Care Unit, and is an important cause of sepsis in this context.

OBJECTIVES. The authors present a retrospective analysis of patients admitted in the ICU of a Portuguese Hospital with a diagnosis of CAP, from February 2010 to February 2014, aiming to identify predictive factors for mortality and optimize clinical practice in this setting.

METHODS. Review of patient files, evaluating demographic data, comorbidity, C-reactive protein (CRP), antibiotic therapy and microbiologic isolates, organ dysfunction (OD), length of invasive mechanical ventilation (IMV), reinfection, severity scores, and mortality.

RESULTS. 118 patients with CAP were included (78 male; 66.1 %), with a mean age of 63.7 ± 17 days and mean length of stay of 12 ± 11.7 days. Mean SAPS II was 49.9 ± 19.2, with a predicted mortality of 47.2 ± 29.9 %. Maximum RCP in the first 24 h was 23.9 ± 14.4 mg/dL. Bacteria were isolated in 46 patients (39 %), the most common being *Streptococcus pneumoniae* (n = 25; 54.3 %). There were positive urinary antigens in 88 % of *S. pneumoniae* and *Legionella pneumophila* infections. Influenza A was detected in 9 patients, 7 of them of the H1N1 variant. The most commonly used empiric antibiotic scheme was ceftriaxone and azithromycin, in 62 patients (52.5 %); in 9 of them oseltamivir was added. 57.6 % of the antibiotic schemes were ceftriaxone-based and 32.2 % were amoxicillin-clavulanate-based. The empiric antibiotic approach was adequate in 87 % of evaluable patients. 96.6 % had OD; 84.7 % needed IMV (mean length of 10.8 ± 9.6 days), and of these 34.3 % had PaO₂/F_iO₂ ratio < 100. Reinfection occurred in 31.4 % of patients (75.7 % respiratory). ICU mortality was 41.5 % (55.1 % attributed to reinfection and 38.8 % to CAP) and in-hospital mortality was 44.1 %. In univariate analysis, age, SAPS II, respiratory OD, renal OD, renal replacement therapy, haematological OD, and reinfection affected mortality. In multivariate analysis only SAPS II retained independent impact on mortality (OR 1.021; p = 0.024).

CONCLUSIONS. Empiric therapy was suitable. Mortality was lower than expected (44.1 % vs. 47.2 %), but SAPS II retained accurate discriminative power in mortality prediction.

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PRELIMINARY RESULTS FROM THE USE OF ANAPNOGUARD 100 SYSTEM IN INTUBATED CRITICAL CARE PATIENTS

G. De Pascale¹, M.S. Vallecocchia¹, D. Giacobelli¹, A. Autunno¹, V. Di Gravio¹, E. Gasperin¹, S.L. Cutuli¹, D. Silvestri¹, M.A. Pennisi¹, M. Antonelli¹

¹Sacro Cuore Catholic University, Policlinico A. Gemelli, Department of Anesthesiology and Intensive Care, Rome, Italy

INTRODUCTION. The AnapnoGuard system (AG) (Hospitech Respiration LTD., Petach-Tikva, Israel) is an innovative respiratory guard system that continuously monitors and controls the cuff pressure by measurements of CO₂ levels, contemporary allowing the aspiration of subglottic secretions.

OBJECTIVES. Evaluate the safety and efficacy of using this system during the course of mechanical ventilation (MV) and intubation in Intensive Care Unit (ICU).

METHODS. All patients (pts) intubated with Hospitech's AnapnoGuard ETT and connected to the AG 100 system using the AG connection kit were retrospectively evaluated. Data from patients enrolled in HST-AG-04 randomized trial were not included. Clinical Pulmonary Infection Score (CPIS) was used to assess the rate of ventilator-associated pneumonia (VAP).

RESULTS. During the study period (January 2102-January 2014) 40 pts were intubated with an AG ETT (8 mm ID) and connected to the system. During the mechanical ventilation (MV) time, cuff pressure (Pcuff) was controlled and optimized by the system every 20 min, according to Carbon Dioxide (CO₂) level measured above the cuff. AG system, rinsing and evacuation (suction) of subglottic secretions were performed automatically, under preset parameters and timing intervals. Mean ± SD age, SAPS II and SOFA score were 67 ± 15, 41 ± 15 and 8 ± 3.5, respectively. Main intubation reason was primary respiratory failure (75 %), followed by haemodynamic instability and decreased level of consciousness (25 %). Mean ± SD duration of MV, connection to AG system and ICU length of stay were 12.7 ± 6 days, 124 ± 113 h and 17 ± 6 days, respectively. Seventeen patients were extubated and five were tracheostomized. Secretion management and analysis were reported for all 40 patients. Mean ± SD net secretions per day was 55.1 ± 61 ml/day (Min-Max: 0-200). Mean ± SD Pcuff values detected were 22.3 ± 1.07 cmH₂O. Four out of 32 patients connected for more than 48h (12.5 %) developed VAP: *Pseudomonas aeruginosa* was the most frequently isolated germ (75 % of cases). The overall feedback from the physicians and nurses with regard to the AG 100 system performance was very positive: easy to use, reduces nurses attention and effective. No device related Adverse Events or Serious Adverse Events were reported.

CONCLUSIONS. Preliminary results from our historical cohort show that AnapnoGuard 100 system is safe and effective in airway management of mechanically ventilated patients. The low VAP reported rate suggests the need of randomized controlled trials to define its potential beneficial role in this field.

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SPECTRUM OF PATHOGENS IN MEDICAL INTENSIVE CARE UNIT PATIENTS WITH LIVER CIRRHOSIS: AN OBSERVATIONAL STUDY

T. Lahmer¹, M. Messer¹, S. Rasch¹, C. Schnappauf¹, A. Schmidt¹, R. Schmidt¹, W. Huber¹

¹Klinikum rechts der Isar, TU München, II. Medizinische Klinik, Munich, Germany

INTRODUCTION. Infections are very common in patients with liver cirrhosis and currently represent one of the most common causes of admission to hospital.

Patients with cirrhosis have increased risk of developing not only bacterial but also fungal and viral infections which is a major challenge for physicians caring for patients with liver diseases.

OBJECTIVES. 206 critical ill patients with liver cirrhosis from our medical intensive care unit were included in this study.

METHODS. Combined observational/retrospective analyses of the microbiological records (including bronchoalveolar lavage, blood culture, urine and all other specimens) to evaluate the spectrum of pathogens in these patients including bacterial, fungal and viral organisms.

RESULTS. Respiratory tract infections occur with 45 %, followed by bacteremia with 20 %, urinary tract infections, also in 20 %, and infections originating from spontaneous bacterial peritonitis (SBP) in 5 %. Less frequent but clinically important sites, include the central nervous system, skin, and end organs such as liver or biliary tract are counted in < 5 %.

Bacterial infections are common in medical intensive care unit patients with liver cirrhosis. Gram-positive organisms cause most bacteremic infections (Enterococci in 31 %, Coagulase negative staphylococci (CoNS) are isolated in 26 %, multi-resistant *Staphylococcus aureus* in 15 %, others e.g. *Lactobacillus* spp. or *Corynebacterium* spp. in 28 %) whereas infections at other sites are often caused by Gram-negative bacilli (*Escherichia coli* in 25 %, *Pseudomonas* spp. in 20 %, *Klebsiella* spp. in 15 %, others e.g. *Stenotrophomonas maltophilia* or *Morganella morganii* in 40 %). Most infections are caused by polymicrobial pathogens and 40 % are multidrug resistant.

Candida spp. (*Candida albicans* in 70 %, *Candida glabrata* in 20 %, others e.g. *Candida krusei* in 10 %), and *Aspergillus* spp. (*Aspergillus fumigatus* in 90 %), remain the most common fungal pathogens, although several other fungi (e.g. *Trichosporon asahii*) have emerged.

Moreover, herpes simplex virus and cytomegalovirus could be detected with a relevant germ count in 30 % and 15 %, respectively.

CONCLUSION. Infections continue to challenge clinicians involved in the care of critical ill patients with liver cirrhosis. These infections occur frequently, can progress rapidly, and may not be associated with the usual clinical manifestations of infection due to a blunted inflammatory response. Physicians should be aware of the spectrum of pathogens in patients with liver cirrhosis as presented in this study.

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A SURVEY OF INTRAVENOUS ANTIBIOTIC ADMINISTRATION PRACTICES IN UK CRITICAL CARE UNITS

G. Barton^{1,2}, N. Henney², C. Morecroft²

¹St Helens and Knowsley Teaching Hospitals NHS Trust, Liverpool, United Kingdom,

²Liverpool John Moores University, School of Pharmacy & Biomolecular Sciences, Liverpool, United Kingdom

INTRODUCTION. Antibiotics are the curative therapy in the management of sepsis. A point prevalence study in 2007 showed that 51 % of patients on Intensive Care Units worldwide were deemed to have sepsis with 71 % receiving antibiotics. Pharmacokinetic/pharmacodynamic (pk/pd) data suggest that some parameters such as volume of distribution and renal clearance are altered in critically ill patients potentially leading to under dosing with standard doses and methods of administration.

OBJECTIVES. To investigate antibiotic administration on Critical Care Units (CCUs) in the United Kingdom (UK) and what factors influence that practice.

METHODS. An online survey was developed to obtain details of local practices in 244 CCUs in the UK regarding the methods of administration of commonly used antibiotics, situations/conditions when practice varied from usual practice and the driving forces for deviation. The desired respondents were pharmacists regularly working on CCUs; the link to the survey was posted on the message board of the UK Clinical Pharmacy Association's Critical Care Group. University ethics approval was obtained.

RESULTS. Completed surveys were received from 64 CCUs (26.2 %). A pharmacist visits the ward weekdays only on 54 CCUs (84.3 %), everyday on 9 (14.1 %) and rarely on one. On 75 % (48/64) of CCUs the pharmacist regularly attends the consultant-led ward round. 81.3 % (52/64) of CCUs had microbiology ward rounds on weekdays, the remaining units (18.7 %, 12/64) had weekly ward rounds. Most antibiotic administration followed the licensed method, however three drugs were regularly administered via "off-label" methods such as extended intermittent infusion (EII) or continuous infusion (CI). EIIs of Piperacillin/Tazobactam and Meropenem were used as usual practice on 14 (21.8 %) and 13 (20.3 %) of responding units respectively. One Trust with four CCUs used EIIs of Benzylpenicillin, Flucloxacillin, Cefuroxime, Ceftazidime and Co-amoxiclav. Vancomycin is the only antibiotic usually given by CI, this occurred on 33/64 units (51.5 %). The most commonly stated reason for using EII/CIs was "evidence based - pk/pd studies" selected by 29/64 respondents (45.3 %). For patients receiving renal replacement therapy (RRT) two CCUs changed administration practice from bolus to EII. Piperacillin/Tazobactam and Meropenem were given as EIIs when treating patients with major burns on two CCUs and one CCU used them for the treatment of pseudomonas. 100 % of respondents used the same total daily dose regardless of method of administration and did regular therapeutic drug monitoring for vancomycin and gentamicin but none was undertaken for any other classes of antibiotics (e.g. penicillins).

CONCLUSIONS. Although most usual administration practice matched the product license there is a trend towards EIIs for Piperacillin/Tazobactam and Meropenem and over half of responding units use Vancomycin by CI. Further study is warranted to justify these off label practices.

0980

DOES PROCALCITONIN USE IMPROVE ACCURACY OF ANTIBIOTIC DECISION MAKING?

P.D. Levin¹, E. Carmi¹, C.L. Sprung¹, M.J. Cohen¹, S. Benenson¹

¹Hadassah Hebrew University Medical Center, Jerusalem, Israel

INTRODUCTION. The presence of infection can only be proved on approximately 50 % of occasions that antibiotics are started for suspected infection in ICU patients. Procalcitonin (PCT) has been shown to have a high sensitivity and specificity for bacterial infection in ICU patients, but it is not known whether this translates into improved antibiotic administration decision making.

OBJECTIVE. To determine whether use of PCT tests improves the accuracy of decisions to start antibiotics for suspected infection in ICU patients.

METHODS. Over a seven month period PCT blood tests were made freely available to ICU physicians 24 h/day with results provided within 30 min. Each time infection was suspected and antibiotics were started, or PCT sent but antibiotics not started, an assessment was made by an ID specialist for the presence of infection. The evaluation was performed several days after the suspected infection decision. All clinical, radiology, laboratory and microbiology data that accrued were examined. Definitions of infection were based on the CDC criteria for nosocomial infection. The ID specialist was blinded to the PCT values. Accurate decisions were defined as the presence of infection when antibiotics were started or the absence of infection when antibiotics were not started. Infection decisions were divided into three groups: decisions where PCT was sent and antibiotics started, PCT sent and antibiotics not started, antibiotics started without PCT being sent. The accuracy for each group was calculated and compared.

RESULTS. Data were collected on 131 infection decisions in 175 patients. PCT was sent prior to 84/131 (64 %) decisions. Infection was defined after 26/56 (accuracy 46 %) decisions where PCT was sent and antibiotics started, 0/28 (accuracy 100 %) where PCT was sent and antibiotics not started, and 18/47 (accuracy 38 %) where antibiotics were started without PCT (p < 0.001). Combining all decision made with PCT, accuracy was significantly higher with PCT (54/84, 64 %) than for decisions made without PCT (18/47, 38 %, p = 0.007). In contrast, considering only infection decisions where antibiotics were started, accuracy was similar with or without PCT (26/56, 46 % vs 18/47, 38 %, p = 0.528). When PCT was sent prior to an infection decision, levels (units mcg/l) were significantly higher in cases when antibiotics were started vs not started (4.4 ± 10.1 vs 0.9 ± 1.7, p = 0.012). Similarly, PCT was higher when infection was defined by the ID specialist (6.8 ± 13.3 vs 1.6 ± 4.1 when not defined, p = 0.02).

CONCLUSION. PCT use was associated with improved accuracy of antibiotic prescription. This was mediated almost entirely by decisions to refrain from antibiotic therapy. The association between higher PCT levels and clinicians' decisions to administer antibiotics and between PCT levels and the ID specialists' determination of the presence of infection support the validity of the results.

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EPIDEMIOLOGY AND OUTCOME OF SEPSIS IN ADULT PATIENTS WITH STREPTOCOCCUS PNEUMONIAE INFECTION IN NORD-TRØNDELAG COUNTY, NORWAY 1993-2011

Å.S. Askim^{1,2}, A. Mehl^{3,4}, J. Paulsen^{3,4}, B.O. Åsvold^{5,6}, J.K. Damås^{3,6}, E. Solligård^{1,2}

¹Norwegian University of Science and Technology, Department of Circulation and Medical Imaging, Trondheim, Norway, ²Clinic of Anaesthesia and Intensive Care, St Olav University Hospital, Trondheim, Norway, ³Norwegian University of Science and Technology, Department of Cancer Research and Molecular Medicine, Trondheim, Norway, ⁴Levanger Hospital, Nord-Trøndelag Health Trust, Department of Medicine, Levanger, Norway, ⁵Norwegian University of Science and Technology, Department of Public Health, Trondheim, Norway, ⁶St Olav University Hospital, Department of Medicine, Trondheim, Norway

INTRODUCTION. Invasive pneumococcal disease (IPD) is responsible for significant mortality and morbidity worldwide (20-40 %). The incidence of IPD is reduced since the introduction of pneumococcal vaccine (PCV 7 and 23 PPV) to high risk groups but the long-term impact on mortality is not known.

OBJECTIVES. We carried out a prospective observational study of patients with sepsis by *Streptococcus pneumoniae* in North Trøndelag county in Norway from 1993-2011 to study the clinical variables and disease outcome. The main outcome was all-cause mortality after 30 and 90 days.

METHODS. Patients with positive blood cultures were registered prospectively by the microbiology laboratory and clinical variables were registered from patients' hospital records. The severity of sepsis was assigned according to the 2001 International Sepsis Definition Conference criteria. The association between mortality and predictive factors was studied using logistic regression analysis.

RESULTS. The total number of patients was 391 with mean age of 67 years and 206 males/185 females. Most patients had a functional status as independent or partly independent (97 %). The main site/origin of infection was the lower respiratory tract: (82 %), meningitis (6 %) and upper respiratory tract (3.3 %). A great proportion of the patients suffered from comorbid illnesses with a median Charlson Comorbidity Index value of 2. 17 % of the patients acquired the infection in a healthcare associated setting, 6 % were hospital acquired and 77 % were community acquired. 109 patients, (27.8 %) had severe sepsis and 25 (6.2 %) septic shock. The all cause mortality in hospital was 11.2 %, 30-day mortality 12.2 % and 90-days was 16.8 %. The 30-day all cause mortality for those with sepsis without organ failure was 7.8 % vs. 20.2 % for those with severe sepsis (Odds ratio (OR) 6.67, 95 % confidence interval (CI) 3.0-14.9, $p < 0.001$) vs. 24 % for those with septic shock (OR 21.1, 95 % CI 7.5-59.5, $p < 0.001$). When comparing the first half of the study period (1993-2003) with the second (2004-2011), we found no difference in 30 day mortality, when adjusting for age, sex and comorbid disease (OR 0.73, 95 % CI 0.38-1.38, $p = 0.34$). 95 % of the patients received appropriate antibiotics the first 24 h and 86 % were according to guidelines.

CONCLUSIONS. Sepsis caused by *Streptococcus pneumoniae* infection is a severe disease that predominantly occurs in elderly people with comorbid disease. This disease still carries a high mortality despite appropriate antibiotics in almost all cases and even with a mild degree of comorbidity burden. An important finding in our study is that there has been no decrease in mortality during the last 18 years, indicating that new measures for improvement of diagnostic and therapeutic management could be of value.

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INCREASING PROCALCITONIN KINETICS MAY BE A GOOD INDICATOR OF INFECTION IN CRITICALLY ILL PATIENTS

N. Öveges¹, D. Trásy¹, M.F. Németh¹, K. Tánzos¹, A. Osztrólczyk¹, J. Fazakas², P. Hankovszky¹, E. Hajdú³, Z. Molnár¹

¹University of Szeged, Department of Anaesthesiology and Intensive Therapy, Szeged, Hungary, ²Semmelweis University, Department of Transplantation and Surgery, Budapest, Hungary, ³University of Szeged, First Department of Medicine, Szeged, Hungary

INTRODUCTION. Early diagnosis of sepsis is crucial in treating septic patients. Starting appropriate antibiotic therapy in time have a significant effect on survival (1). Procalcitonin (PCT) is a reliable marker of infection (2) but its role in predicting bacterial infection, hence indicating antibiotic therapy is still controversial.

OBJECTIVES. Our aim was to investigate the value of PCT-change from the day before (T_{-1}) to the day when infection was suspected (T_0), in predicting infection in intensive care patients.

METHODS. In this subgroup analysis we used the results of a prospective observational study in which the value of the 0-16-24 h PCT-kinetics after starting empirical antibiotic therapy in intensive care patients to predict effective or ineffective antibiotic treatment was investigated. In this analysis, patients who had PCT data from the previous day (T_{-1}) were included. Based on the microbiological results patients were grouped *post hoc* into "infection" and "no infection" groups by two independent experts (intensivist, infectologist) who were blinded for PCT. Statistics were performed by using SPSS® 20.0 data are presented as median (interquartile range) and statistical analysis was performed by χ^2 and Mann-Whitney, as appropriate.

RESULTS. Out of the 209 patients included in the whole study in 114 cases PCT was available from the previous day when infection was suspected (T_{-1}). Infection was proven in 85(75 %) patients and could not be proven in 29(25 %) cases. Although PCT levels were higher in the Infection-group at T_{-1} : 1.28 (6.78) vs. 0.53 (1.84), $p = 0.018$, and this difference was even higher at T_0 : 4.26 (11.35) vs. 1 (2.09), $p < 0.001$. The rate of increase was significantly higher in the Infection-group from T_{-1} to T_0 as compared to the No-infection-group: 233 (432) % vs. 89 (426) % ($p = 0.006$). The best cut-off for indicating infection was found at ≥ 90 % increase in PCT from $T_{-1,0}$ with a sensitivity = 68 % and specificity = 72 %, $p < 0.001$.

CONCLUSION. Absolute values of PCT at T_0 were elevated in patients with and without infection, indicating that absolute values may be difficult to rely on. Our results suggest that PCT-kinetics may be superior to absolute PCT values in indicating infection in the critically ill.

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MULTI-ORGAN DYSFUNCTION - A RELEVANT ENDPOINT FOR FUTURE SEPSIS STUDIES

I. Gocze¹, Y. Soeder¹, C. Johnson¹, F. Zeman², T. Bein¹, H.J. Schlitt¹, M.H. Dahlke¹

¹University Medical Center Regensburg, Department of Surgery, Regensburg, Germany, ²University Medical Center Regensburg, Center for Clinical Studies, Regensburg, Germany

INTRODUCTION. Over the last decade, short-term mortality for patients with severe sepsis has declined to such a level that it no longer fully reflects patient outcome. Consequently, it is recommended that new sepsis clinical trials should incorporate alternative endpoints related to the morbidity and long-term mortality. Ongoing organ dysfunction in survivors following sepsis recovery can be associated with decreased quality of life and poor long-term outcome. Therefore, the Sequential Organ Failure Assessment (SOFA) score may represent an appropriate marker of organ dysfunction and predictor of long term outcome in sepsis studies.

OBJECTIVES. To compare the cumulative SOFA score of survivors and non-survivors obtained in the first 96-hours post severe septic shock of abdominal origin onset, as assessed at day-28.

METHODS. Retrospective evaluation of 109 patients with severe sepsis in the years 2010 and 2011 was performed. Severe septic shock (severe sepsis and high dose of vasopressors) was identified in a total of 27 patients. Clinical and epidemiological risk factors, source control therapies and supportive interventions as well as organ function measurements were recorded.

RESULTS. The 28-day mortality of patients with severe septic shock was 30 %. A significant association between short-term mortality and SOFA score was shown 24-hours ($p = 0.028$), 72-hours ($p = 0.025$) and 96-hours ($p = 0.015$) post-onset. A significant association between short-term mortality and mean- ($p = 0.03$) and total- ($p = 0.025$) SOFA scores was observed 96 h post-onset. The mean total SOFA score of non-survivors was 54 (SD 16), compared to a mean total SOFA score of 44 (SD 18) in survivors. Thus, in these cohorts, a 10-point difference in total SOFA score can be considered highly clinically relevant.

CONCLUSIONS. Reduction in degree of multi-organ dysfunction during the early phase of severe sepsis and septic shock, as quantified by SOFA score and its variables, may represent a pertinent composite endpoint for future interventional sepsis studies. This reduction may have a high clinical relevance for short- and long-term outcome.

Process improvement in the ICU: 0998-1011

0998

FOLLOW UP OF CRITICALLY ILL PATIENTS AFTER DISCHARGE FROM ICU

A. Estella¹, M. Jaén¹

¹Hospital of Jerez, Intensive Care Unit, Jerez de la Frontera, Spain

INTRODUCTION. Follow up of critically ill patients after discharge from the ICU can be considered a strategy for assessing quality of care.

OBJECTIVES. The objectives of this study are to describe the clinical profile of patients discharged from ICU, to evaluate the recovery trajectory of patients surviving ICU treatment and to analyze the rate of readmissions and post- ICU mortality.

METHODS. Observational study conducted in a 17-bed Intensive Care Unit of a community hospital. Patients discharged from ICU were consecutively enrolled. Time of study was 120 days. Age, gender, vascular risk factors, APACHE II at admission, ICU and conventional ward length of stay, reason for admission, mechanical ventilation requirements, readmission rate and mortality were collected. Data were analyzed by SPSS 18. software.

RESULTS. 294 patients were included, 170 male and 124 female. Mean age was 61.4 \pm 15 years. APACHE II at admission was 13.8 \pm 6 points. Most patients had vascular risk factors, 46.4 % were hypertensive. The mean ICU length of stay was 4.6 \pm 4 days. 69 patients (23.5 %) required mechanical ventilation, prolonging for more than 7 days in 17.3 % of patients. 36.9 % of patients were admitted for pacemaker or venous reservoirs implantation. Forty-three patients, 14.6 %, were admitted for surgical pathology. 3.4 % were trauma patients and only three patients were admitted for hematologic pathology. Remaining reasons for ICU admissions were for medical causes prevailing coronary syndrome. Length of stay in conventional ward after ICU discharge was 7.6 \pm 20.5 days. The most frequent destinations of ICU discharge were the cardiology department, followed by internal medicine and surgery wards. Mortality after ICU discharge was 2.7 %. We observed in this subgroup of patients and increased ICU length of stay, 10.9 \pm 9.5 days. No relationship was observed with other factors. 4.8 % were readmitted in ICU and in the first three months after discharge. 10.5 % of patients discharged from the hospital were readmitted in conventional wards during the follow up time of the study.

CONCLUSIONS. Mortality of patients discharged from ICU was not related to age, APACHE II at admission or mechanical ventilation requirements, we observed a relationship with an increased ICU length of stay. The recovery trajectory for ICU patients is often prolonged and suboptimal, readmissions rates and post-ICU mortality may contribute to give feedback to ICU staff.

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BLOOD SAMPLING ON THE INTENSIVE CARE UNIT

M.E. Packer¹, C.J. Thorne¹, N. Arora¹

¹Heartlands Hospital, Intensive Care, Birmingham, United Kingdom

INTRODUCTION. Excessive blood sampling can cause harm to patients, putting them at risk of iatrogenic anaemia and unnecessary blood transfusions¹ and can have a significant

financial implications². The ease of taking blood from indwelling arterial lines and the use of a protocol based blood sampling can easily lead to unnecessary samples being taken.

OBJECTIVES. In this audit we aimed to assess the number and type of blood tests taken on the intensive care unit (ITU) and high dependency unit (HDU) at Heartlands Hospital, Birmingham, UK and whether they were clinically required.

METHODS. Data was collected once weekly for four consecutive weeks. For each patient on ITU or HDU that day, the blood samples taken over the preceding week were recorded and notes were reviewed to assess reasons for clotting screens and blood transfusions. The blood tests recorded were full blood count, urea and electrolytes, magnesium, liver function tests, bone profile (calcium, albumin and phosphate), clotting screens and blood cultures.

RESULTS. Data was recorded for a total of 185 ITU/HDU patient days. Over this time a total of 1494 blood samples were recorded. This amounts to an approximate total volume of 2.5 l of blood or an average a 13.5 ml/person/day. When reasons for clotting screens were assessed, the most common reasons were as part of a routine protocol (39 %), for patients on haemofiltration (26 %) and on admission (15 %). It was noted that where patients had a normal initial INR, there was little variation in an individual patients INR in subsequent tests (range 0-0.7 variation in INRs taken over a week). Seven patients required a blood transfusion during this period, four of which were required for acute bleeding.

CONCLUSION. Too many blood samples are taken without a clear clinical indication. The number of unnecessary tests could be reduced by moving away from a protocol based system for blood sampling³. A reduction in the number of clotting screens performed, particularly in level two patients, is likely to reduce the volume of blood lost per patient and the cost of blood sampling without impacting on patient care.

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EVALUATION OF CLINICIAN PERFORMANCE IN THE ASSESSMENT AND MANAGEMENT OF ACUTELY DECOMPENSATED PATIENTS WITH AND WITHOUT ELECTRONIC CHECKLIST: A SIMULATION STUDY

R.A. Sevilla Berrios¹, J.C. O'Horo¹, C. Schmickl¹, A. Erdogan¹, X. Chen¹, L.Y. Garcia Arguello¹, R. Kashyap¹, B. Pickering¹, Y. Dong¹, O. Gajic¹, Multidisciplinary Epidemiology and Translational Research in Intensive Care (METRIC)

¹Mayo Clinic, Critical Care, Rochester, United States

INTRODUCTION. Acute critical illness is routinely treated by highly trained staff in specialized care units. However, initial care, the so-called "Golden Hour", can be impeded by inefficient processes of care delivery. The "Checklist Manifesto" showed that checklists are a valid approach to standardized care in clinical practice². We designed and developed a novel electronic Checklist for Early Recognition and Treatment of Acute Illness (CERTAIN) to apply standard approach in evaluation and management of acutely decompensated patient. We created clinical scenarios to evaluate the usefulness of CERTAIN in a high fidelity simulation center.

OBJECTIVES. Evaluation and management of acutely decompensated patient using electronic checklist CERTAIN can improve health care providers' performance and satisfaction in a simulated environment.

METHODS. Volunteers were invited to test the CERTAIN model. Clinicians could be included if they had recent advanced cardiac life support certification. Each volunteer attended 2 sessions in the simulation center. The first session was used to establish a baseline evaluation where they were asked to provide care in a standard clinical resuscitation scenario. Each then watched an online education module that consisted of training videos on how to use CERTAIN model. Following this intervention, each learner returned to the simulation center for a live didactic lecture, software knowledge training and practice scenarios. Each subject was given a post-test survey.

RESULTS. In preliminary analysis, 18 subjects have been evaluated. Post-test survey was completed by 16 subjects of whom 72 % felt better prepared during an emergency scenario using the CERTAIN model. 65 % indicated that they would want to use CERTAIN model on a real clinical scenario and 85 % would want to be treated by CERTAIN model if they were critically ill or injured. However, only 30 % subjects thought the software was easy to use.

CONCLUSION. The electronic checklist enabled model of care improves subjective perceptions and confidence of bedside clinicians confronted with emergency medical scenarios in high-fidelity simulation environment. Enhanced design and better training are needed to leverage potential benefits of electronic checklist in critical care environment

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COMMONLY ASKED QUESTIONS BY CRITICALLY ILL PATIENTS RELATIVES IN ARABIC COUNTRIES

T. Zaytoun¹, A. Abouelela¹, M. Malak²

¹Alexandria University, Faculty of Medicine, Critical Care Medicine, Alexandria, Egypt,

²Alexandria University, Faculty of Nursing, Alexandria, Egypt

INTRODUCTION. Relatives often lack important information about intensive care unit patients. Research on ways to improve family satisfaction in the ICU has become a crucial point in ICU quality improvement research.

OBJECTIVES. The aim of this study is to develop and analyze a list of commonly asked questions from relatives of patients in the intensive care unit in Arabic countries. This list might help families to determine which questions they want to ask and help them in decision-making process in emergency situations of their critically ill relatives.

METHODS. This study was a prospective double center study. It took place in the ICUs of two hospitals in Arabic countries: Egypt and Kingdom of Saudi Arabia. Alexandria University Main Hospital in Egypt and the ICU of King Fahad specialist Hospital in Dammam in Saudi Arabia. Data collection was done by reporting of Questions asked by the relatives of ICU patients during daily interview. The list of questions generated was subjected to a qualitative analysis to identify questions that could be eliminated. The remaining questions were categorized into 9 different groups: diagnosis, treatment, prognosis, comfort, patient interaction, family, mortality, post-

ICU management and other questions. A quantitative analysis was performed to rank the questions in the preliminary list through ICU staff, patients families and the patient themselves.

RESULTS. 115 Health care professional (34 physicians and 81 nurses) participated in the data collection, the questions recorded were 2240 questions. It was found that about 1750 questions (78.12 %) were duplicated or not clear. The remaining 490 questions were classified into different categories. The same 115 Health care professional (34 physicians and 81 nurses) who shared in the collection of data also shared in the ranking of the questions. 128 first degree relatives shared in the evaluation of the relevance of questions as well as 62 patients after they have been cured and before their discharge from ICU. A list was created including the most important 12 questions which got a score of 3 or more (in a score from 1-5) from all the 3 categories who did the assessment (the patients, their relatives and health care professional).

CONCLUSIONS. This study could provide a real help and guide to the physicians in the ICU and the patients families in the preparation for the families - physicians meetings, save the time lost in poor communication, decrease conflict, increase family satisfaction and help in decision-making process.

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A TEAMWORK MODEL "A-C-L-S (AIRWAY-CIRCULATION-LEADERSHIP-SUPPORT)" APPLIED IN IN-SITU HIGH-FIDELITY SIMULATION TO IMPROVE RESUSCITATION QUALITY AND TEAMWORK IN A CARDIAC CARE UNIT

C.-W. Yang¹, S.-L. Tsai¹, Y.-Y. Chen¹, C.-C. Yeh¹, T.-S. Chu¹, S.-C. Chang²

¹National Taiwan University Hospital, Department of Medical Education, Taipei, Taiwan, Province of China, ²National Taiwan University Hospital, Department of Internal Medicine, Taipei, Taiwan, Province of China

INTRODUCTION. Sudden cardiac arrests are not uncommon in cardiac care units (CCUs) and the survival depends mainly on the quality of resuscitation and teamwork performance¹. However, performance of resuscitation team during in-hospital cardiac arrest is suboptimal currently².

OBJECTIVES. This study is to demonstrate the effectiveness of a novel teamwork model "A-C-L-S (Airway-Circulation-Leadership-Support)" applied in situ high-fidelity simulation (HFS) for resuscitation teamwork training in a CCU.

METHODS. This is a pilot study with before-and-after study design. Medical staffs in a CCU of National Taiwan University Hospital were all invited to attend the training courses. Trainees were grouped into 4-5 persons for each HFS session (simulated cardiac arrest in a CCU). Each session lasted 10 min, followed by video-assisted debriefing. A novel teamwork model "A-C-L-S" was introduced during debriefing. One month later, a second HFS session was arranged for each group. Assessments for each trainee, including 10-point-scale self-efficacy questionnaires (Score S) and 10-point-scale teamwork global self-ratings (Score T), were used in both HFS sessions. Checklists of simulated performance (Score C) using 10-point scale were used to evaluate group performance during simulation sessions.

RESULTS. During November 2013 to January 2014, totally 22 medical staffs (5 groups) were included for training courses and assessments. Assessments for each trainee improved significantly after in situ HFS training (Score S 5.72 to 6.78 (p < 0.01), and Score T 6.17 to 7.18 (p < 0.01)). Resuscitation performance for each group during simulation also improved significantly (Score C 6.83 to 9.24 (p < 0.001)), especially in immediate chest compressions, opening airway during ventilations, appropriate ventilation rates, and checking rhythm and pulse regularly and properly.

CONCLUSIONS. A novel teamwork model "A-C-L-S" applied in situ HFS for resuscitation teamwork training is an effective modality in improving not only self-efficacy and teamwork self-ratings, but also group resuscitation performance.

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1003

INTERHOSPITAL TRANSFERS IN A NON-TERTIARY HOSPITAL. HOW HAVE WE IMPROVED THE PRACTICE

S. Sevastru¹, M. Rooms², F. Kovari²

¹North Middlesex University Hospital, Intensive Care Medicine, London, United Kingdom,

²North Middlesex University Hospital, Intensive Care Unit, London, United Kingdom

INTRODUCTION. Critically ill patients are frequently transferred from secondary hospitals following their initial stabilisation. The transfer is required due to the need for specialist investigation or treatment, lack of a staffed critical care bed or for repatriation purposes. The number of transfers is ever increasing so the aim for a safe critical care transfer is of paramount importance.

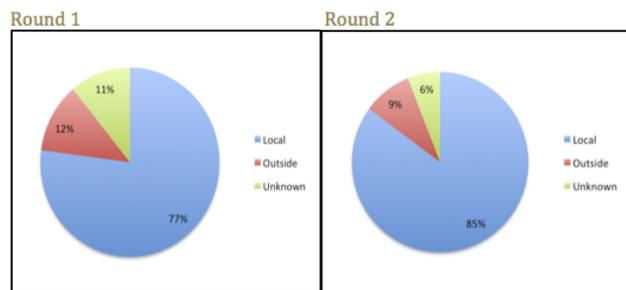
OBJECTIVES. On round 1 of this audit we analysed various parameters of all interhospital transfers made from our unit between 2010-2012. The data was compared with the Intensive Care Society guidelines and we discovered several areas where improvement was needed. We implemented a series of changes: clear transfer protocols, designated area for transfer kit (lean thinking), transfer checklists and better staff training. Critical Care Outreach Services facilitated the process by assisting the transfer teams.

Following the completion of these interventions, on Round 2 we analysed the same parameters of the interhospital transfers performed during 2012-2014 and we compared the results to the ones from Round 1.

METHODS. This is a single centre retrospective audit of a non-tertiary university hospital with 8 bed mixed ICU. We analysed data for 35 critical care transfers on round 1 and 67 transfers on round 2. We audited data of the referring team, location, receiving team, the reason for transfer, decision- departure time, the intubation details, and arterial blood gases pre/post transfer, time of transfer, adverse events, documentation and the grade of transferring doctor.

RESULTS.**Destination of transfer**

The number of patients transferred outside the local Critical Care Network has decreased on the second round, from 12 % to 9 %. See Fig. 1.



[Fig. 1 Destination of transfer]

Decision to departure time

We measured the time taken for the patient to leave our hospital from the moment the decision to transfer had been made by the parent team.

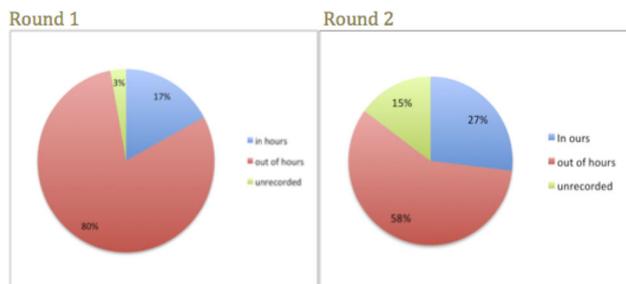
Our interventions have resulted in a faster transfer time by minimizing the time used for preparation. Compared to round 1 in round 2 the average time has been reduced by 1 h and 44 min. See Fig. 2.

	Round 1	Round 2
Average time	4 hours 47 min	3 hours 3 min

[Fig. 2 Time taken for departure]

The time of departure

On round 2, despite an increase in the overall number of transfers, the proportion of 'out-of-hours' transfers has significantly decreased from 80 % to 58 %. See Fig. 3.



[Fig. 3 The time of transfer]

CONCLUSIONS. We designed a better induction pack and an interhospital transfer course helping the trainees achieve their competences in transfer medicine. By applying concepts of lean thinking to the process and by involving the outreach teams we achieved an overall reduction in the transfer time as well as a decrease in the number of 'out-of-hours' transfers. Thus we improved the safety and quality of the level 3 transfers from our unit.

REFERENCE(S). 1. Intensive Care Society. Guidelines for transport of the Critically ill adult. London: Intensive Care Society, 1997.

1004**CONSUMPTION OF RESOURCES (CR) IN CRITICALLY ILL PATIENTS (CIP) WITH RENAL REPLACEMENT THERAPY (RRT)**

J. Ruiz Moreno¹, E. González Marín¹, R. Corcuera Romero de la Devesa¹, M.J. Esteve Paños², M.J. Ribas Ribalta¹, S. Godayol Arias¹, N. Suárez Álvarez¹

¹IDC Salud Hospital Universitari Sagrat Cor, Critical Care Department, Barcelona, Spain, ²ICU/Medicine/CRCHUS, Critical Care Department, Barcelona, Spain

INTRODUCTION. It is considered that the CR of CIPs requiring RRT is higher than the overall CIP population. However, both the identification of specific ICU procedures and the relative weight (RW) of the diagnostic related groups (DRG) case - mix system related to each CIP have not been researched sufficiently.

OBJECTIVES. To identify and evaluate the CR of the CIPs with need of RRT in comparison with the CIPs without requiring RRT.

To evaluate and compare the RW of the DRGs between CIPs with RRT and without.

METHODS.

- Prospective, analytical, longitudinal, and observational study
- Period: Between January 1-2012 and August 31-2013 (20 months)
- Setting : Medical/Surgical ICU belonging to a 290 acute care teaching hospital
- Population and sample: All the CIPs admitted consecutively to the ICU. Sample: 1090 CIPs.

· Exclusion criteria: CIPs < 16 years, major burn patients, incomplete clinical documentation, and voluntary discharge

· Variables analyzed: a) length of stay (LOS), readmission, RW of DRG (AP-DRG 25.0 version, TISS 28 scale, NAS scale, invasive mechanical ventilation (IMV), non invasive mechanical ventilation (nIMV), percutaneous tracheostomy, cardiac catheterization, and isolation measures.

· Statistical analysis: χ squared and contrast of means.

RESULTS. Global CIPs: 1090. The results are shown in Tables I and II

	CIPs	%	RRT	%	No RRT	%	'p' value
Age	66,0 (SD 16,6)		72,5 (SD 11,1)		65,8 (SD 16,7)		0,0001
LOS	3,35 (SD 6,42)		14,4 (SD 18,3)		2,93 (SD 5,04)		0,0001
Readmission	47	3,78	5	11,1	42	3,49	0,0083
RW	4,02 (SD 4,44)		9,52 (SD 12,43)		3,81 (SD 3,67)		0,0001
Isolation	29	2,32	5	11,1	24	2,0	0,0001

[Results I]

	CIPs	%	RRT	%	No RRT	%	'p' value
TISS 28	343,89		477,24		338,90		0,0001
NAS	78,68		87,62		78,34		0,0001
IMV	375	30,05	33	73,33	342	28,43	0,0001
nIMV	117	9,38	15	33,33	102	8,48	0,0001
Tracheostomy	23	1,84	7	15,56	16	1,33	0,0001
Catheterization	34	2,72	0	0,00	34	2,83	0,2528

[Results II]**CONCLUSIONS.**

- LOS, readmission and RW are remarkably higher in the CIPs with RRT
- IMV and nIMV are also remarkably higher in the CIPs with RRT
- TISS and NAS scores are higher in the CIPs with RRT
- Isolation measures are used more in RRT patients.

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1005**IMPLEMENTING A VENTILATOR ASSOCIATED PNEUMONIA PREVENTION BUNDLE IN INTENSIVE CARE AT UNIVERSITY TEACHING HOSPITAL, ZAMBIA - CHALLENGES OF INFECTION CONTROL IN A LOW-RESOURCE ENVIRONMENT**

C.A. McCue¹, L. Bowen¹, S. Brosnan¹, J. Kinnear²

¹University Teaching Hospital, Anaesthetics and Intensive Care, Lusaka, Zambia,

²Southend University Teaching Hospital, Anaesthetics, Westcliff-on-Sea, United Kingdom

INTRODUCTION. University Teaching Hospital in Lusaka is the largest tertiary referral hospital in Zambia, serving a population of around 2 million. The 10-bedded Intensive Care Unit (ICU) is undergoing development as part of the ongoing improvements within the anaesthetic department. One established method of quality improvement is care bundle implementation to reduce hospital-acquired infection (HAI). Ventilator associated pneumonia (VAP) is the most common ICU HAI, with rates of 45 % (1). VAP is associated with increased mortality, duration of ventilation, ICU stay, and cost (2). Compounding this problem in developing countries is the lack of adequate infection control surveillance programmes, and subsequently no awareness of institutional VAP rates or strategies for improvement (3).

OBJECTIVES. Implement and assess a low cost VAP prevention bundle.

METHODS. For all ventilated patients the bundle included 4 elements: oral care with mouthwash, head of bed elevation, regular suctioning, and antacid prophylaxis. Implementation was supported with staff education, display of posters and daily compliance checks on ward rounds. Pre-implementation data was collected retrospectively from admission logs and case notes. Post implementation, daily review of ICU admissions was performed. Diagnostic criteria for VAP included worsening gas exchange or increased ventilation requirements, plus signs of sepsis or new chest x-ray changes.

RESULTS.

Results	Pre-implementation (4 weeks)	Post implementation (12 weeks)
Male:Female Ratio	1.9:1	1.3:1
Age range (years)	9 months - 80	10 months - 73
Total patient number	47	150
Mortality (%)	47 %	38 %
Patients ventilated > 48 h (%)	13 (27 %)	36 (24 %)
VAP rate	77 %	3.3 %

[Results - Pre and Post Implementation Data]

Bundle compliance was difficult to assess, however drug prescription and mouthwash use was universal as observed in charts and from daily discussion with nursing staff.

CONCLUSIONS. There are significant obstacles to be overcome in resource-limited settings to reduce HAI including lack of staff and equipment, high patient turnover and inadequate surveillance. We have demonstrated even with low cost interventions that improvements can be achieved. Limitations of this study include lack of microbiological support for VAP diagnosis, retrospective data collection, which may explain the high initial VAP rate, and the confounding factor of concomitant initiation of consultant led ward rounds. Despite this, in the process of initiating this bundle we have improved data collection by setting up a database on a dedicated computer within the unit, and encouraged regular ward round review of healthcare associated infection.

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GRANT ACKNOWLEDGMENT. AAGBI, ZADP.

1006
ADVANTAGES AND RESULTS OF WARD DRIVEN EDUCATIONAL PROGRAMS

W. Veugen¹, T. van Galen²

¹Senior ICU Nurse, VU University Medical Center, Amsterdam, Netherlands, ²ICU Nursing Staff Manager, VUmc, Amsterdam, Netherlands

INTRODUCTION. The continuous development of EBNE/EBM and technical advancements evolves in high speed. Continuous training is therefore needed to maintain knowledge and skills to ensure the performance of the best and safest possible (nursing) care. But there are some drawbacks: Educational programs are time and money consuming and can conflict with production targets, it can be difficult to determine the educational focus and educational institutes can be rigid. At VU University medical center (VUmc) ICU educational programs are self driven and organized. The VUmc ICU is a 24-bed level 3 ward, 85 Fte/115 nurses and 14 Fte/18 ICU nursing students are deployed.

METHODS. Educational programs are determined by the ICU educational focus group where doctors, nurses and nurse education managers are joined. This group defines the necessity of educational goals. Various teams offer a variety of educational topics to all nurses and are led by senior nurses or educators.

Educational program overview: • **Hard skills:** ALS training and teaching and testing of technical skills which are led by a skills-assessor. Assessor sessions are performed at the ward during shifts. Only the assessors (8) are not scheduled for patient care.

• **Soft skills:** simulation based training (CRM/TRM) at the ICU simulation center where non technical skills are performed and assessed.

• **E learning:** modules that are selected or developed for direct benefit of the ICU nursing staff.

Only 25 % of necessary educational training is offered outside of the ICU. Trainers and trainees are scheduled on weekly or monthly basis. Trainees are scheduled mostly during the peaceful part of shifts or after shift handoffs. The designated trainers are at least educated by *Train the trainer* programs or external if needed. As part of the educational climate the trainers are skilled and stimulated to be encouraging to their colleagues to cooperate in the facilitated training programs.

RESULTS. Since 2011 the educational performance increased for all educational programs although the invested time did not increase in the same rate. The impact of the educational programs on regular ICU performance and logistics is minimal despite an average ICU occupancy rate off 85 % with a 1:1.5 nurse to patient ratio. There is little disturbance in attending educational sessions.

2011	145	41 session hrs
2012	166	44 session hrs
2013	176	57 session hrs

[ALS trained ICU nurses]

2012	15	24 session hrs
2013	31	48 session hrs

[CRM trained ICU nurses]

2011	257	96 session hrs
2012	321	96 session hrs
2013	447	96 session hrs

[Skill based assessments]

CONCLUSIONS. At the VUmc ICU educational programs are mostly self driven and performed effectively. Increasing numbers of nurses are trained with almost no impact on ward care processes and logistics. This format provides flexibility and speed concerning optional choices, educational scheduling and educational capacity. Besides the mentioned advantages and outcomes we notice positive side effects as increased attention for education and quality, increased trainers and trainees motivation and the full use of nursing skills and potential by offering extra challenges¹.

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1007
MONITORING OF CONSULTATIONS TO THE INTENSIVE CARE UNIT: EVALUATION OF 3 MONTHS

C. Martín Dal Gesso¹, J.A. Silva Obregón¹, S. Saboya Sánchez², M.A. Romera Ortega², J.E. Romo Gonzales¹, J.M. Borralló Pérez¹

¹Hospital Universitario de Guadalajara, Guadalajara, Spain, ²Hospital Universitario Puerta de Hierro - Majadahonda, Madrid, Spain

OBJECTIVES. Evaluate the daily work done in the Intensive Care Unit (ICU) by analyzing consultations received, collected using a consultation form (CF) designed for that purpose.

METHODS. All consultations in the last quarter of 2013 were analyzed. The reason for the CF and the shift (morning (MS) or on-duty (ODS)) were reviewed. We considered: A) Scheduled surgery admission (SA) B) Procedure (PRO) [central venous catheter (CVC), other PRO]; C) Unscheduled admission (UA) [to evaluate a patient (EP), cardiopulmonary arrest (CPA) or primary angioplasty (PPCI)].

In this case, the source of consultation [emergency room (ER), hospitalization (H), post-anesthesia care unit (PACU)], the final decision (patient admitted or not), patient outcome at January 14 and reason to reject the admission were also reviewed.

RESULTS. A total of 205 consultations (2.23 calls per day) were received for a total of 195 patients.

A) SA 24 (11.7 %), 17 in MS (70.8 %) and 7 in ODS (all in the afternoon).
 B) PRO 34 (16.6 %), 28 in MS (82.4 %) and 6 ODS (all in the afternoon). For CVC 33 (97 %) [ODS 6 (18.2 %)].
 C) EP 147 (71.7 %), 48 in the MS (32.6 %) and 99 ODS (evening 67 [45.6 %], night 32 [21.8 %]). Eighty-five (57.8 %) came from ER, 45 (30.6 %) H and 17 (11.6 %) PACU. For

EP 96 (65.3 %) [ODS 65 (67.7 %)], CPR 9 (6.1 %) [ODS 4 (44.4 %)], PTCA 42 (28.6 %) [ODS 30 (71.4 %)].

Admission was decided in 117 (79.6 %) consultations (113 patients with 4 readmissions). Twelve (10.6 %) died (ICU 7 Floor 5). Not admitted 30 (20.4 %), corresponding to 28 patients (2 rejected 2 times). Of these, 3 died during the initial assessment. The reasons for not being admitted were: awaiting progress of the patient in 11 cases (36.7 %), the basal pathology in eight (26.7 %), by applying anesthesia agreed protocol in four (13.3 %) and transfer to another hospital in four (13.3 %). Only 2 of the 25 patients rejected (8 %) died and 2 other were still hospitalized.

CONCLUSIONS. 31 % of the activity (procedures and ER patients) would not be computed if there was no consultation form. The main reason for the consultation was to request admission to the ICU, mainly from the emergency department and evening shift. 20 % were not admitted, mainly awaiting evolution or dismissed by previous disease and died only 8 %.

1008
NOVEL REAL-TIME DATA TRANSMISSION SYSTEM FOR PRE-HOSPITAL EMERGENCY CARE: EXPERIENCES OF HIROSHIMA-CITY EMERGENCY MEDICAL SERVICES

S. Kusunoki¹, T. Sadamori², K. Une², J. Itai¹, K. Suzuki², H. Giga², T. Otani², S. Yamaga², Y. Kida², K. Ota², S. Ohshimo², Y. Iwasaki², N. Hirohashi², T. Yamanoue¹, K. Tanigawa²

¹Hiroshima Prefectural Hospital, Critical Care Medical Center, Hiroshima, Japan,

²Hiroshima University Hospital, Department of Emergency and Critical Care Medicine, Hiroshima, Japan

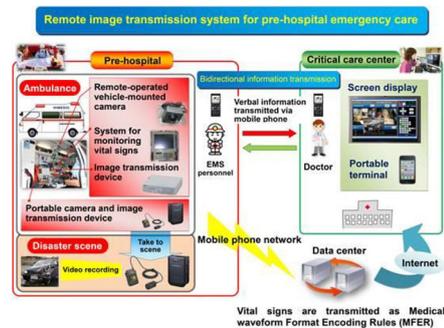
INTRODUCTION. Real-time communication between emergency medical service personnel in pre-hospital settings and hospital medical directors is essential to guarantee the quality of emergency care. Since most is done using voice communication, we developed a system for data transmission including visual images from the pre-hospital emergency scene to the designated hospital in real time.

OBJECTIVES. To assess the usefulness of our real-time data transmission system for improvement of pre-hospital emergency care.

METHODS. In March 2011, all ambulances of the Hiroshima City Fire Department were equipped with a system that transmits visual images and patient vital data using stationary and portable video cameras, a bio-monitor, a video-laryngoscope, and a specially designed transmission device (RVT-SD200, SONY). With it, data are transmitted in real time to medical directors at critical care centers in Hiroshima city using 3G mobile phone networks and the Internet (Figure 1), allowing them to advise paramedics for performing evaluations and procedures while supervising live video images of the patient (Figure 2A). Pharyngo-laryngeal images obtained with a video-laryngoscope (PENTAX-AWS, HOYA) (Figure 2B) are also transmitted for assisting tracheal intubation on the scene (Figure 2C, D). To assess the usefulness of the system, a questionnaire was sent to all affiliated paramedics and medical directors.

RESULTS. From March 2011 through March 2012, images and vital data for 1153 cases were transmitted. Severity was classified as mortal in 15 %, very severe in 21 %, severe in 26 %, moderately severe in 32 %, and mild in 6 %. Trauma accounted for 36 %, followed by cardiovascular diseases, acute intoxication, and cerebrovascular diseases in 22, 9, and 8 %, respectively. The questionnaire return rates for the medical directors and paramedics were 85 % and 100 %, respectively. For 924 cases with valid responses from both, 90 % and 78 % of all cases, 90 % and 77 % of those regarding impaired consciousness, and 91 % and 78 %, respectively, of those regarding trauma answered that this system is quite useful, indicating statistically significant differences ($P < 0.0001$, Chi square test).

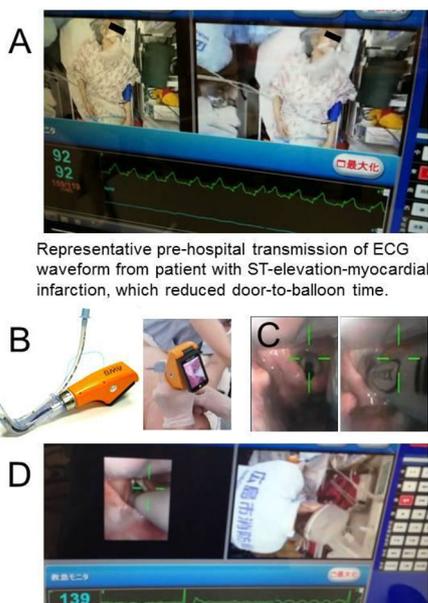
CONCLUSIONS. Our novel system provides real-time transmission of visual information from the pre-hospital scene to designated hospital. Medical directors evaluated the usefulness of this system more highly than paramedics in a questionnaire survey, likely because they could quickly and accurately recognize the condition of patients by viewing transmitted images. Accumulation of clinical evidence is needed to determine whether this real-time data transmission system can improve patient outcome.



Liquid crystal touch screen display at critical care center



[Figure 1]



[Figure 2]

1009 A SIMPLIFIED SCREENING ALGORITHM TO MONITOR COMPLIANCE WITH LUNG PROTECTIVE VENTILATION IN ARDS

G. McCreath^{1,2}, A. Amaral¹

¹Sunnybrook Health Sciences Centre, Critical Care, Toronto, Canada, ²University of Aberdeen, Aberdeen, United Kingdom

INTRODUCTION. The acute respiratory distress syndrome (ARDS) is one of the most common ICU conditions, affecting 26 % of mechanically ventilated patients and has a mortality of 38.5 % (1). Lung protective ventilation (LPV), including tidal volumes (Vt) of 6 ml/kg, is the standard of care (2), however only 6 % of patients receive it (3). To properly monitor compliance with LPV, ICUs require a validated, reliable tool.

OBJECTIVES. The primary objective of this study was to assess the validity of a simplified screening algorithm (SSA) for ARDS. The secondary objective was to demonstrate whether a single Vt measurement during the day could reliably identify compliance with LPV, compared with the average Vt.

METHODS. We abstracted data from 87 consecutive patients. We retrospectively and blinded applied the ARDS Berlin definition (4) to each admission within the first 7 days of ICU stay. Separately, we prospectively collected data 3 times a week on the SSA, which included a PaO₂/FiO₂ < 300 and a FiO₂ ≥ 0.5, and on the Vt at 8 am. We compared diagnostic accuracy of the SSA to the Berlin definition and we calculated compliance with LPV for the Berlin definition using the 24-hour average Vt and for the SSA using the 8 am Vt.

RESULTS. 44 % of patients had ARDS by the Berlin definition and 41 % using the SSA. 82 % had at least 1 risk factor for ARDS and 74 % had chest imaging that would fulfill criteria for ARDS. The SSA had a sensitivity of 81 % (66-97 %), a specificity of 88 % (80-96 %), a PPV of 71 % (54-88 %), and an NPV of 93 % (87-99 %). There was no difference in compliance with LPV using the gold standard and the average Vt over 24 h versus the SSA using the 8 am Vt (20.3 % [25/123 days] vs 22.6 % [7/31 days], p = 0.806).

CONCLUSION. The SSA has good accuracy and compliance with LPV is comparable between SSA and the gold standard. These results suggest that the SSA can be used to monitor performance with LPV in this single centre study.

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1010 ICU OUTREACH SERVICES IN A PROVINCIAL HOSPITAL IN NORTHERN GREECE

I. Chouris¹, M. Stogianni¹, M. Georgiou¹, V. Radu¹, D. Lagonidis¹

¹General Hospital Giannitsa, ICU, Giannitsa, Greece

INTRODUCTION. The ICU outreach services goals include: early recognition and timely intervention for patients with deteriorating clinical condition in order to start appropriate treatment, reduce morbidity, mortality, and to avert ICU admissions. Secondary goals are: participating in the therapeutic plan of the patient who will benefit from intensivist consultation and competence, and lowering the costs.

OBJECTIVES. We present the outreach service experience in a provincial hospital in northern Greece.

METHODS. Prospective documentation of all cases that required ICU outreach services from 29/09/2012 and for three subsequent months. The parameters documented were: demographics, primary and secondary reason for admission, reason for assessment, vitals, selected biochemistry and hematology tests, arterial blood gases. Documentation also

included the assessment and treatment plan, the outcome and the subjective opinion of the consultant intensivist as to the correctness of the referral and the adequacy of the level of health care.

RESULTS. Thirty-one cases were documented, age average 73,77 years, males 54,83 %. Distribution based on the admitting ward: Cardiology 6 patients (19,35 %), Internal Medicine 11 (35,48 %), Surgery 5 (16,12 %), Orthopedics 9 (29,03 %). Most frequent reason for assessment was acute respiratory insufficiency (19 cases, 61,29 %), 11 of which were hypercapnic and 8 hypoxemic. Five cases of circulatory shock (16,12 %), 3 cases of acute renal insufficiency (9,67 %), 1 comatose patient and 3 referrals for the assessment of the clinical condition of the patients were also examined. Following the intensivist consultation and the interventions proposed, the level of care (ward) was deemed adequate in 21 cases (67,74 %); 10 cases were judged in need for transfer to another department (32,25 %). Of those, 6 patients were admitted in ICU, 3 were transferred to another ward and one was transferred to a tertiary hospital. Intensivist consultation was regarded as justified in 27 cases (87,09 %). Non-invasive ventilation adjusted by the intensivist was applied in 15 patients (48,38 %), all successfully managed outside the ICU.

CONCLUSIONS. The outreach services are part of hospital functions in many countries. Despite initial enthusiasm, published papers have so far failed to demonstrate statistically significant benefit considering morbidity, mortality, ICU admission reduction and lowering of health care costs. However, to our experience, the ICU outreach service in our hospital is beneficial for a substantial number of patients, where the intensivist intervention was successful in averting ICU admission, while other patients were helped from referral to another department, more appropriate for their clinical situation. Additionally, sharing critical care expertise with our colleagues at the wards, contributes to achieving an integrated and comprehensive management of the clinical problems.

1011 THE EMERGENCY ROOM AT THE CENTER OF THE EMERGENCY CHAIN INSIDE THE HOSPITAL

A.O. Gomes¹, L. Proença¹, C. Carvalho¹, I. Aragão¹, R. Antunes¹

¹Unidade de Cuidados Intensivos Polivalente, Hospital de Santo António - Centro Hospitalar do Porto, Porto, Portugal

INTRODUCTION. The Emergency Room (ER) is the mainstay for critically ill patients in the Accidents and Emergency Department (A&E); if its resources are exceeded there will be risks for patient safety. This highlights the need for an adequate triage system and a structured interaction between all the elements of the emergency chain.

OBJECTIVES. To characterize ER admissions and outcomes in a non-professionalized emergency department where the ER, with 2 beds capacity, is under full responsibility of the intensive care unit. Independent risk factors associated with longer length of stay in ER are also described.

METHODS. Retrospective cohort of all admission into the ER over one year period (2013) at a university, tertiary care 600-bed hospital, with 130.000/year A&E admissions. Functionally dependent on the intensive care unit, the ER is organized and assigned daily to the specific task of treating critically ill patients.

RESULTS. Over the study period, 1578 patients (median of 4 admissions/day) were attended at the ER with a mean age of 68 ± 17 years of which 58 % were male; 42 % were observed during the night shift (8 pm-8am). Median time of permanence in the ER was 1.40 h (IQR 0.55-2.50 h). Of all admission: 39 % came from A&E, 50 % from outside the hospital (19 % with no referral, 17 % with an out-of-hospital medical emergency team and 15 % from other hospital). Main causes of admission were hemodynamic instability (33 %), respiratory failure (24 %) and altered mental status (25 %); cardiac arrest at admission occurred in 8 %, and 7 % did not meet any criteria for admission at ER. The most prevalent diagnosis were sepsis/septic shock (21 %), gastrointestinal bleeding (13 %), acute pulmonary oedema (APO) (9 %) and stroke (9 %). After ER attendance, 35 % returned to A&E, 24 % were admitted to intermediate care unit and 16 % were admitted to intensive care unit. Regarding life support: 25 % needed invasive mechanical ventilation, 14 % non-invasive ventilation and 12 % hemodynamic support; 8 % died. Independent factors associated with higher length of ER stay (≥ 1.40 h) were APO (adjusted OR = 3.092), hemorrhagic shock (adjusted OR = 2.220), sepsis/septic shock (adjusted OR = 2.024), trauma (adjusted OR = 1.654), hemodynamic support (adjusted OR = 2.763), invasive (adjusted OR = 1.484) and non-invasive ventilation (adjusted OR = 6.147) and admission to intermediate (adjusted OR = 4.656) or intensive (adjusted OR = 4.005) care units. Cardiac arrest (adjusted OR = 0.533) was independently associated with a shorter length of stay.

CONCLUSIONS. In our model, A&E represents the most important element in the emergency chain. The need for organ support was associated with greater length of stay at ER and so were admission to acute specialized units. This should be taken into account when planning appropriate allocation of health resources.

Sepsis prognosis II: 1012–1025

1012 RISK FACTORS FOR MORTALITY IN ELDERLY PATIENTS (> 75 YEARS OLD) WITH INVASIVE ASPERGILLOSIS

D.K. Matthaiou¹, G. Dimopoulos¹, T. Christodoulou¹, D. Vogelaers², S. Blot², and the AspICU Investigators

¹Attikon University Hospital, Critical Care, Athens, Greece, ²Ghent University Hospital, General Internal Medicine and Infectious Diseases, Ghent, Belgium

INTRODUCTION. Mortality in critically ill patients with aspergillosis is very high. However, data regarding risk factors for mortality in patients with invasive aspergillosis older than 75 years old are scarce.

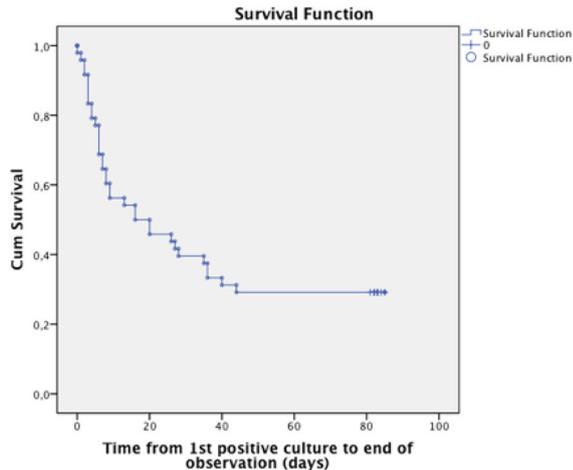
OBJECTIVES. We sought to examine risk factors for mortality in critically ill patients older than 75 years old with invasive aspergillosis.

METHODS. We analysed relevant data from the AspICU study, which is a multicenter web-based surveillance study of *Aspergillus* in Intensive Care Units (ICUs). More than 200 variables were collected including demographics, clinical characteristics, laboratory and imaging data, antifungal therapy, and mortality 12 weeks after the first positive culture.

RESULTS. Forty-eight out of 271 patients with invasive aspergillosis were included in the analysis. Thirty-four of them (70.8 %) died. Risk factors related to mortality were higher SOFA score (10.3 ± 4.9 vs 5.2 ± 3.2) (p = 0.001), time from ICU admission to the end of observation (91 ± 11.7 vs 21.3 ± 15.4 days) (p < 0.001), time from first positive culture to the end of observation (82.6 ± 1 vs 13.5 ± 12.9 days) (p < 0.001), fever refractory to at

least 3 days of appropriate antibiotic therapy [9/34 (26.5 %) vs 0/14 (0 %)] ($p = 0.04$), and worsening respiratory insufficiency in spite of appropriate antibiotics and ventilation support [23/34 (67.6 %) vs 3/14 (21.4 %)] ($p = 0.003$).

The shorter time observed from ICU admission and from first positive culture to the end of observation in patients who died indicates the grave clinical course of those patients. No difference was found regarding the delay in antifungal therapy from first positive culture. No independent risk factors for mortality were found after binary logistic regression analysis. The mean and median times for survival after the first culture were 34.4 (24.7 to 44) and 16 (0 to 35.2) days, respectively. A Kaplan–Meier curve regarding the survival of elderly patients with invasive aspergillosis is shown in the Figure.



[Kaplan–Meier curve]

CONCLUSIONS. Invasive aspergillosis in elderly critically ill patients is related with high mortality. Patients who are more severely ill on admission have worse prognosis. Timing of antifungal therapy seems to have no impact on the prognosis of those patients, as the disease has a devastating impact on their clinical course. Increased vigilance and clinical suspicion is required on behalf of the attending physicians.

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INCREASED CU/ZNSOD PLASMA LEVELS IN NON-SURVIVORS SEPTIC PATIENTS VS SURVIVORS DURING SEPSIS

M. Karapetsa¹, V. Tsolaki¹, I. Tsilioni¹, E. Zakyntinos¹

¹University Hospital of Larissa, ICU, Larissa, Greece

INTRODUCTION. Cu/ZnSOD is one of three superoxide-dismutase enzyme (SOD) isoforms (MnSOD, Cu/ZnSOD, ecSOD) and is located in cytoplasm of mammalian cells. Its role is to scavenge superoxide thus protects cells from oxidative stress. Oxidative alterations in ICU patients have been and remain a matter of ongoing investigation¹.

OBJECTIVE. The purpose of this study was to estimate changes of oxidant-antioxidant profile in septic ICU patients during sepsis evolution.

METHODS. ICU septic shock patients were included. Besides other oxidative and antioxidant markers that were assessed, levels of Cu/ZnSOD and of 8-isoprostane (8-iso-PGF_{2α}), a biomarker of lipid peroxidation, were determined in plasma. Serial measurements for both biomarkers were performed.

RESULTS. 17 septic shock patients participated in the study. They were divided in two groups, survivors ($n = 7$) and non-survivors ($n = 10$). Mean APACHE II score (without CNS estimation) was 11.5 ± 5.4 for the survivors and 19.9 ± 4.97 for the non-survivors group $p = 0.005$, mean SOFA score was 8.7 ± 1.7 and 9.80 ± 3.0 $p = ns$, CRP was 20.3 ± 3.1 and 27.6 ± 18.5 $p = ns$, respectively. Cu/ZnSOD levels differed significantly among survivors and non-survivors during the course of the septic insult ($p = 0.0057$, p significant < 0.05). In fact, these were higher in non-survivors in all timepoints while levels of 8-isoprostane did not present significant difference among the two groups. No significant correlations were found between levels of Cu/ZnSOD, APACHE II score, SOFA score, CRP measurements for each separate group and for the total amount of patients at study entry. Levels of 8-isoprostane did not correlate either.

CONCLUSION. Levels of Cu/ZnSOD in plasma maybe an independent factor associated with prognosis in septic shock patients. Since Cu/ZnSOD is passively excreted in plasma from the cells, the higher levels in the non-survivors probably reflect the greater amount of endothelial injury and tissue dysfunction in this group of patients rather than indicate an increased antioxidant activity of the enzyme in plasma.

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PROGNOSTIC IMPACT OF MICRONUTRIMENTS SERUM LEVEL AT THE EARLY PHASE OF SEPTIC SHOCK

A. Behouche¹, J. Arnaud², V. Ducros², C. Ara-Somohano^{1,2}, P. Faure², C. Schwebel², J.-F. Timsit^{1,2}

¹INSERM U823, Grenoble, France, ²Grenoble University Hospital, Grenoble, France

INTRODUCTION. Several studies have shown that micro-nutriments are involved in sepsis, playing a crucial role on bacterial virulence and host-microbe interactions.

OBJECTIVES. Our prospective, monocenter, observational study was designed to assess micro-nutriments evolution during the early phase of septic shock.

METHODS. From 03/2010 to 09/2012, 62 consecutive patients admitted in ICU for severe sepsis or septic shock were included. Demographic and various clinical and biological data were recorded including age, sex, origin of sepsis, estimated infection start time, SAPS II comorbidities, organ dysfunctions and outcome. Kinetics (time course) of plasma copper, zinc and selenium were assessed at admission, 3, 6, 12 and 24 h post-admission. Ion ratios were also calculated to increase sensibility. 36 patients survived and were discharged with 7 days and were considered of good outcome. 26 patients died or were still in the ICU after 7 days and were considered of poor outcome. ANOVA for repeated measurements were used to assess relationship between micronutriments and outcome.

RESULTS. Cu and Zn increased significantly with time but was not different between groups ($p = 0.65$ and $p = 0.50$ respectively). A low selenium serum level was significantly associated with prognosis ($p = 0.0041$) without time effect between H0 and H24.

(Good outcome | Poor outcome | p -val)

Se (μmol/L) :

H0 : 0,52 [0,40 - 0,66] | 0,39 [0,29 - 0,47] | 0,003

H3 : 0,51 [0,39 - 0,60] | 0,41 [0,28 - 0,48] | 0,007

H6 : 0,52 [0,41 - 0,62] | 0,43 [0,29 - 0,49] | 0,007

H12 : 0,52 [0,39 - 0,63] | 0,41 [0,33 - 0,48] | 0,005

H24 : 0,51 [0,43 - 0,59] | 0,44 [0,36 - 0,51] | 0,012

Zn (μmol/L) :

H0 : 2,9 [2,4 - 5,1] | 3,5 [2,4 - 5,2] | 0,711

H3 : 3,0 [2,6 - 5,3] | 4,0 [3,0 - 6,0] | 0,149

H6 : 3,6 [2,5 - 5,0] | 3,8 [2,7 - 5,7] | 0,458

H12 : 4,1 [2,8 - 5,8] | 4,7 [3,4 - 6,3] | 0,248

H24 : 4,6 [3,4 - 6,2] | 4,9 [3,3 - 6,0] | 0,808

Cu (μmol/L) :

H0 : 13,3 [10,6 - 15,8] | 12,3 [10,6 - 15,0] | 0,568

H3 : 13,1 [11,7 - 16,4] | 13,3 [9,9 - 16,7] | 0,797

H6 : 13,5 [12,2 - 15,9] | 12,6 [10,2 - 16,8] | 0,535

H12 : 14,5 [11,7 - 16,3] | 12,9 [10,7 - 18,0] | 0,392

H24 : 14,8 [12,2 - 17,1] | 14,2 [11,5 - 16,4] | 0,404

CONCLUSIONS. Our results suggest that early micronutriments assessments could help physicians to screen patients admitted in ICU for septic shock and identify high-risk profiles. A low selenium level is associated with a poor prognosis.

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RETROSPECTIVE STUDY OF PATIENTS ADMITTED WITH SUBMANDIBULAR SPACE INFECTIONS TO THE INTENSIVE CARE UNIT

K. Sundararajan¹, J. Gopaladas², H. Somehsa³, D. Shaw⁴

¹Discipline of Acute Care Medicine, University of Adelaide, Royal Adelaide Hospital, Intensive Care Unit, Adelaide, Australia, ²University of Adelaide, Royal Adelaide Hospital, Intensive Care Unit, Adelaide, Australia, ³University of Adelaide, Royal Adelaide Hospital, Adelaide, Australia, ⁴University of Adelaide, Royal Adelaide Hospital, Department of Infectious Diseases, Adelaide, Australia

OBJECTIVES. To review the predisposing factors, clinical characteristics, and complications in patients admitted with a submandibular space infection requiring intensive care unit (ICU) admission.

METHODS. Retrospective review of patient records, within a tertiary level ICU over a five year period between 2008-2013. Patients with a diagnosis of submandibular space infection at time of admission to the ICU, identified from an ICU specific dataset.

RESULTS. 256 (45 %) of 572 patients who sought medical attention at the Royal Adelaide Hospital were admitted to the ICU with a submandibular space infection. Diabetes and Psychiatric illness were the two independent predisposing factors accounting for 11.5 % and 12 % of these admissions. The infections were odontogenic in origin for 218 (85 %) and non-odontogenic for 38 (15 %) patients. There were no significant differences in patient characteristics between the two groups. Extended dental clearance was a major complication of odontogenic infections. The inciting pathogens were polymicrobial in 58 % of cases and in 29 % of cases no pathogen was isolated. Non-odontogenic infections were associated with a higher risk of developing mediastinitis (3 % vs 2 %, $p = 0.02$) and a longer hospital stay (5.9 days vs 3.6 days, $p = 0.0003$) compared to odontogenic infections. Both groups had a similar ICU length of stay (1.5 days vs 1.6 days, $p = 0.123$) and infection related ventilator associated complications ($p = 0.52$). The mortality was higher in patients with odontogenic infections compared to non-odontogenic infections ($p = 0.023$).

CONCLUSIONS. Infection related complications occur not infrequently and are more likely to be related to odontogenic infections. Routine admission to the ICU has serious implications for the health care sector particularly in terms of costs associated with managing a critically ill patient. Early diagnosis and treatment of odontogenic infections could alter the mortality and morbidity in this patient population.

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DETERMINANTS OF OUTCOME IN BURN ICU PATIENTS WITH SEPTIC SHOCK

A. Lavrentieva¹, V. Karali¹, M. Konoglou¹, C. Nakou¹, P. Koukiasa¹, G. Vasiliadou¹, M. Bitzani¹

¹Papanikolaou Hospital, ICU, Thessaloniki, Greece

INTRODUCTION. Sepsis is common in the burn patient and can markedly increase morbidity and mortality. Prompt diagnosis of infection and effective therapy can result in successful outcomes.

OBJECTIVES. To describe the incidence and outcome of septic shock and to explore the determinants of effective treatment of septic shock in burn patients.

METHODS. This was a retrospective single center study. Data of 370 adult burn patients admitted to a 4 -bed Burn Intensive Care Units from 2006 to 2013 were analyzed. We examined the impact of initial empiric antimicrobial therapeutic variables and low- dose hydrocortizone use on the mortality of patients with severe burn injury and septic shock.

RESULTS. Septic shock was diagnosed in 59 out of 370 patients (15.9 %). Mortality rate of patients with septic shock was 47 %. Median time from the onset of hypotension to antimicrobial therapy was 7.5 h, interquartile range 1.7–13.3 h. Low-dose hydrocortisone therapy had been received by 42 % of patients. Inappropriate initial empiric antimicrobial therapy was administered in 47 % of non survivors compared to 32 % of survivors, $p = 0.013$. Non survivors were more likely to have longer delays to receiving antimicrobial therapy compared to survivors [median 6.0 h (interquartile range, 2.3–15.3 h) vs. median 4.3 h, (interquartile range, 1.5–9.8 h), $p < 0.01$], higher rate of inappropriate antibiotic treatment (62 % vs. 32 %, $p < 0.02$), lower rate of combination of antibiotics (60 % vs. 82 %, $p = 0.05$), higher incidence of low dose hydrocortisone treatment (53 % vs. 32 %, $p < 0.01$).

CONCLUSIONS. Septic shock is common in burn patients and is associated with high mortality rate. Survival was lower for septic shock associated with delayed initial empiric antimicrobial therapy, with use of antibiotic monotherapy and with inappropriate initial antibiotic treatment. Use of low-dose hydrocortisone did not improve survival in burn patients with septic shock.

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A MULTICENTER STUDY OF SEPTIC SHOCK DUE TO CANDIDEMIA: OUTCOMES AND PREDICTORS OF MORTALITY

L. Lagunes¹, J. Garnacho-Montero², M. Antonelli³, J. Rello¹, M. Tumbarello³, M. Bassetti⁴, and other investigators on behalf of the Study Group for Infections in Critically Ill Patients (ESGICP)

¹Vall d'Hebron University Hospital, Critical Care Department, Barcelona, Spain, ²Virgen del Rocío University Hospital, Sevilla, Spain, ³Università Cattolica del Sacro Cuore, Rome, Italy, ⁴Santa Maria Misericordia University Hospital, Udine, Italy

BACKGROUND. Candida is responsible for severe infections, especially in critically ill patients. Septic shock is a major cause of death in ICUs, showing hospital mortality between 30 % and 50 %⁽¹⁾. In this setting, septic shock attributable to Candida is burdened by high mortality rates⁽²⁾.

OBJECTIVE. A multicenter study was performed to investigate the determinants of the outcome in critically ill patients with septic shock due to candidemia.

METHODS. A retrospective cohort involving five teaching hospitals in Italy and Spain included patients with septic shock attributed to Candida over a three-year period. Patient characteristics, infection-related variables, and therapy-related features were reviewed. Multiple logistic regression analysis was performed to identify the risk factors significantly associated with 30-day mortality.

RESULTS. A total of 216 patients were included in the study. Of these, 163 (75 %) were admitted to the intensive care unit. Mean age was 63.4 ± 18.5 , 58.3 % were males. Overall thirty-day mortality was 54 %. Significantly higher APACHE II scores, number of organ dysfunction, and inadequate antifungal therapy were detected in non-survivors compared to survivors. *C. albicans* (CA) represented the most common species and was isolated in 131 (61 %) patients. Among non-albicans (NAC), *C. parapsilosis* was the most frequently species isolated (16 %), followed by *C. glabrata* (12 %), *C. tropicalis* (10 %), and others (1 %). No significant differences in mortality were detected between CA and NAC or among Candida species. Central vascular-catheter (CVC) associated candidemia was the most common source when founded (40 %). In this group, significantly higher mortality was registered for patients without CVC removal compared to patients undergoing CVC removal (26/64, 41 % vs. 14/19, 74 % respectively, $P = 0.006$). No differences in survivors versus non-survivors were found regarding the time from positive blood culture to adequate antifungal therapy start. Multivariate logistic regression identified inadequate source control, inadequate antifungal therapy, and increments in 1-point APACHE II as independent variables associated with greater 30-day mortality.

CONCLUSIONS. High mortality rates were confirmed in patients with Candida-induced septic shock. In this group, the administration of an inadequate antifungal therapy along with adequate source control are key factors to improve clinical outcomes.

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1018

PROGNOSTIC VALUE OF PROCALCITONIN CLEARANCE IN SEVERE SECONDARY PERITONITIS

S. Rebollo¹, R. Jiménez¹, A. Ortín¹, L. García de Guadiana², A. Ojados¹, L. Tárrega¹, M.J. Del Amor³, L. Herrera¹, S. Moreno¹, A. Hernandez², R. Carbonell², A. De Bejar², J. Pedregosa², O.M. Téllez¹, J.M. Castillo¹

¹Hospital General Universitario Santa Lucía, Intensive Care Unit, Cartagena, Spain,

²Hospital General Universitario Santa Lucía, Servicio de Análisis Clínicos, Cartagena, Spain,

³Hospital General Universitario Santa Lucía, Laboratorio de Microbiología, Cartagena, Spain

INTRODUCTION. Procalcitonin (PCT) is a specific biomarker of bacterial infections and has been related to severity of sepsis. In peritonitis there are some studies investigating the usefulness of procalcitonin as diagnostic tool and postoperative monitoring, but not studying its prognostic value.

OBJECTIVES. To analyze PCT kinetics and its prognostic value in secondary peritonitis as compared to septic patients from another source.

METHODS. Prospective, observational, cohort study was performed involving severe sepsis/septic shock adult patients admitted to our ICU. Baseline PCT and PCT clearance in the first 48 h, as well as their usefulness to predict mortality were studied attending to a peritonitic or non peritonitic origin of sepsis. Statistical analysis was made using T-test, Mann-Whitney, Chi Square as appropriate and ROC curves was obtained to study diagnostic usefulness of variables.

RESULTS. 185 patients were included in the study. No differences in baseline characteristics (age, sex, APACHE II) and ICU stay was observed between peritonitis and non peritonitis group. Patients with peritonitis had a higher significant incidence of septic shock (76.2 vs 57.1 %, $p 0.019$) but not significant differences in ICU mortality (25 vs 17.5 %).

Table 1	Whole population (n = 185)	p	Peritonitis group (n = 42)	p	Non peritonitis group (n = 143)	p
	Surv vs NoSurv		Surv vs NoSurv		Surv vs NoSurv	
Age	62.6 vs 70.3 (60.0-65.2) (65.8-74.7)	0.009	63.57 vs 75.8 (58.53-68.6) (71.6-80)	<0.001	19.36 vs 25.84 (18.2-20.5) (23.1-28.6)	<0.001
APACHE II	18.8 vs 23.26 (17.8-19.8) (23.9-28.6)	<0.001	16.63 vs 27.3 (14.7-18.6) (22.0-32.6)	<0.001	65.36 vs 67.96 (59.4-65.3) (62.0-73.9)	0.093
Basal PCT	16.9 vs 8 (5-34)(3-34)	0.23	7.4 vs 7 (2.0-20.1) (2.0-19.7)	0.963	18 vs 8.6 (6.6-36.7) (3.5-40.1)	0.277
PCT	clearance	2.96 vs	58.03 (-130-50.2) (20.1-69.2)	<0.001	38.85 vs -105.26 (-77.5-67.2) (-191.7-34.3)	0.086
	60.48 vs 13.92 (29.6-69.5) (-80.0-57.1)	0.004				

[1. Differences between survivors and non-survivors]

Table 1 shows differences between survivors (SV) and non-survivors (NSV) in terms of age, APACHE II and procalcitonin issues. Procalcitonin clearance was higher in survivors than in non-survivors in the whole population and in the non peritonitis group, but not in peritonitis group.

Table 2	Whole population (n = 185)	p	Peritonitis group (n = 42)	p	Non peritonitis group (n = 143)	p
APACHE II	0.803 (0.729-0.878)	<0.001	0.903 (0.808-0.999)	<0.001	0.770 (0.674-0.867)	<0.001
Basal PCT	0.56 (0.445-0.676)	0.28	0.528 (0.313-0.743)	0.806	0.556 (0.416-0.696)	0.386
PCT	clearance	0.697	(0.293-0.525)	<0.001	0.694 (0.504-0.885)	0.097
	0.686 (0.563-0.809)	0.004				

[2. AUC for mortality]

Table 2 shows how the area under the curve (AUC) for PCT clearance results significant for predicting mortality in the whole population and in the non peritonitis group, but not in the peritonitis group. No differences in basal PCT was observed between survivors and non survivors.

CONCLUSIONS. According to our data, procalcitonin clearance in the first 48 h could have value to predict mortality in a general population of septic patients, but seems to fail in a specific population of septic peritonitis patients.

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EPIDEMIOLOGY AND OUTCOME OF SEPSIS WITH STAPHYLOCOCCUS AUREUS IN A NORWEGIAN COUNTY 1996-2011

J. Paulsen^{1,2}, A. Mehl^{2,3}, Å. Askim^{4,5}, E. Solligård^{4,5}, B.O. Åsvold^{6,7}, J.K. Damås^{1,8}

¹Norwegian University of Science and Technology, Centre of Molecular Inflammation Research, Trondheim, Norway, ²Levanger Hospital, Nord-Trøndelag Health Trust, Department of Medicine, Levanger, Norway, ³Norwegian University of Science and Technology, Institute of Cancer Research and Molecular Medicine, Trondheim, Norway,

⁴Norwegian University of Science and Technology, Department of Circulation and Medical Imaging, Trondheim, Norway, ⁵St Olav's University Hospital, Clinic of Anaesthesia and Intensive Care, Trondheim, Norway, ⁶Norwegian University of Science and Technology, Department of Public Health and General Practice, Trondheim, Norway, ⁷St Olav's Hospital, Department of Endocrinology, Trondheim, Norway, ⁸St Olav's University Hospital, Department of Infectious Disease, Trondheim, Norway

INTRODUCTION. *Staphylococcus aureus* is one of the most common causes of sepsis and related death, [1] and the incidence has not declined over the last decades [2]

OBJECTIVES. We carried out a prospective observational study of patients with sepsis caused by *Staphylococcus aureus* in Nord-Trøndelag county in Norway from 1996-2011 in study the clinical characteristics and disease outcome in our patient population. The main outcome was all-cause mortality after 30 and 90 days.

METHODS. Patients with positive blood cultures were registered prospectively by the microbiology laboratory and clinical variables were registered from patients' hospital records. The severity of sepsis was assigned according to the 2001 International Sepsis Definition Conference criteria. The association between mortality and predictive factors was studied using logistic regression analysis.

RESULTS. 373 patients were included in the study, the median age was 74 years, 60.3 % were male and 39.7 % female. A great proportion of the patients suffered from comorbid illnesses, with a median Charlson Comorbidity Index value of 2. 41.8 % of the patients acquired the infection in a health care associated setting, 29.2 % were hospital acquired and 29 % were community acquired. 111 patients (20.8 %) developed severe sepsis and 48 patients (12.9 %) septic shock. The all-cause mortality was 14.5 % at 7 days, 27.3 % at 30 days and 36.2 % at 90 days. The 30-day all cause mortality was 12.6 % for those with sepsis without organ failure, 40.5 % for those with severe sepsis (Odds ratio (OR) 4.9, 95 % confidence interval (CI) 2.7-8.9, $p < 0.001$) and 62.5 % for those with septic shock

(OR 11.6, 95 %CI 5.4-25.1, $p < 0.001$). When comparing the first half of the study period (1996-2003) with the second (2004-2011), we found no difference in 30 day mortality when adjusting for age, sex and comorbid diseases (OR 0.99, 95 % CI 0.59-1.95, $p = 0.97$). Independent predictors of mortality included severe sepsis and septic shock, Charlson Comorbidity Index > 1 , and age > 80 .

CONCLUSIONS. Sepsis caused by *Staphylococcus aureus* is a severe disease that predominantly occurs in elderly people with comorbid disease. *Staphylococcus aureus* sepsis still carries a high mortality in Norway, even among those with a relatively mild degree of comorbid burden. An important finding in our study is that there has been no decrease in mortality during the last 16 years, indicating that new measures for improvement of diagnostic and therapeutic management could be of value.

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1020 INFLUENCE OF SOURCE OF INFECTION IN SEPTIC PATIENTS: CLINICAL OUTCOME AND MORTALITY

A. Estella¹, M. Recuerda¹, E. Moreno¹, L. Pérez Bello Fontaña¹

¹Hospital de Jerez, Intensive Care Unit, Jerez de la Frontera, Spain

INTRODUCTION. The influence of different sources of infection on outcome of septic patients have been scarcely studied. It is unclear if source of sepsis affects mortality. Infections of respiratory or abdominal origin are a common cause of sepsis in critically ill patients.

OBJECTIVES. The aims of the study were to compare the prognosis of septic patients according source of infection: abdominal or respiratory and to analyze the influence of this factor can have on mortality.

METHODS. Septic patients admitted in ICU during a time of study of 5 years were registered. Age, ICU length of stay, source of infection, blood lactate concentration, APACHE II score and mortality were collected. Patients were classified according the source of infection, abdominal or respiratory origin.

RESULTS. 359 consecutive septic patients admitted to the ICU were analyzed, 218 male and 141 female, mean APACHE II score was 20.6 ± 6.6 points. 121 patients, 33.7 %, with pulmonary sepsis and 238 patients, 66.3 %, with abdominal sepsis. Table shows clinical characteristics of the comparison between groups.

Source of sepsis	Pulmonary n:121	Abdominal n:238
Age	59,4 ± 16,5	66,87 ± 14,2
Apache II at admission	20,6 ± 6,6	22,64 ± 7,5
ICU length of stay	12,6 ± 10,8	9,05 ± 10
Lactate mMol/l	3,9 ± 3,7	3,4 ± 3,2

[Comparison table according source of infection]

Mortality was 52.9 % in pulmonary sepsis and 36.1 % in abdominal sepsis.

CONCLUSIONS. The retrospective design and knowledge of influence of several factors in sepsis mortality that have not been included in our study may result in limited data for analysis, we conclude:

- Differences in patient profiles were observed according the site of infection.
- Mortality was higher in the group of septic patients with pulmonary infection compared with abdominal origin.

1021 THE VALUE OF PROADRENOMEDULLIN IN CRITICALLY ILL PATIENTS WITH SEVERE COMMUNITY-ACQUIRED PNEUMONIA: AN EARLY MARKER OF RESPONSE?

J.M. Pereira^{1,2}, A. Azevedo^{3,4}, J.A. Paiva^{1,2}

¹Centro Hospitalar S. João, Intensive Care Department, Porto, Portugal, ²University of Porto Medical School, Porto, Portugal, ³Centro Hospitalar de S. João, Hospital Epidemiology Centre, Porto, Portugal, ⁴Institute of Public Health, University of Porto, Department of Clinical Epidemiology, Predictive Medicine and Public Health, University of Porto Medical School, Porto, Portugal

INTRODUCTION. Midregional proadrenomedullin (proADM) is a novel biomarker with potential prognostic utility in patients with pneumonia.

OBJECTIVES. The goal of this study was to evaluate the value of proADM levels at ICU admission for further severity stratification and outcome prediction, and its kinetics as an early predictor of response in severe community-acquired pneumonia (SCAP).

METHODS. Prospective cohort study of 19 patients with SCAP admitted to the Intensive Care Department of a University Hospital in Portugal within 12 h after the first antibiotic dose. Besides demographic data, general and pneumonia specific severity scores were calculated. ProADM was measured at ICU admission and 48 h later.

RESULTS. Median proADM on ICU admission was 3.58 nmol/l (interquartile range (IQR): 2.83-10; normal < 0.52 nmol/l). No significant association was found between proADM serum levels at admission and severity assessed by SAPS II (Spearman's correlation = 0.24, $p = 0.31$) or SOFA score (median proADM: 3.45 for SOFA < 10 and 3.90 for SOFA ≥ 10 , $p = 0.74$). No significant differences in proADM serum levels were observed across different classes of pneumonia specific severity scores such as PSI, CURB-65 and PIRO-CAP. Three patients died in the ICU, 5 in the hospital and 6 within 1 year. No significant difference in median proADM serum levels was found between survivors and non-survivors regarding ICU, hospital and 1-year mortality. ROC curve analysis showed that proADM serum levels at ICU admission were a bad predictor of hospital (aROC 0.53; 95 % CI 0.26-0.79) and 1-year mortality (aROC 0.51; 95 % CI 0.25-0.78). After 48 h of antibiotic therapy, proADM decreased in all but 5 patients (median -20 %; IQR -56 % to +0.1 %). ProADM kinetics measured by the percent change from baseline was a good predictor of clinical response (aROC 0.80; 95 % CI 0.47-1.00). The best discrimination was achieved by classifying patients according to proADM decreasing (1 patient died out of 13) or not (4 out of 5 died) within 48 h. No decrease in proADM serum levels significantly increased the chances of dying independently of general severity (SAPSII-adjusted OR 174; 95 % CI 2-15422; $p = 0.024$).

CONCLUSIONS. In SCAP, proADM levels on ICU admission showed no association with severity scores. No association with both short- and long-term outcome was observed. However, its kinetics in the first 48 h after ICU admission was a good predictor of response in this cohort of patients.

1022 IMPACT OF STATINS IN OUTCOMES OF SEPTIC PATIENTS: A SYSTEMATIC REVIEW

A. Tralhão¹, V.C. Souza-Dantas^{2,3}, J. Salluh^{4,5}, P. Póvoa^{6,7}

¹Hospital de Santa Cruz, Centro Hospitalar de Lisboa Ocidental, Cardiology, Lisbon, Portugal, ²Universidade Federal do Rio de Janeiro (UFRJ), Intensive Care Unit, Rio de Janeiro, Brazil, ³Instituto Estadual do Cérebro, Intensive Care Unit, Rio de Janeiro, Brazil, ⁴D'OR Institute for Research and Education, Rio de Janeiro, Brazil, ⁵Instituto Nacional de Câncer, Postgraduate Program, Rio de Janeiro, Brazil, ⁶Hospital de São Francisco Xavier, Centro Hospitalar de Lisboa Ocidental, Polyvalent Intensive Care Unit, Lisbon, Portugal, ⁷Faculty of Medical Sciences, New University of Lisbon, CEDOC, Lisbon, Portugal

INTRODUCTION. The pleiotropic effects of statins have prompted considerable research in fields other than cardiovascular disease.

OBJECTIVES. We reviewed the literature aiming to summarize and critically evaluate the current evidence about the potential use of statins in sepsis.

METHODS. We searched Pubmed, SciELO and Cochrane electronic databases from inception through November 2013 for randomized clinical trials (RCTs) and cohort studies that examined the association between statin use (upon hospital admission or previous users) and the risk or outcome of sepsis. Data on study characteristics, measurement of statin use and outcomes (adjusted for potential confounders) were extracted. We structured our review according to PRISMA (Principles of Reporting in Systematic Reviews and Meta-analysis) criteria. Quality assessment of cohort studies was performed using the Ottawa-Newcastle Scale.

RESULTS. Twenty-three cohort studies and five RCTs were eligible, comprising 42,549 statin users and 54,201 non-statin users, from 1995 to 2013. Populations included varied from patients admitted to general wards or intensive care units with bacterial infections, community-acquired pneumonia, ventilator-associated pneumonia, bacteremia and sepsis to outpatients with chronic kidney disease or established cardiovascular disease. Overall, sixteen studies reported a benefit from statin use in morbidity and/or mortality outcomes (range of adjusted OR 0.06-0.62, $\alpha = 0.05$). The remaining twelve studies found no protective effect associated with statin use upon hospital admission or previous users. Among the five RCTs, none demonstrated a reduction in mortality.

CONCLUSIONS. There is insufficient evidence to support the use of statins in patients with sepsis as the existing studies failed to prove a consistent mortality benefit. More clinical trials are warranted to provide more conclusive knowledge and ultimately change clinical practice.

1023 EVALUATION OF SEVERITY IN CRITICALLY ILL PATIENTS CIPS) WITH SEPSIS

R. Corcuera Romero de la Devesa¹, J. Ruiz Moreno¹, E. González Marin¹, M.J. Esteve Paños¹, S. Godayol Arias¹, N. Conesa Folch¹, M. Rinaudo Videla¹, A. Artigas Raventós²

¹IDC Salud Hospital Universitari Sagrat Cor, Critical Care Department, Barcelona, Spain, ²Parc Taulí General Hospital & IDC Salud Catalan Hospitals, Critical Care Department, Sabadell, Spain

INTRODUCTION. It is considered that the severity of septic CIPs is higher than the overall CIPs requiring ICU admission. However, beyond the use of SOFA and LODS, the identification of specific clinical variables which determine the severity of the sepsis perhaps has not been researched sufficiently.

OBJECTIVES. To assess the severity of the septic CIPs compared to non septic CIPs. Likewise, to evaluate and compare the mortality between two populations.

METHODS.

- Prospective, analytical, longitudinal, and observational study
- Period: Between January 1-2012 and August 31-2013 (20 months)
- Setting : Medical/Surgical ICU belonging to a 290 acute care teaching hospital
- Population and sample: All the CIPs admitted consecutively to the ICU. Sample: 1090 CIPs.
- Exclusion criteria: CIPs < 16 years, major burn patients, incomplete clinical documentation, and voluntary discharge
- Clinical variables: a) demographic: age, origin (medical CIPs, urgent surgical CIPs, elective surgical CIPs); b) hospital mortality; c) clinical variables: metabolic acidosis, oncological pathology; d) ICU procedures: total parenteral nutrition, intra-abdominal pressure, blood products, cultures, cardiac output, advanced life support, fibrogastroscopy, fibrobronchoscopy; e) organ dysfunction: SOFA and LODS; e) limitation of life support (LLS).
- Statistical analysis: Ji squared and contrast of means.

RESULTS.

Global CIPs: 1090.
SOFA: · Global (2.86), septic CIPs (5.80), non septic CIPs (2.00)
LODS: · Global (1.39), septic CIPs (2.81), non septic CIPs (0.97)
See Table I and II

	Global CIPs	Sepsis	No sepsis	'p' value
Age	66,1 (SD 16,6)	72,8 (SD 14,0)	64,4 (SD 16,8)	0,0001
Mortality	73 (5,8 %)	46 (20,5 %)	24 (2,35 %)	0,0001
Medical CIPs	317 (25,4 %)	92 (41,1 %)	223 (21,84 %)	0,0001
ES CIPs	714 (57,2 %)	18 (8,0 %)	696 (68,2 %)	0,0001
US CIPs	217 (17,4 %)	114 (50,9 %)	102 (10,0 %)	0,0001
Metabolic acid	452 (36,2 %)	159 (71,0 %)	291 (28,5 %)	0,0001
Oncological path.	462 (37,0 %)	53 (23,7 %)	407 (39,9 %)	0,0001
TPN	238	87 (38,8 %)	151 (14,8 %)	0,0001

[Results I]

	Global CIPs	Sepsis	No sepsis	'p' value
IAP	71 (5,7 %)	53 (23,7 %)	18 (1,8 %)	0,0001
Blood products	239 (19,1 %)	98 (43,7 %)	140 (13,7 %)	0,0001
Cultures	340 (27,2 %)	217 (96,9 %)	120(11,7 %)	0,0001
Advanced Life S	41 (3,3 %)	17 (7,6 %)	24 (2,3 %)	0,0001
F.Gastro.C	30 (2,4 %)	16 (7,1 %)	14 (1,8 %)	0,0001
F.Bronc.C	29 (2,2 %)	22 (9,8 %)	5 (0,5 %)	0,0001
Cardiac Output	79 (6,3 %)	56 (25,0 %)	21 (2,1 %)	0,0001
Limitation Life S	113 (9,05 %)	59 (26,3 %)	52 (5,1 %)	0,0001

[Results II]

CONCLUSIONS.

- More than twenty percent of septic CIPs patients die.
- According to the area of medical origin, sepsis appears in fifty percent of urgent surgical CIPs, 40 % of medical CIPs and less than 10 % of medical CIPs.
- According to all clinical variables, severity is much higher in septic CIPs; of course also the SOFA and LODS.
- Wrong or not, the LLS applies more in septic CIPs.

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1024**SEVERE SEPSIS, SEPTIC SHOCK, CORTICOSTEROIDS AND 28-DAY MORTALITY**

M.-V. de la Torre-Prados¹, A. García-de la Torre², C. Trujillano-Fernández¹, J. Perez-Vacas¹, A. Puerto-Morlán¹, E. Camara-Sola¹, P. Nuevo-Ortega¹, T. Tsvetanova-Spasova¹, A. García-Alcántara¹

¹Hospital Universitario Virgen de la Victoria/IBIMA Institute, Intensive Care Medicine, Málaga, Spain, ²Hospital Universitario Puerto Real, Clinical Chemistry Department, Cádiz, Spain

INTRODUCTION. Critical illness-related corticosteroid insufficiency is a well-described phenomenon in patients with septic shock. However, the use of corticosteroids as an adjunctive therapy in patients with septic shock remains controversial due to conflicting results from randomized controlled trials and subsequent meta-analyses.

OBJECTIVES. To analyze the profile of patients with severe sepsis (SS) or Septic Shock (ShS) with or without corticosteroid treatment and 28-day mortality.

METHODS. Prospective, observational study in 150 adults with SS or ShS according to Clinical Guidelines for Surviving Sepsis Campaign (SSC, 2008), during 20 months in a polivalent Intensive Care Unit (ICU) of a University Hospital. Group 1 (n = 55) without corticosteroids administration and group 2 (n = 95) received corticosteroids. Cortisol levels were determined in all patients admitted to the ICU without therapy or before receiving the steroid treatment. Statistical analysis was performed using SPSS 15.0 for Windows (SPSS Inc. Chicago, IL, USA). Mann-Whitney test was used for quantitative variables and Fisher's exact test for qualitative variables.

RESULTS. We analyzed 150 consecutive episodes of SS (16 %) or ShS (84 %) admitted in the ICU. The age and gender were similar in both groups, masculine 60 % and 62 [48,25-72,25] vs. 64 [49-71] years old. In group 1 the percentage of patients with pathology of income from emergency surgery was 3.6 % (n = 2) vs. 20 % (n = 19) in group 2 and primary site of infection was respiratory sepsis 28.6 % (n = 16) vs. 44.2 % (n = 42); both data were significantly higher in group 2. The profile patients who received corticosteroids treatment had higher clinical severity scores, APACHE II 23.5 [21 to 29.7] vs. 26 [21-30] and SOFA 8.5 [7-11] vs. 10 [8-11], being significant in the number of organs failure 3.5 [3-5] vs. 4 [3-5], p = 0.004 and 28 day mortality, 12.5 % vs. 28.4 %, p = 0.02. Plasma cortisol levels were significantly lower in patients in group 2 (n = 42) (before receiving corticosteroids) 23.24 [18.6 to 30.9] mg/dL, compared with group 1 (without corticosteroids administration), 25.65 [21-47.87] mg/dL, (p = 0.04).

CONCLUSIONS. Corticosteroids should be part of the complex treatment in these patients and, this study shows that early resuscitation is relevant for the number and degree of organ dysfunction modulation.

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1025**PREDICTING CLINICAL DETERIORATION IN SEVERE SEPSIS PATIENTS WITH CRYPTIC SHOCK**

S. Patolia¹, S. Subramanian¹, J. Kasal¹, K. Iyer¹, B. Malte¹, R. Taylor¹

¹Mercy St Johns Medical Center, St Louis, United States

INTRODUCTION. Early identification and protocolized treatment has reduced mortality of patients with sepsis. Severe sepsis patients with cryptic shock ("intermediate" lactic acid levels (2-4 mmol/L), without hypotension), represent a large proportion of septic patients and have substantial (16 %) mortality risk. These patients are increasingly identified and treated in ICU. However only 18 % subsequently need aggressive ICU interventions. We hypothesized that this subgroup may be identified prior to ICU admission by characteristics which will also predict ICU mortality.

OBJECTIVE. Identify clinical characteristics associated with development of secondary organ failure (AKI and ARDS) and subsequent need for invasive treatments, in patients with cryptic shock.

METHODS. Retrospective analysis of 292 consecutive patients with severe sepsis without shock (systolic BP > 90, lactate 2-4 mmol/L), admitted to ICU in 919 bed university affiliated hospital. All patients were identified using an electronic sepsis surveillance system, received early evaluation and treatment by a dedicated sepsis team. Acute physiologic data, chronic comorbidities, blood pressure and heart rate trend over the first 4 h., and fluid bolus delivered during initial resuscitation were entered into a multivariate logistic regression model. Primary endpoint was a composite of invasive treatments i.e. need for mechanical

ventilation or acute dialysis or vasopressors. Secondary endpoints were hospital mortality and development of secondary organ failure at 48 h.

RESULTS. Of 292 patients, invasive treatments were used in 22.6 %. Overall ICU mortality was 9.2 % and hospital mortality was 15 %. Patients who received invasive treatments vs. those who did not had higher ICU mortality (20.5 % vs. 5.8 %, p = 0.0002) and hospital mortality (25 % vs. 13.5 % p = 0.02). In a logistic regression model (p = 0.005, R² = 0.28), increasing potassium (OR = 1.565 p = 0.042), decreasing Glasgow Coma Scale (OR = 0.058, p = 0.037), bloodstream source of infection (OR = 5.9, p = 0.05), were significantly associated with subsequent need for ICU level invasive treatments. Fluid bolus delivery exceeding 30 ml/kg (OR = 0.24 p = 0.01) was associated with lower risk of invasive treatments. Similar regression model for mortality (p = 0.019, R² = 0.22) found the following to be significantly associated with mortality risk: elevated bilirubin (OR = 1.7, p = 0.046) and decreasing MAP trajectory during first 4 h (OR = 0.47, p = 0.03). Delivery of fluid bolus between 15-30 ml/kg was associated with a lower mortality (OR = 0.43, p = 0.041). Lactate clearance did not predict need for invasive therapy nor mortality. Secondary organ failures could not be predicted based on clinical characteristics or treatment variables.

CONCLUSIONS. Only minority of patients with cryptic shock actually require invasive treatments in the ICU and may be identified based on certain clinical characteristic prior to ICU admission.

Cardiac arrest: Management & complications: 1026-1039**1026****GRAM-NEGATIVE RESISTANCE IS HIGHLY PREVALENT IN INITIAL OUT-OF-HOSPITAL CARDIAC ARREST RESPIRATORY ISOLATES**

J.L.C. Wong¹, K.B. Bamford², H.F. Harb¹, A. Ramesh¹, R. Stumpf¹, P. Patel¹

¹Imperial College Healthcare NHS Trust, Hammersmith Hospital GICU, London, United Kingdom, ²Imperial College Healthcare NHS Trust, Department of Microbiology, London, United Kingdom

INTRODUCTION. In those surviving out-of-hospital cardiac arrest (OOHCA), infection, particularly pneumonia, is a frequent complication. Recent data suggest that inhibiting fever rather than induced hypothermia is associated with more favourable outcomes'. Community antibiotic resistance and the inherent resistance of aspirated enteric flora should guide our empirical antibiotic choices.

OBJECTIVES. To analyse the first positive respiratory isolates in our OOHCA population to determine the prevalence of potential pathogens and extent of antimicrobial resistance to guide treatment choices in this initially antibiotic naive population.

METHODS. A retrospective analysis of 160 OOHCA patients, admitted to intensive care between May 2007 and September 2013. Respiratory samples were sent when clinically indicated by medical and nursing staff for culture and sensitivity. Extended-spectrum beta-lactamase (ESBL) and AmpC profiles were identified from phenotypic markers in routine testing by our clinical microbiology laboratory using third-generation cephalosporins including cefoxitin and beta-lactam/beta-lactamase inhibitor combinations.

RESULTS. 92 of 160 patients had respiratory samples sent within 72 h of admission and 62 samples grew potentially pathogenic bacteria. The majority of samples grew a gram-negative organism 34/62 (54.8 %). Gram-positive bacteria were cultured from 28/62 (45.2 %). No methicillin-resistant staphylococci were detected in this population.

20/34 (58.8 %) of the isolated gram-negative organisms were enterobacteriaceae. Fully-sensitive Haemophilus influenzae comprised the remaining fraction.

An ESBL phenotype pattern was detected in 16/34 (47.0 %) of gram-negative organisms. Of these 12/16 (8 lactose fermenting and 4 non-lactose fermenting organisms) displayed a phenotype consistent with the presence of an AmpC type of ESBL pattern. In the four initial respiratory samples that harboured other ESBL phenotypes, all occurred in lactose fermenting enterobacteriaceae.

CONCLUSIONS. Gram-negative organisms were the most commonly isolated pathogens from initial early respiratory samples.

Among these there is a high prevalence of antimicrobial resistance in initial OOHCA respiratory samples with 25.8 % (16/62) of our population's isolates resistant to extended-spectrum beta-lactams through production of ESBLs. The majority exhibited an AmpC type pattern which, would be unlikely to respond to treatment with commonly recommended for community acquired pneumonia, including aspiration.

Using these data as guidance empirical antibiotic choice should employ broader and extended spectrum agents, more commonly used to treat nosocomial chest infections.

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1027**TIME POST OUT-OF-HOSPITAL CARDIAC ARREST DETERMINES THE PREVALENCE OF DIFFERENT PATHOGENIC ORGANISMS FROM RESPIRATORY SECRETIONS**

J.L.C. Wong¹, H.F. Harb¹, K.B. Bamford², A. Ramesh¹, R. Stumpf¹, P. Patel¹

¹Imperial College Healthcare NHS Trust, Hammersmith Hospital GICU, London, United Kingdom, ²Imperial College Healthcare NHS Trust, Department of Microbiology, London, United Kingdom

INTRODUCTION. Duration of in-hospital care or hospital-associated care is a determining factor for the exposure to different groups of potentially pathogenic bacteria¹. The out-of-hospital cardiac arrest population (OOHCA) acquires their initial severe insult and exposure in the community and subsequently receives high-level in-hospital support with nosocomial pathogen exposure. They almost exclusively require initial mechanical ventilation and their mortality remains high. Pneumonia is a common infective complication from admission to discharge or death. We have explored the first ten days of causative organisms.

OBJECTIVES. To analyse our OOHCA population following admission comparing the potentially pathogenic flora identified from respiratory secretions sent for analysis.

METHODS. 162 OOHCA patients were admitted between May 2007 and September 2013. Respiratory samples were sent when clinically indicated by medical and nursing staff for culture and sensitivity. Subsequent analysis was carried out in days following admission (admission to intensive care day 1).

RESULTS. 187 respiratory samples were sent in the 10 days after admission. 66.3 % yielded potentially pathogenic bacteria, similar proportions (65.4 % vs 67.4 %) were positive early (< 72 h) and late (72-240 h).

There is a marked transition from gram positive (GP) and gram-negative (GN) growth in early samples to a lactose-fermenting coliform enterobacteriaceae dominant growth in the late population.

Specifically, 45.2 % of early samples contained GP bacteria, largely Staphylococci (n = 16) and Streptococci (n = 11).

Early GN bacteria were non-enterobacteriaceae (usually Haemophilus), lactose-fermenting coliforms and non-lactose fermenting coliforms in 41.2, 35.3 and 23.5 % respectively. No atypical organisms were detected in our population.

Samples sent later than 72 h were dominated by GN pathogens (77.4 %). 89.6 % of these were enterobacteriaceae. 75 % of these were lactose-fermenting pathogens.

CONCLUSIONS. In this population there is a marked transition and trend towards the acquisition of GN pathogens from respiratory secretions with increasing time from admission. Choice of antibiotic in late post OOHCA pneumonia should empirically target lactose-fermenting coliforms. That they often have a resistant phenotype, should be kept in mind when prescribing antibiotics before sensitivities are known.

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1028 WHO GETS COOLED? FACTORS ASSOCIATED WITH INITIATION OF MILD INDUCED HYPOTHERMIA IN SURVIVORS OF IN-HOSPITAL CARDIAC ARREST

S.F. Schmidbauer^{1,2}, J. Dankiewicz^{1,2}, N. Nielsen^{1,3}, D. Seder⁴, B.T. Unger⁵, H. Friberg^{1,2}

¹Lund University, Department of Clinical Sciences, Lund, Sweden, ²Skåne University Hospital, Department of Anaesthesiology and Intensive Care, Lund, Sweden, ³Helsingborg Hospital, Department of Anaesthesiology and Intensive Care, Helsingborg, Sweden, ⁴Maine Medical Center, Department of Critical Care Services and Neuroscience Institute, Portland, United States, ⁵Abbot Northwestern Hospital, Minneapolis Heart Institute Foundation, Minneapolis, United States

INTRODUCTION. Although mild induced hypothermia (MIH) has not been evaluated in randomized trials after in-hospital cardiac arrest, guidelines recommend that MIH should be considered. (1) The TTM-trial (2) has challenged the optimal target temperature, but temperature control remains important due to the potentially deleterious effect of post-resuscitation fever. (3) The Hypothermia Network Registry (HN) and the International Cardiac Arrest Registry (INTCAR) include patients treated in an intensive care setting after cardiac arrest. Decisions on whether to initiate MIH or not were made by the treating physician.

OBJECTIVES. To assess factors associated with use of MIH among survivors of in-hospital cardiac arrest and to describe outcomes.

METHODS. We conducted a retrospective study of prospectively collected data in two registries (HN and INTCAR). Patients with sustained return of spontaneous circulation (ROSC) after cardiac arrest were included between 2004 and 2013 in 47 sites in Europe and the United States. A cerebral performance category of 1 or 2 at hospital discharge was considered a good outcome. A logistic regression model was created to study factors associated with the use of MIH.

RESULTS. The registries included 879 patients treated in an intensive care setting after in-hospital cardiac arrest. MIH was used in 708 cases (81 %). In multivariate analysis, factors associated with higher odds of receiving MIH were; a cardiac cause of arrest (OR: 1.63), a longer time to ROSC (OR: 1.04 per minute) and lower age (OR: 0.98 per year). A shockable initial rhythm was associated with MIH in univariate analysis but not significant in the multivariate model. (Table 1) Outcomes were similar; 40 % of patients treated with MIH and 39 % of patients not receiving MIH had a good outcome with no statistical difference between groups (p = 0.87).

CONCLUSIONS. A majority of in-hospital cardiac arrest patients received MIH. A longer time to ROSC, a cardiac cause of arrest and lower patient age were associated with use of MIH.

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	Odds Ratio	95 % CI	p
Age (per year)	0.98	0.97 - 1.00	0.021
Time to ROSC (per minute)	1.04	1.02 - 1.06	0.000
Cardiac cause of arrest	1.63	1.09 - 2.44	0.018
Male sex	1.02	0.69 - 1.50	0.919
Witnessed arrest	1.01	0.56 - 1.82	0.975
Shockable initial rhythm	1.33	0.87 - 2.04	0.184

[Table 1. Factors associated with the use of MIH]

1029 EARLY CORONARY ANGIOGRAPHY DOES NOT IMPROVE SURVIVAL AFTER OUT-OF-HOSPITAL CARDIAC ARREST IN PATIENTS WITHOUT STEMI

J. Dankiewicz^{1,2}, N. Nielsen^{2,3}, M. Annborn^{1,2}, C. Hassager⁴, J. Kjaergaard⁴, D. Erlinge⁵, H. Friberg^{1,2}

¹Skåne University Hospital, Intensive and Perioperative Care, Lund, Sweden, ²Lund University, Department of Clinical Sciences, Lund, Sweden, ³Helsingborg Hospital, Intensive and Perioperative Care, Helsingborg, Sweden, ⁴Copenhagen University Hospital, Rigshospitalet, The Heart Center, Copenhagen, Denmark, ⁵Skåne University Hospital, Department of Cardiology, Lund, Sweden

INTRODUCTION. Urgent coronary angiography (CAG) after cardiac arrest is recommended for patients with ST-elevation myocardial infarction (STEMI). There is no consensus whether patients without STEMI should receive early CAG. No randomized controlled trials have investigated this issue and retrospective studies do not show consistent results. (1-3).

OBJECTIVES. To compare survival and neurological outcome among patients without STEMI who received early CAG after cardiac arrest with those who did not.

METHODS. This study is a post hoc analysis of the randomized controlled Target Temperature Management after Cardiac Arrest trial (TTM-trial), which showed no difference in mortality or neurological outcome between 33 °C and 36 °C. (4) Patients with acute left bundle branch block (LBBB) were not considered a STEMI-equivalent. Early CAG was defined as CAG performed on admission or within the first 24 h after cardiac arrest, during the temperature intervention. Patients were followed until the end of the study or a minimum of 180 days.

A Cox-proportional hazard model was created to adjust for age, sex, initial rhythm, shock on admission, time to return of spontaneous circulation (ROSC) and target temperature (33 °C or 36 °C). A generalized linear model with Poisson distribution and robust variance was used to estimate the relative risk (RR) of a Cerebral performance category (CPC) > 2 at 180 days after cardiac arrest.

RESULTS. We included 544 patients where the admission ECG did not show STEMI. Among these, 55 patients had acute LBBB. Early CAG was performed in 265 patients (49 %).

At the end of the trial, 127 of 265 of patients in the early-CAG group (48 %) and 154 of 279 patients in the no early CAG-group (55 %) had died (crude hazard ratio 0.80 in the early-CAG group; 95 % confidence interval (CI) 0.63-1.01, p = 0.07). The adjusted hazard ratio for death was 1.08 in the early-CAG group; 95 % CI 0.83-1.39, p = 0.57). (Table 1)

There was no difference in the neurological outcome at six months between the early-CAG group and no early-CAG group. The RR for a CPC of > 2 was 1.07 for early-CAG group (95 % CI 0.93-1.24, p = 0.32).

CONCLUSIONS. Early coronary angiography for patients without STEMI was not associated with survival or neurological outcome.

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	Hazard ratio	95 % Confidence Interval	p-value
Early CAG	1.08	0.83 - 1.39	0.57
Age (per year)	1.03	1.02 - 1.05	<0.001*
Sex (male)	0.88	0.66 - 1.17	0.38
Shock on admission	1.88	1.36 - 2.58	<0.001*
Time to ROSC	1.02	1.01 - 1.02	<0.001*
Witnessed arrest	0.96	0.65 - 1.42	0.84
Bystander CPR	0.78	0.60 - 1.02	0.07
Shockable initial rhythm	0.32	0.25 - 0.42	<0.001*
Target temperature 36 °C	0.83	0.65 - 1.06	0.13

[Table 1. Cox-proportional hazard model]

CAG: Coronary artery angiography, ROSC: Return of spontaneous circulation, CPR: Cardio-pulmonary resuscitation, *p < 0.05

1030 COMPARISON OF TRACHEAL INTUBATION USING CONVENTIONAL DIRECT LARYNGOSCOPE AND VIDEO LARYNGOSCOPE DURING UNEXPECTED CARDIOPULMONARY RESUSCITATION

D.H. Lee¹, M. Han¹, J.Y. Jung¹, J.Y. An¹, Y. Koh¹, C.-M. Lim¹, J.W. Huh¹, S.-B. Hong¹, J. Jin²

¹Asan Medical Center, University of Ulsan College of Medicine, School of Respiratory and Critical Care, Seoul, Republic of Korea, ²Asan Medical Center, Critical Care Medicine, Seoul, Republic of Korea

INTRODUCTION. Although tracheal intubation is mandatory in patients with cardiopulmonary resuscitation (CPR), it is a high-risk procedure even for the skilled operators. Recently developed video laryngoscope, which visualizes the laryngeal structures has been reported to be superior in the success rate with lower complication. However, the efficacy of video laryngoscope in CPR which required emergent airway management has not been evaluated yet.

OBJECTIVES. We investigated the efficacy and safety of video laryngoscope compared to the conventional direct laryngoscope during CPR.

METHODS. Medical records including CPR sheets of patients who were intubated during CPR between January 2011 and December 2013 were reviewed. Data was prospectively collected by rapid response team (RRT) and retrospectively reviewed. CPR records were written by RRT nurse. Initial intubation trial using conventional direct laryngoscope and video laryngoscope were compared.

RESULTS. Total 238 patients were intubated during unexpected CPR. Mean age was 62.7 years and 156 patients (65.5 %) were male. Direct laryngoscope was used in 112 patients (47.1 %) and video laryngoscope was used in 122 patients (51.3 %) at initial intubation trial. Patients were successfully intubated in a single trial in 59 patients (52.7 %) with direct laryngoscope and in 87 patients (71.3 %) with video laryngoscope showing significantly different success rate (p = 0.004). Medical specialists (professors and clinical fellows) showed significantly higher success rate in a single trial compared with residents (72.5 % versus 52.6 %, p = 0.002). Patients with failed initial intubation trial exhibited significantly longer time to successful intubation (3.8 ± 4.0 min versus 1.3 ± 0.9 min, p < 0.001) and higher incidence of procedure related complications (17.2 % versus 4.7 %, p = 0.002). However, the mortality at 28 days after CPR did not show significant difference (66.9 % versus 67.0 %, p = 1.000).

CONCLUSIONS. Video laryngoscope used as initial intubation method in CPR showed significantly higher success rate of intubation in a single trial.

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1031**THE OVERPRODUCTION OF NITRIC OXIDE INDUCED BY ANGIOGENIC AND COAGULATION FACTORS LEADS TO MULTIPLE ORGAN DYSFUNCTION SYNDROME ASSOCIATED WITH POST-CARDIAC ARREST SYNDROME**

T. Wada¹, S. Jesmin², A. Mizugaki¹, K. Katabami¹, Y. Ono¹, K. Maekawa¹, D. Miyamoto¹, Y. Yanagida¹, M. Hayakawa¹, A. Sawamura¹, S. Gando¹

¹Hokkaido University Graduate School of Medicine, Department of Emergency and Critical Care Medicine, Sapporo, Japan, ²University of Tsukuba, Department of Emergency and Critical Care Medicine, Faculty of Medicine, Tsukuba, Japan

INTRODUCTION. Post-cardiac arrest syndrome (PCAS) often leads to multiple organ dysfunction syndrome (MODS) and the prognosis for this condition remains poor. Endothelial activation after whole-body ischemia/reperfusion following resuscitation from cardiac arrest is a critical step in endothelial injury and related organ damage. Nitric oxide (NO) may play pivotal roles in these pathophysiological processes. NO prevents vasospasm and thrombus formation in the circulation and thereby helps to maintain blood flow to vital organs. However, the overproduction of NO may contribute to circulatory failure, myocardial dysfunction, organ injury, and MODS [1]. NO is generated by three different forms of nitric oxide synthetase (NOS). Two of these NOS isoenzymes are constitutively expressed in vascular endothelial cells (eNOS) and neurons (nNOS), whereas the expression of a third enzyme (iNOS) is inducible in a variety of cells. Moreover, angiogenic factors and tissue factor, which are essential to angiogenesis, elicit NO release [2]. However, the role of NO in PCAS remains controversial, and there are few reports regarding the clinical data of NO in PCAS patients. **OBJECTIVES.** The aim of this study was to examine the pathophysiological relationships between NO and organ dysfunction associated with PCAS.

METHODS. A total of 52 patients resuscitated after out-of-hospital cardiac arrest were included in the study. MODS was defined as a SOFA score > 12. The DIC diagnosis was based on the Japanese Association for Acute Medicine (JAAM) DIC criteria. This study compared the levels of NO between the groups with and without MODS and evaluated the factors affecting NO levels. Angiogenic factors include vascular endothelial growth factor (VEGF), soluble VEGF receptor (sVEGFR1, sVEGFR2, angiopoietin (Ang)1, and Ang2. **RESULTS.** The MODS groups exhibited significantly higher levels of NO compared to the non-MODS groups throughout the entire study period. Patients were also divided into DIC and non-DIC subgroups. There were significantly higher levels of NO in DIC group on Day 1 and 3. The maximum levels of Ang2 and the JAAM DIC score were found to be statistically significant at a 5% level in the univariate analyses for predicting an increase in NO levels. In addition, the multivariate logistic regression analysis demonstrated that the maximum Ang2 level was an independent predictor of increasing NO levels.

CONCLUSIONS. NO overproduction plays roles in the development of MODS associated with PCAS. NO expression may be induced by angiogenic and coagulation factors.

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GRANT ACKNOWLEDGMENT. This study was supported in part by a Grant-in-Aid for Scientific Research (2009-21249086).

1032**INCIDENCE AND CLINICAL FEATURES OF SUBARACHNOID HEMORRHAGE FOLLOWING THE RETURN OF SPONTANEOUS CIRCULATION AFTER CARDIAC ARREST**

J. Shin¹, K. Jang¹, H.J. Lee¹, J.H. Jung¹, K.J. Hong¹, Y.J. Son¹, J.S. Seo¹

¹Boramae Medical Center, Seoul Metropolitan Government Seoul National University, ER, Seoul, Republic of Korea

INTRODUCTION. The prevalence of cases of patients with subarachnoid hemorrhage (SAH) following out-of-hospital cardiac arrest (OHCA) varies between 4 to 18% among those who were admitted. The differences of prehospital and laboratory variables between SAH and non-SAH following OHCA were not known.

OBJECTIVES. The main objectives of our study were to describe the incidence of SAH occurring after OHCA in Korea and the differences of clinical variables between SAH and non-SAH groups.

METHODS. A retrospective-observational registry-based study was conducted in an emergency department (ED) at the university hospital. All cases of OHCA were registered in our study over the period of 5 years, from January 2009 to January 2014. Several prehospital, hospital, and laboratory variables were examined for a comparison analysis between SAH and non-SAH groups.

RESULTS. A total of 819 patients who had cardiac arrest were registered in our database. Among them, 344 patients (42%) had return of spontaneous circulation (ROSC) after the advanced cardiac life support (ACLS). After ROSC, brain computed tomography was performed on 234 patients and the existence of SAH was found in 31 patients (13.2%, 14 females). The mean age in SAH and non-SAH groups were 49 ± 17 years and 62 ± 17 years, respectively (p < 0.001). The number of patients who had initial shockable rhythm were 2 (8%) in SAH and 51 (27%) in non-SAH, respectively (p = 0.043). There were no statistical differences between the serum electrolyte, glucose, lactate level, and initial pH, during CPR in ED. However, initial PCO₂ and PO₂ during CPR were significantly different between SAH and non-SAH (p = 0.025 and p = 0.006, respectively). The PCO₂ level were 87 ± 27 mmHg in SAH and 73 ± 31 mmHg in non-SAH, and the PO₂ level were 49 ± 51 mmHg in SAH and 83 ± 75 mmHg in non-SAH.

CONCLUSIONS. The incidence of SAH after ROSC from OHCA was about 13%. There were lower rate of shockable rhythm, higher PCO₂ level, and lower PO₂ level in SAH compared to non-SAH.

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1033**CARDIAC COMPLICATIONS DUE TO CHEST COMPRESSIONS IN CARDIOPULMONARY ARREST PATIENTS**

T. Sugimura^{1,2}, Y. Asaka¹, Y. Nagasaki², M. Sono¹, K. Ariyoshi¹

¹Kobe City Medical Center General Hospital, Kobe, Japan, ²Hyogo Medical Examiner's Office, Kobe, Japan

INTRODUCTION. Chest compression is an indispensable technique for cardiopulmonary resuscitation (CPR). Published values for the complication by CPR range from 21-65%. Serious complications include aortic rupture, cardiac explosion, stomach explosion, liver injury, and spleen injury. Although a rare occurrence, cardiac injury is a serious complication of chest compression. Among the cardiac complications, the prevalence of myocardial contusion is 1.3%, and that of myocardial laceration is 0.1%.

[OBJECTIVES] The purpose of this study was to investigate the anatomical site and severity of cardiac injury, and the relation between those and the effects of chest compression.

METHODS. We enrolled 876 cases, all for which death was confirmed after arrival of hospital, following out-of-hospital cardiac arrest (OHCA) which went for CPR, and autopsy was performed at Hyogo Medical Examiner's Office between 1 January 2008 and 31 August 2013. Patients with chest trauma, those aged 12 years or younger, and those who received open-chest cardiac massage were excluded from the study. We investigated the anatomical site and type of the cardiac injury, and considered the relation of these to the effects of chest compression.

RESULTS. Of all 876 cases, 35 cases (approximately 4%) involved complicated cardiac injuries. The average age was 75; the youngest was 52 and the oldest was 94. The number of male cases was 16, and that of female cases was 19. The average body mass index was 20.2; the lowest was 10.5 and the highest was 28.4. There were 13 cases involving right atrium injury, 13 cases involving right ventricle injury, 4 cases involving left ventricle injury, and 4 cases involving pericardial injury. None of the cases involved left atrium injury. In 5 cases, the site of cardiac injury was unknown. There were 10 cases involving myocardial contusion, 9 cases involving myocardial laceration, and 8 cases involving full thickness myocardial laceration. In 8 cases, the type of cardiac injury was unknown.

CONCLUSIONS. More cardiac injury cases were right-sided, and their major causes were fractures to the sternum or to the ribs. The causes of the left-sided cardiac injury cases were fragility of the left ventricular myocardium due to old myocardial infarction and pressure contusion by the thorax and spinal column. It was thought that the fragility of bones in older people and their lean figures contributed to more severe cardiac injury. Japan has become a super-aged society. Approximately 40% of emergency ambulance transports of cardiopulmonary arrest patients are over 80 years old. The 2010 American Heart Association Guidelines for CPR recommends a chest compression depth of at least 5 cm. It is important to consider the appropriateness of applying the same depth to elderly Japanese patients whose figures differ significantly from those of Westerners.

1034**ARTERIAL OXYGEN PARTIAL PRESSURE IN PATIENTS AFTER CARDIAC ARREST**

I. Belloni¹, A. Dell'Anna¹, K. Donadello¹, J.-L. Vincent¹, F.S. Taccone¹

¹Erasme Hospital, Dpt of Intensive Care, Brussels, Belgium

INTRODUCTION. The relationship between PaO₂ levels and outcome after cardiac arrest (CA) has yielded conflicting results. The limited number of blood gas analyses per patient and the lack of the evaluation of the duration of high PaO₂ are important confounders to interpret these data.

Hypothesis: Prolonged exposure to high PaO₂ is associated with worse outcome after CA.

METHODS. We reviewed all comatose patients admitted after successful resuscitation from CA to our Dept between January 2007 and April 2013. Inclusion criteria were age ≥ 18 years, non-traumatic CA and survival ≥ 24 h after admission. We analyzed all arterial blood gas data for the first 24 h after admission, and we calculated the mean, maximum and minimum values of PaO₂. We calculated the area under the curve (AUC) for exposure above a PaO₂ of 60, 100, 150 or 200 mmHg during the first 24 h. Also, we calculated the time (T) above these thresholds as well as the AUC/T ratio. We assessed ICU mortality as well as neurological outcome. Poor neurological outcome was defined as a Cerebral Performance Category (CPC) score of 3-5 at 3-months.

RESULTS. The study included 197 CA patients, with 10 [8-12] blood gas analyses per patient; 112 (57%) patients died in the ICU and 131 (67%) had a poor 3-month neurological outcome. Mean, maximum and minimum PaO₂ values were similar between survivors and non-survivors, as well as between patients with good and poor neurological outcome. Survivors had a longer T > PaO₂ of 100 mmHg (17.3 [13.7-21.1] vs. 9.5 [14.5-20.0], p = 0.03) than non-survivors; however, the AUC and AUC/T ratios between the two groups were similar across the different thresholds. Similarly, patients with good neurological outcome had a longer T > PaO₂ of 100 mmHg (17.4 [14.2-21.2] vs. 15.2 [9.4-20.0] hrs, p = 0.03) than those with poor outcome. There were no other differences among groups for AUC and T above other thresholds of PaO₂.

CONCLUSIONS. Patients with longer time above a PaO₂ threshold of 100 mmHg had a higher survival and better neurological outcome after CA. Our data challenge the negative impact of high PaO₂ after CA.

1035**EXTRA CORPOREAL MEMBRANE OXYGENATION IN CARDIAC ARREST PATIENTS WITH POST-CARDIAC ARREST SHOCK: THE ECCAR STUDY**

A. Le Gall¹, A. Bouglé^{1,2}, G. Geri^{1,3,4}, F. Daviaud^{1,3}, D. Grimaldi⁵, P. Leprince^{6,7}, J.-P. Mira^{3,4}, A. Cariou^{1,3,4}

¹Medical Intensive Care Unit, Cochin - Broca - Hôtel-Dieu University Hospital, Assistance Publique - Hôpitaux de Paris, Paris, France, ²Department of Anesthesiology and Critical Care Medicine, Cardiology Institute, Pitié Salpêtrière University Hospital, Assistance Publique - Hôpitaux de Paris, Paris, France, ³Paris Descartes University, Paris, France, ⁴INSERM UMR-S970, Paris Cardiovascular Research Center, Paris, France, ⁵Medical Intensive Care Unit, Centre Hospitalier de Versailles, Le Chesnay, France, ⁶Department of Cardiac and Thoracic Surgery, Cardiology Institute, Pitié Salpêtrière University Hospital, Assistance Publique - Hôpitaux de Paris, Paris, France, ⁷Pierre et Marie Curie University, Paris, France

INTRODUCTION. Post-cardiac arrest shock (PCAS) occurs in nearly two-thirds of cardiac arrest (CA) patients, and is responsible for one-third of ICU deaths. As veno-arterial extracorporeal membrane oxygenation (AV-ECMO) has been used successfully for treatment of cardiogenic shock or refractory CA such mechanical assistance could be useful as a supportive treatment of post-CA shock. However data are lacking on AV-ECMO in this field. This preliminary retrospective study aimed 1/at describing a cohort of patients with severe PCAS treated with AV-ECMO, and 2/at defining parameters associated with the implementation of AV-ECMO in PCAS patients.

MATERIALS AND METHODS. All CA patients admitted in our ICU between January 2005 and October 2013 were assessed for eligibility. PCAS was defined as the need for

continuous norepinephrine or epinephrine infusion to maintain mean arterial pressure above 60 mmHg for more than 6 h following restoration of spontaneous circulation (ROSC), despite adequate fluid loading. AV-ECMO was considered in patients with refractory PCAS despite maximal medical management. Patient's characteristics were prospectively collected according to Utstein style. Hemodynamic status during ICU stay, need for coronarography or percutaneous coronary intervention (PCI), cardiopulmonary assistances delay, and outcomes were recorded. Baseline characteristics according to AV-ECMO were compared with a two-sided exact Fischer test and univariate then multivariate logistic regression were performed to identify factors associated with AV-ECMO's implementation.

RESULTS. 1017 patients were included in the study (20 in AV-ECMO group, and 997 in control group). Patients with AV-ECMO were younger (50 vs. 60 years old; $p < 0.01$), were more likely to require coronary angiogram (95.0 % versus 62.7 %; $p < 0.01$) and PCI (60.0 % vs. 27.2 %; $p < 0.01$) because of a more frequent suspected cardiac etiology (100 % vs. 51.8 %; $p < 0.01$). Therapeutic hypothermia was more frequently used in AV-ECMO group (95.0 % versus 72.1 %; $p < 0.02$). Mortality was not different between the two groups (80.0 vs 75.1 %, NS). In multivariate analysis, factors independently associated with implementation of AV-ECMO were age < 60 yo (OR = 3.25; CI [1.04-10.15]; $p = 0.04$), initial shockable rhythm (OR = 6.49; CI [1.43-29.4]; $p = 0.01$), and lactate level at admission < 6.9 mmol/l (OR = 0.14; CI [0.04-0.5]; $p = 0.02$).

CONCLUSION. In our practice, use of AV-ECMO in patients with a severe post-CA shock was associated with an acceptable mortality rate. These preliminary results suggest assessing the benefit of implementation of ECMO in this specific population. Further powerful studies are needed to better define the patients in whom this strategy could be most useful.

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EXPRESSION OF SERUM INFLAMMATORY MARKERS IN POST CARDIAC ARREST PATIENTS DURING AND AFTER TREATMENT WITH MILD THERAPEUTIC HYPOTHERMIA

M. de Waard¹, A. Spoelstra-de Man², N. Witsen², T. Opstal², I. van den Hul², E. Alberts², A. Girbes²

¹VU University Medical Center, Intensive Care Medicine, Amsterdam, Netherlands, ²VU University Medical Center, Amsterdam, Netherlands

INTRODUCTION. While mild therapeutic hypothermia (MTH) is widely used after cardiac arrest (CA) to increase survival and neurological outcome, the mechanisms underlying the beneficial effect of MTH are not fully understood. Limiting the amount of circulating inflammatory cytokines by prevention of fever or optimizing the rewarming speed are suggested to be of major importance.

OBJECTIVE. The aim of this study was to analyze the systemic inflammatory response in post-CA patients during mild therapeutic hypothermia and rewarming.

METHOD. In a clinical observational study in a tertiary care university hospital 21 patients after out-of-hospital CA treated with MTH and gradually rewarmed were studied. Arterial blood samples were taken upon admission to the emergency room, after reaching target temperature of 32.5 °C, after 24 h maintenance phase before rewarming started (< 0.5 °C/h), after reaching normothermia and 24 h after reaching normothermia to measure serum inflammatory marker expression levels. Patient characteristics were collected from the patient data management system (Metavision, Tel Aviv, Israel).

RESULTS. Expression of matrix metalloproteinase-9 decreased significantly during hypothermia which progressed in time (Figure). Interleukin-6 and tumor necrosis factor- α expression increased during hypothermia, suggesting that the inflammatory response was not completely suppressed by MTH. Interleukin-1 β levels were not affected by hypothermia. Interleukin-10 decreased during hypothermia and increased during rewarming. Interestingly, all cytokine levels significantly decreased during the day after the rewarming phase to normal levels. No association was found between the change in cytokine expression and the rate of cooling or rewarming.

CONCLUSION. This study provides more insight into the systemic inflammatory response after CA. The data suggests that the inflammatory response was not suppressed completely by MTH or stimulated by rewarming.

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EFFECTIVENESS OF DO NOT ATTEMPT RESUSCITATION (DNAR) EDUCATION ON REDUCING THE INCIDENCE OF INAPPROPRIATE RESUSCITATION ATTEMPTS

J.C. Murley¹, E. Parkinson¹, B. Scoones¹, K.J. Turner¹

¹Ipswich Hospital, Critical Care Unit, Ipswich, United Kingdom

INTRODUCTION. The Ipswich Hospital has approximately 800 beds and is currently taking part in the National Cardiac Arrest Audit (NCAA). As a result of the interim results it was noted that a large proportion of cardiac arrest calls may have been inappropriate with Do Not Attempt Resuscitation (DNAR) status not being discussed with the majority of these patients prior to cardiac arrest. We undertook an audit of all cardiac arrests occurring over a three month period. An intervention was made consisting of a teaching session for junior and senior doctors at a grand round and a change to hospital clerking documentation to include a red tick box to encourage DNAR discussion. Following this intervention cardiac arrests over a further three month period were audited.

OBJECTIVES. To find the effectiveness of junior education on DNAR discussion rates and the subsequent appropriateness of cardiac arrest calls.

METHODS. A retrospective review of notes over three month periods prior to and following the intervention. A consultant and three registrars assessed the notes for each patient who had a cardiac arrest during those periods. A decision was made as to whether they were suitable for ICU admission in view of their pre-cardiac arrest condition and co morbidity. If they were not deemed suitable for ICU intervention the appropriateness of the 2222 call was questioned.

RESULTS. During three months prior to the DNAR education 17 cardiac arrest calls were made, 3/17 (17 %) were deemed to be appropriate. In three months following the intervention 38 cardiac arrest calls were made, 15/38 (39 %) were deemed to be appropriate. During the initial three months the death rate from cardiac arrest was 53 %, this is compared with a death rate of 66 % occurring post intervention.

CONCLUSIONS. The consequences of inappropriate cardiac arrest calls are widespread and counter-productive in terms of adverse patient experience, relatives distress and excessive demands on clinicians time and NHS resources. The percentage of appropriate

cardiac arrest calls has more than doubled after the intervention of education and a change in documentation. Whilst there has been a positive reduction in the number of inappropriate cardiac arrest calls there is still much room for improvement. The next step will be to ensure that the red DNAR tick box has been completed within 24 h of admission and countersigned by two senior clinicians, indicating that a discussion has occurred regarding DNAR status, either with the patient or the next of kin. The DNAR status can be and should be reviewed every three days or sooner if required. This will require further education and audit, but will result in better patient and relative experience if there is a further reduction in inappropriate cardiac arrest calls.

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VENTILATION PRACTICES DURING CARDIO-PULMONARY RESUSCITATION: AN INTERNATIONAL OPINION SURVEY

R. Cordoli¹, L. Suppan², V. Garelli³, A. Lyazidi¹, F. Templier⁴, A. Khoury⁵, S. Delisle⁶, D. Savary⁷, L. Brochard⁸, J.C.M. Richard¹

¹University Hospital of Geneva, Intensive Care Unit, Geneva, Switzerland, ²University Hospital of Geneva, SMUR, Geneva, Switzerland, ³HUG, Intensive Care Unit, Geneva, Switzerland, ⁴University Hospital of Angers, SAMU, Angers, France, ⁵University Hospital of Besançon, Intensive Care Unit, Besançon, France, ⁶Hôpital du Sacré-Cœur de Montréal, Service des Soins Intensifs, Montréal, Canada, ⁷General Hospital of Annecy, Emergency Department, Annecy, France, ⁸St Michael's Hospital, University of Toronto, Toronto, Canada

INTRODUCTION. Ventilation during cardio-pulmonary resuscitation (CPR) is based on a low level of evidence and recommendations are unclear. We hypothesized that ventilation strategies during CPR might considerably differ worldwide.

OBJECTIVE. The aim of the survey was to obtain responses from professionals involved in resuscitation teams worldwide about the way they manage ventilation during CPR in adult patients with non traumatic cardiac arrest.

METHODS. We used a web-based opinion survey that was made available from December 2013 to March 2014. Links to the survey were sent by e-mail newsletters and displayed on different international web sites (ESICM, ERC, IPACCMS) or national medical societies (France, Brazil, Japan, Belgium, Switzerland). Only completed surveys were analyzed.

RESULTS. Responses came from 54 countries worldwide. Among 1328 surveys opened, 555 were completed (42 %), 7 duplicate entries were deleted. Responders were mostly physicians (88 %), belonging to a non-university hospital (51 %). 96 % declared following CPR-guidelines (46 %-ERC, 36 %-AHA, 11 %-National, 3 % specific to the hospital). Regarding specific ventilation practices during CPR, 30 % used (always or frequently) only chest compressions (CC) without additional ventilation. During endotracheal intubation, CC were stopped 48 % of the time when they were manually provided, and 44 % of the time when they were performed with a mechanical device. To ventilate, bag-mask was the most used device (97 %), then mechanical ventilator (79 %) and Boussignac-CPR tracheal tube (6 %). 18 % stopped CC during insufflations in intubated patients, 45 % gave 8-10 breaths/min while 8 % applied > 16 breaths/min. When a ventilator was used, volume controlled mode was the most common strategy, 54 % set 1-5 cm H₂O of PEEP and 14 % used a PEEP of 6-10 cm H₂O, 58 % set the trigger-off, 49 % set FiO₂ according to SpO₂, with a range of 94-96 % the most frequently targeted (34 %). 78 % used EtCO₂ monitoring. Regarding CC, 38 % had mechanical CC device available and, when used, 26 % declared to frequently or always experienced respiratory problems. In such cases, 62 % declared to return to manual bag ventilation while only 11 % preferred to revert to manual CC.

CONCLUSIONS. During CPR, ventilation practices declarations are heterogeneous and differ significantly from recommendations. It may reflect the low level of evidence concerning ventilation during CPR presented in recent international CPR guidelines. Clearer recommendations regarding ventilation are necessary especially when mechanical CC are applied.

Critical care nursing & ICU organisation: 1040–1053

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ALARM REDUCTION IN THE ICU: CAN TECHNOLOGY DO IT ALL?

A.-S. Debue¹, S. Cabon¹, J. Charpentier¹, A. Marincamp¹, C. Augustin¹, C. Boulila¹, S. Ben Abdallah¹, H. Le Goff¹, F. Daviaud¹, J.-D. Chiche¹, Groupe de Travail sur la Ventilation

¹Cochin Hospital/Paris-Descartes University, Medical ICU, Paris Cedex 14, France

INTRODUCTION. Originating from multiple sources, alarms generate noise, stress and discomfort for patients. They can lead to medical errors as they divert attention of the ICU staff and hinder organisation of the workflow [1]. Beside false alarms, some alarms can be generated by inappropriate settings. Data regarding the precise nature and incidence of alarms in the ICU are scarce. In addition, there are no guidelines regarding alarms settings in the ICU.

OBJECTIVES. We conducted this study to assess

i) the nature, incidence of alarms from multiparameter monitors as well as the type of staff response elicited by each alarm,

ii) the effectiveness of a specific algorithm designed to reduce false alarms.

METHODS. We conducted a single-centre, prospective study during 3 weeks to assess nature, incidence and staff response for monitor alarms in 4 group of pts:

Group A - unstable, mechanically ventilated pts within 1 h of admission,

Group B - pts with shock,

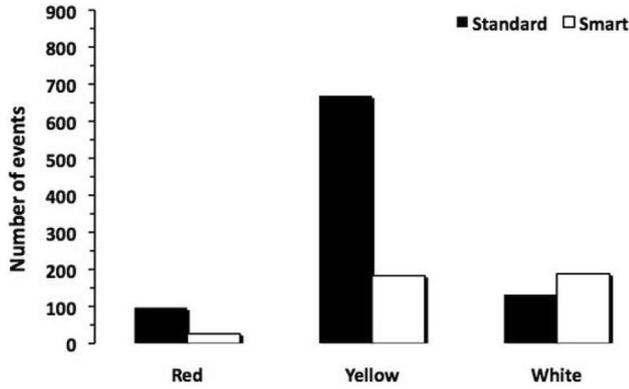
Group C - stable, mechanically ventilated pts,

Group D - stable, alert and spontaneously breathing pts.

In addition, we tested a "Smart Alarm" algorithm designed to decrease the number of false alarms. For each patient, an independent observer recorded all alarms originating from the monitor with and without the "Smart Alarm" feature, as well as the staff response (time and nature) during a 4-h period. Analysis was carried out independently for transient (< 30 s) and sustained alarms (> 60 s), and according to the degree of severity of the alarms (white, yellow & red). We also recorded demographic data, motif of ICU admission, ICU length of stay, type and duration of organ support, & SOFA scores.

RESULTS. 46 pts monitored for a total of 484 monitoring days have been enrolled in the study. During the study period, 1172 monitor-related alarms have been recorded and analysed. Main results can be summarized as follows. First, 60 % of alarms do not trigger any specific action from the staff. Second, the number of false alarms is significantly lower than the number of true, non-clinically significant alarms. Third, the most important source of

alarms in the study originated from invasive arterial blood pressure monitoring. Finally, a "Smart Alarm" algorithm decreased the number of true, but not clinically significant alarms (Fig 1).



[Fig 1]

CONCLUSIONS. Alarms remain a significant problem in the ICU that cannot be solved solely by technology. Guidelines to set alarms and smart algorithms can potentially decrease the number of false and true, non-clinically significant alarms and thus lead to better staff response.

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1041 THE HIGHER WORK-LOAD THE WORSEN SLEEP QUALITY IN NURSES; WHAT ABOUT THE RISKS?

V. Inal¹, D. Yaylak², Pioneers Study Group of Trakya University Faculty of Medicine

¹Trakya University Faculty of Medicine, Medical Intensive Care Unit, Edirne, Turkey,

²Trakya University Faculty of Medicine, Edirne, Turkey

INTRODUCTION. The role of sleep loss and fatigue on cognitive performance, in health care providers who practice during extended and nighttime workshifts, has received increased attention recently. Inadequate sleep increases the risk for errors, compromises problem solving and decision making, and poor patient outcomes. Several studies have indicated a link between adverse outcomes, fatigue, and sleep loss

OBJECTIVES. The aim of our study was to describe relation between work-load and sleep and fatigue variables in nurses.

METHODS. The volunteered nurses, each were responsible for care of four patients, in the random sample (N = 204) were received a questionnaire packet. The work-load was determined by "Simplified Therapeutic Intervention Scoring System (TISS-28)". One TISS-28 point equals 10.6 min of each nurses shift, and per shift, a typical nurse is capable of delivering nursing activities equal to 46 TISS-28 points. The severity of daytime sleepiness was evaluated by using the "Epworth Sleepiness Scale (ESS)" and subjective sleep quality was measured by using the "Pittsburgh Sleep Quality Index (PSQI)".

RESULTS. About 50 % of nurses had TISS-28 points of 30.96 ± 5.76, within acceptable ranges, and had better ESS and PSQI scores (p < 0.05). On the other hand, every 16 points increased above these levels increased risk 2 x and nurses with 60 and above TISS-28 points (15 %) had worst outcomes in terms of ESS and PSQI. A TISS-28 score of 60 and more was predicted sleepiness with sensitivity of 75 % and specificity of 81 %.

CONCLUSIONS. A shift work-load of 60 or more may contribute to a variety of sleep disturbances in which persistent and chronic sleep debt may lead devastating effects on performance and adverse health and safety consequences.

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1042 EFFECT OF ICU FOLLOW-UP CONSULTATIONS VERSUS STANDARD CARE ON QUALITY OF LIFE AND BURDEN OF SYMPTOMS: A SYSTEMATIC REVIEW AND META-ANALYSIS

J.F. Jensen¹, D. Overgaard², T. Thomsen^{3,4}, M.H. Bestle¹, D.F. Christensen⁵, I. Egerod^{6,7}

¹Nordsjællands Hospital, University Hospital of Copenhagen, Department of Anaesthesiology and Intensive Care Medicine, Hillerød, Denmark, ²Nordsjællands Hospital, University Hospital of Copenhagen, Department of Research, Hillerød, Denmark, ³Copenhagen University Hospital, Rigshospitalet, Abdominal Centre, Copenhagen, Denmark, ⁴Skaane University Hospital, University of Lund, Clinical Health Promotion Centre, Malmö, Sweden, ⁵University Hospital of Copenhagen, University Hospital of Copenhagen, Department of Anaesthesiology and Intensive Care Medicine, Hillerød, Denmark, ⁶Rigshospitalet, University Hospital of Copenhagen, Department of Trauma Center, HOC 3193, Copenhagen, Denmark, ⁷University of Copenhagen, Faculty of Health & Medical Sciences, Copenhagen, Denmark

INTRODUCTION. Worldwide millions of patients require treatment in the intensive care unit (ICU), and the number of survivors is increasing. Survivors experience physical, mental and cognitive symptoms, described as "post intensive care syndrome" (PICS) [1]. Critical illness and intensive care reduces the health-related quality of life (HRQOL) while increasing the burden and cost for families, and the healthcare system [2]. Follow-up clinics

and consultations have been developed to address the needs of survivors. There is no gold standard for intensive care aftercare, and the effect on HRQOL, long-term symptoms, and return to work is undetermined.

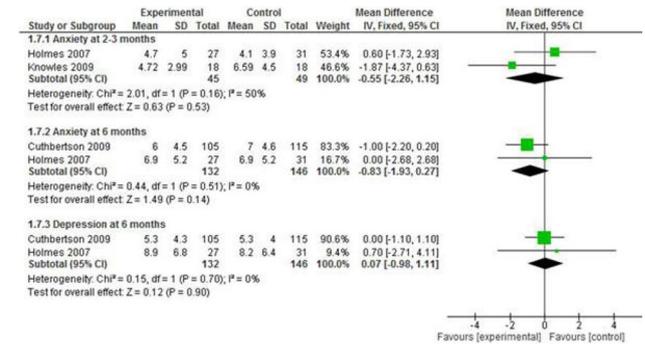
OBJECTIVES. To evaluate the effect of systematic follow-up consultations versus standard care on recovery in ICU survivors.

METHODS. Five databases were systematically searched for randomized controlled trials (RCTs) up to January 2014. Ongoing and unpublished trials were searched on Clinical-Trials.gov, and experts were contacted. A detailed study protocol is available [3]. Studies were assessed by their methodological quality using the risk of bias tool and GRADE profile recommended by the Cochrane Collaboration by two reviewers independently. A meta-analysis was performed to determine the impact on outcomes following post ICU consultations.

RESULTS. From 1213 citations, five trials were found including 608 patients. The selected trials investigated ICU follow-up clinics, ICU diary interventions, and outpatient interpersonal counseling after ICU discharge. One trial explored HRQOL, and found no effect (Standard effect sizes of the SF-36 Physical health Component Score (PCS) and Mental health Component Score (MCS): -0.8 (-3.6 to 2.0, p = 0.59), -0.6 (-3.9 to 2.8, p = 0.74) at 6 months, and 1.1 (-1.9 to 4.2, p = 0.46), 0.4 (-3.0 to 3.7, p = 0.83) at 12 months). Overall there was a positive trend favoring follow-up consultations to improve anxiety at 6 months (Mean difference (MD) -0.83, 95 % CI: [-1.93, 0.27], p = 0.14) and a positive effect on the risk for new onset PTSD between 3-6 months (Risk Ratio 0.49, 95 % CI: [0.26, 0.95], p = 0.03). There was no effect on other outcomes.

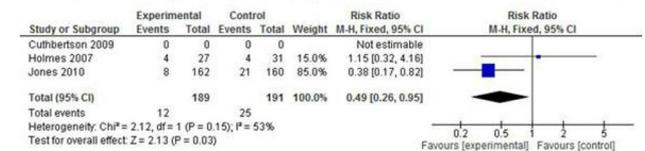
Outcome	Assessed risk	Corresponding risk	Relative effect (95% CI)	Quality of the evidence	Comments
Quality of life: Physical component of SF-36	Control	Follow-up consultation(s)	1.00	High	One trial reported the estimate of the outcome.
Quality of life: Mental component of SF-36	Control	Follow-up consultation(s)	0.83	High	One trial reported the estimate of the outcome.
Quality of life: Mental component of SF-36	Control	Follow-up consultation(s)	0.83	High	One trial reported the estimate of the outcome.
Anxiety at 2-3 months	Control	Follow-up consultation(s)	0.50	Low	Heterogeneity: 50%. One trial assessed with high risk of bias. Possible confounding and/or unbalanced depression due to small sample sizes in both studies.
Depression at 2-3 months	Control	Follow-up consultation(s)	0.50	Low	Heterogeneity: 60%. One trial assessed with high risk of bias. Possible confounding and/or unbalanced depression when sample sizes. Not pooled estimates.
Anxiety at 6 months	Control	Follow-up consultation(s)	0.50	Moderate	One trial assessed with high risk of bias. There may be some confounding due to population, but not downgraded the outcome.
Depression at 6 months	Control	Follow-up consultation(s)	0.50	Moderate	One trial assessed with high risk of bias. There may be some confounding due to population, but not downgraded the outcome.
PTSD, new onset between 3-6 months	Control	Follow-up consultation(s)	0.49	Moderate	One trial assessed with high risk of bias. There may be some confounding due to population, but not downgraded the outcome.
Return to work proportion	Control	Follow-up consultation(s)	1.00	High	One trial measured this outcome. At 6 months 40% (95% CI: 30-50%) of intervention group vs. 20% (10-30%) of control, OR: 1.58 (0.95%: 2.63, 1.52)

[Figure 3 Summary of Findings]



[Figure 1 Anxiety and depression]

Follow-up consultation(s) versus no follow-up, outcome: PTSD New onset between 3-6 months.



[Figure 2 New onset PTSD]

CONCLUSIONS. Follow-up consultations for post ICU survivors appear to reduce symptoms of PTSD, and may benefit survivors' level of anxiety after ICU admission. Trials are needed to improve HRQOL and prevent associated symptoms after ICU.

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1043 THE IMPACT OF PSYCHOLOGICAL MORBIDITY ON THE EFFECTIVENESS OF STRUCTURED REHABILITATION CLASSES FOR SURVIVORS OF CRITICAL ILLNESS

D. McWilliams¹, H.E. Garratt-Kirk¹

¹Queen Elizabeth Hospital, Therapy Services, Birmingham, United Kingdom

INTRODUCTION. The significant physical and psychological impact of a period of critical illness has been well documented. Recovery can take many months and is often incomplete. Previous studies of post ICU rehabilitation have demonstrated potential improvements in both physical and psychological parameters (1), although it is still unclear which patients would benefit most from such interventions (2).

OBJECTIVES. To assess the impact of a 6-week outpatient based exercise programme for survivors of critical illness and evaluate whether initial anxiety or depression levels impact on level of recovery.

METHODS. 42 patients from a single tertiary centre ICU, invasively ventilated for ≥ 5 days were recruited to the study. Baseline assessment was completed within 4 weeks of hospital discharge, with reassessment 8-10 weeks later. Patients attended for a 6 week course of out-patient, class based structured rehabilitation. Primary outcome measure was physical fitness, assessed using the 6 min walk test (6MWT), with secondary measures of anxiety and depression using the HADS questionnaire.

RESULTS. 26/42 (62 %) patients completed the programme and underwent reassessment. All subjects who completed the programme demonstrated significant improvement in the 6MWT and HADS scores. A median increase of 134 m (49 %) was seen for the 6MWT which was similar to those seen in a previous study of the same intervention (1).

n = 26	Pre Rehabilitation	Post rehabilitation	p
6MWT, median (IQR)	276 m (204.25 - 365)	410 m (287.5-458.75)	<0.001
Anxiety, median (IQR)	6 (3-9)	3 (1-6)	0.00252
Depression, median (IQR)	4 (3-9)	3 (2-6)	0.00194

[Patient Outcomes]

A secondary analysis was completed for results based on initial anxiety and depression scores. Of the 16 subjects who failed to complete the programme it was noted over half (n = 9, 56 %) had significant scores for anxiety (> 8). On a sub group analysis (see table 2) patients with anxiety scores of ≥ 10 showed the largest improvement in 6MWT distance (94 %), as well as the largest reduction in anxiety (45 %) and depression (30 %).

	6MWT	Anxiety	Depression
Anxiety 0-7	137 m (43 %)	0.8 (27 %)	1.9 (21 %)
Anxiety 8-10	106 m (51 %)	2.4 (27 %)	1.3 (20 %)
Anxiety > 10	134 m (94 %)	6.5 (45 %)	4.5 (30 %)

[Level of improvement per initial anxiety score]

CONCLUSIONS. Attendance at a 6 week out patient, class based rehabilitation programme results in significant improvements to both physical and psychological outcomes in survivors of critical illness. The level of improvement seen appeared to correlate with anxiety scores on the HADS questionnaire, with the greatest improvement seen in those patients with anxiety scores of ≥ 10 . It was noted however, subjects with higher levels of anxiety at initial assessment were the least likely to complete the full 6 week programme. As such, methods to reduce anxiety and improve compliance should be explored to ensure maximum benefit to patients following critical illness.

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1044 STRESSFUL PERCEPTIONS OF TRACHEOSTOMIZED PATIENTS IN THE INTENSIVE CARE UNIT

M.A. Riera^{1,2}, E. Gallart^{1,2,3}, E. Afonso⁴, J. Gomez¹, A. Vicalvaro^{1,2}, A. Solsona^{1,2}, M. Lolo^{1,2}, L. Calleja¹, E. Oliveira¹, A. Mont¹

¹Vall d'Hebron Hospital, Critical Care, Barcelona, Spain, ²Vall d'Hebron Research Institute, Health Research Group, Barcelona, Spain, ³Universitat Autònoma de Barcelona, Nursing, Barcelona, Spain, ⁴Chelsea and Westminster Hospital, NICU, London, United Kingdom, ⁵Vall d'Hebron Hospital, Barcelona, Spain

INTRODUCTION. A significant number of patients who are submitted to mechanical ventilation require a tracheostomy in order to ensure safety and efficacy of ventilation. Several authors have explored stressful experiences of patients in the intensive care unit (ICU), but few studies have focused specifically in tracheostomized patients. Acknowledging the factors that are associated with stress in these patients may help prevent them.

OBJECTIVES. To determine the stressful perceptions that are related to the ICU environment and with the tracheal cannula (TC) in tracheostomized patients.

METHODS. A prospective, cohort study was performed in a tertiary ICU during 14 consecutive months. Patients submitted to mechanical ventilation and tracheostomized were included. Main variables analysed included gender, age, APACHE II, ICU Length of stay (LOS) and score in the ICU Stressful Experience Questionnaire (ICU-SEQ). Descriptive. Questionnaire was done upon ICU discharge.

RESULTS. 75 patients were included, of which 47 (62.70 %) were male. Mean age was 54.92 (SD = 13.47), mean APACHE II score was 24.01 (SD = 7.72) and median of ICU LOS was 38 days (minimum 11- maximum 189). 93.3 % of included patients remembered at least one of the proposed stressors, both general and related to the TC. Most patients remembered "Trouble falling asleep" and "Headaches" - both 67 patients (89.33 %). "Being thirsty", "Noise", "Not being able to sleep", "Feeling blue or depressed", "Feeling lonely" and "Missing your spouse, relatives or friend" were remembered by 66 patients (88 %). When evaluating levels of stress caused by each factor, the highest scores were attributed to "Not being able to speak" [61.3 % out of the 62 patients who remembered (82.5 %)], "Trouble speaking" [60 % out of the 65 patients who remembered (86.7 %)], "Trouble falling asleep" [59.7 % out of the 67 patients who remembered (89.3 %)], "Being thirsty" [59.1 out of the 66 patients who remembered it (88.0 %)], "Missing your spouse, relatives

or friends" [57.6 % out of the 66 patients who remembered (88.0 %)] y "Waking up in the middle of the night" [53.8 % out of the 65 who remembered it (86.7 %)].

CONCLUSIONS. Almost all patients who had a TC have stressful memories of their ICU stay. However, the level of stress caused by these memories varied according to factors and patients. Experiences that were remembered as more stressful by patients were related to communication, sleep, thirst and loneliness.

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1045 OUTCOMES AND NURSING WORKLOAD RELATED TO OBESE PATIENTS IN THE INTENSIVE CARE UNIT

F.S.A. Carrara¹, I.Y. Whitaker¹, S.S.V. Zanezi¹, M.F. Cremasco¹

¹Escola Paulista de Enfermagem - EPE - UNIFESP, Sao Paulo, Brazil

INTRODUCTION. The elevated prevalence of obesity in the population associated to the effects on their health may increase the frequency of obese people are admitted in hospital and in Intensive Care Units (ICU).

OBJECTIVES. To verify the prevalence of patients admitted to the ICU with a body mass index (BMI) ≥ 30 kg/m²; to characterize patients according to BMI ≥ 30 kg/m² or BMI < 30 kg/m² considering the variables: demographic, clinics, hospitalization and nursing workloads; to identify obese patients' risk factors for death and length of stay (LOS) in the ICU.

METHODS. A cross-sectional study was carried out in the ICU of the University Hospital at the Universidade Federal de São Paulo, Brazil. The variables analyzed were demographic data, admission height and weight, comorbidities, illness severity, mortality, ICU and hospital length of stay (LOS), adverse events and nursing workload. The Pearson's Chi squared or Fisher's exact test and Student T test or Mann-Whitney test were used to compare the obese and nonobese groups. The multiple logistic and linear regression were used to identify risk factors.

RESULTS. The sample consisted of 530 patients, 105 (19.8 %) had a BMI ≥ 30 kg/m². The women's group had a significantly higher number of obese patients (p = 0.025). The average age of obese patient was 57.8 years old, predominantly underwent surgical procedures (62.9 %) and the mean of length of stay was 6.8 days in the ICU and 20.3 days in the hospital. There was no difference in the average scores of the Charlson Comorbidity Index (Charlson CI) between obese and non-obese patients, however, patients with BMI ≥ 30 kg/m² had diabetes mellitus (p = 0,008) more often, systemic arterial hypertension (p < 0.001) and dyslipidemia (p = 0,042). The average of Simplified Acute Physiology Score (SAPS3), Sequential Organ Failure Assessment (SOFA) at admission, SOFA at discharge, Nursing Activities Score (NAS), duration of mechanical ventilation (MV) and number of complications revealed no statistical differences.

Variables	≥ 30 kg/m ² (n = 105)	< 30 kg/m ² (n = 425)	P value
Gender (n, %) Female	62 (59.0)	199 (46.9)	0.025P
Age (average)	57.8 \pm 16.9	59.9 \pm 18.6	0.290t
Type of patient (n, %) Surgical	66 (62.9)	276 (64.9)	0.690P
ICU LOS (days average)	6.8 \pm 8.2	7.5 \pm 9.4	0.232 MW
Hospital LOS (days average)	20.3 \pm 25.1	21.4 \pm 22.3	0.083 MW
SAPS 3 (average)	42.5 \pm 16.5	44.5 \pm 15.1	0.220t
SOFA Admission (average)	3.5 \pm 3.4	3.5 \pm 3.1	0.647 MW
NAS (average)	65.3 \pm 9.1	64.2 \pm 7.9	0.219t
ICU Discharge (n, %) Death	10 (9.5)	56 (13.2)	0.293P

[Patients characteristics according to BMI]

In the obese group, the morbidly obese were younger (p < 0.001), had lower Charlson CI (p = 0.002), lower SAPS3 (p = 0.047), lower admission SOFA (p = 0.019), shorter LOS in ICU (p = 0.015) and hospital stays (p = 0.039), however, there was an increased NAS (p = 0,004).

Variables	Obese I (n = 69)	Obese II (n = 15)	Obese III (n = 21)	p
Gender (n, %) Female	36 (52.2)	11 (73.3)	15 (71.4)	0.139P
Age (average)	61.8 \pm 15.8	56.4 \pm 20.3	45.5 \pm 11.3	<0.001AN
Type of patient (n, %) Surgical	40 (58.0)	9 (60.0)	17 (81.0)	0.157P
Charlson CI (average)	3.5 \pm 2.5	3.0 \pm 1.8	1.5 \pm 1.4	0.002KW
ICU LOS (days average)	7.1 \pm 7.3	8.1 \pm 10.4	4.8 \pm 4.8	0.015KW
Hospital LOS (days average)	21.7 \pm 26.5	21.5 \pm 26.1	14.8 \pm 19.4	0.039KW
SAPS 3 (average)	44.5 \pm 15.7	44.2 \pm 16.3	34.6 \pm 17.6	0.047AN
SOFA-admission (average)	3.9 \pm 3.4	3.9 \pm 3.9	1.8 \pm 2.4	0.019KW
NAS (average)	63.4 \pm 9.0	66.9 \pm 8.7	70.6 \pm 7.6	0.004AN

[Characteristics of patients of obese groups]

In the obese group, admission SOFA and NAS were related to death in the ICU.

		IC 95 % OR Lower	IC 95 % OR Upper	P
Model Initial	SAPS 3	0.941	1.097	0.680
	SOFA- adm	1.090	2.496	0.018
	NAS	1.048	1.382	0.009
Model Final	Constant			0.001
	SOFA- adm	1.289	2.383	<0.001
	NAS	1.051	1.382	0.007
Constant			0.001	

[Logistic Regression Model]

Regarding to the LOS in ICU, besides admission SOFA and NAS were added type of patient and duration of MV.

CONCLUSIONS. The prevalence of obesity in this study was 19.8%. The developing of knowledge about the obese patient's characteristics is important to conduct therapy and care. Further studies should be carried out to support the multidisciplinary team to give a safe care to the critical obese patient.

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GRANT ACKNOWLEDGMENT. None.

1046 NURSING INTENSIVE CARE SKILLS TRAINING (NICST): A STRUCTURED, PRACTICAL, NURSE LED TRAINING PROGRAMME, DEVELOPED AND TESTED IN A RESOURCE LIMITED SETTING

T. Stephens¹, A.P. de Silva^{2,3}, J. Welch⁴, C. Sigera², L. Peiris⁵, A. Dondorp⁶, T. Karunathilake⁷, K.S.A. Jayasinghe⁷, R. Haniffa^{2,6,7}

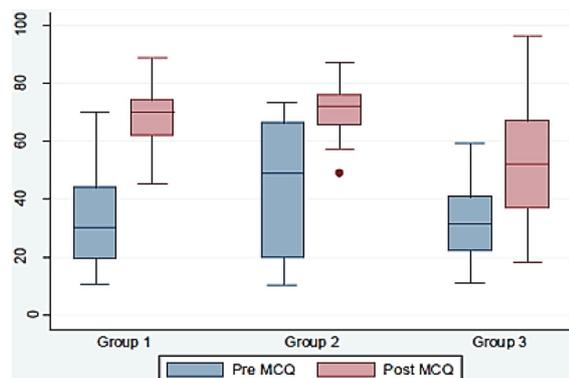
¹Barts Health NHS Trust, London, United Kingdom, ²National Intensive Care Surveillance, Ministry of Health, Colombo, Sri Lanka, ³ICNARC, London, United Kingdom, ⁴University College London Hospitals NHS Foundation Trust, London, United Kingdom, ⁵Post Basic College of Nursing, Colombo, Sri Lanka, ⁶University of Oxford, Mahidol Oxford Tropical Medicine Research Unit (MORU), Bangkok, Thailand, ⁷University of Colombo, Faculty of Medicine, Colombo, Sri Lanka

BACKGROUND. Nurses constitute the largest proportion of the critical care workforce and the availability of appropriately skilled nurses is essential for the delivery of quality care and for the minimisation of morbidity and mortality (Aiken et al., 2014; Riviello et al., 2011). However, formal high quality training for nurses in intensive care units (ICUs) in resource limited settings is rarely available.

OBJECTIVES. The objective was to design and deliver a structured, locally resourced, nurse led practical training programme (Nursing Intensive Care Skills Training; NICST) for ICU nurses in a low-middle income country (Sri Lanka) and to assess the impact of this training on participants' practical knowledge and skills.

METHODS. A three day training programme utilising a structured approach to patient assessment and management for ICU nurses was delivered by local nurse tutors in partnership with overseas nurse trainers. Feedback was obtained throughout the planning and delivery process to ensure the programme met the participants' learning needs. The impact of the course was evaluated using the following methods: Pre and post course self-assessment; an identical pre and post course, 30 min, Multiple Choice Questionnaire (MCQ); a post course Objective Clinical Skills Assessment (OSCA) station; two post course Short Oral Exam (SOE) stations and post course feedback questionnaires.

RESULTS. Three groups were trained totalling 117 ICU nurses. The level of self-reported confidence in clinical skill improved significantly ($p < 0.0001$) in all groups after training. Post MCQ scores were significantly higher when compared to pre MCQ ($P < 0.0001$) in all three groups (see graph 1). Over 95% passed the post course OSCA (patient assessment) and SOE 1 (arterial blood gas analysis) whilst 76.9% passed SOE 2 (3-lead electrocardiogram analysis). The course was highly rated by participants, with 98% believing that the course was a useful experience.



[Graph 1: Pre and Post MCQ scores/ %]

CONCLUSIONS. Nursing Intensive Care Skills Training (NICST) was highly rated by participants and was effective in improving the knowledge and skills of those trained. This sustainable short course model maybe adaptable to other settings and may offer an opportunity to fill the current gap in formal, high quality training availability for ICU nurses in low and middle income countries.

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1047 DELIRIUM AND EARLY PHYSICAL THERAPY (DEPTH): A QUALITY IMPROVEMENT (QI) PROJECT IN CORONARY CARE UNIT (CCU): INITIATING EARLY PHYSICAL THERAPY

S.J. Lee¹, D.R.S. Reddy¹, P.K. Guru¹, J.K. Pannu¹, M.O. Al-Qadi¹, L.M. Welper², M.P. Dinsder Moulder³, J.P. Bois⁴, T.H. Tajouri⁴, R.J. Le⁴, R. Kashyap⁵, M.D. Pyfferoen⁶, B.J. Selim¹, Delirium and Early Physical Therapy (DEPTH) QI Team

¹Mayo Clinic, Division of Pulmonary and Critical Care Medicine, Rochester, United States, ²Mayo Clinic, Department of Nursing, Rochester, United States, ³Mayo Clinic, Hospital Pharmacy Services, Rochester, United States, ⁴Mayo Clinic, Division of Cardiovascular

Diseases, Rochester, United States, ⁵Mayo Clinic, Department of Anesthesiology, Critical Care Medicine, Rochester, United States, ⁶Mayo Clinic, Department of Physical Therapy, Rochester, United States

INTRODUCTION. It has been progressively recognized that immobility due to critical illness requiring respiratory support via mechanical ventilation (MV) or non-invasive positive pressure (NIPPV), adversely impacts long-term physical function, quality of life, and cognition [1,2]. In patients with respiratory failure, neuromuscular deconditioning can be reduced through a QI initiative aimed at reducing deep sedation and implementing early physical and occupational therapy (PTOT) [2].

OBJECTIVES. Develop a new sedation protocol with a goal of using less benzodiazepine infusion and amount for sedation, decreasing oversedation, and increasing initial PTOT consultation with use of a new PTOT algorithm adopted from Johns Hopkins medical ICU [2,3,4].

METHODS. This is a prospective QI cohort of consecutive adults (age > 18 years) admitted to a quaternary academic CCU with cardio-respiratory failure requiring mechanical ventilation (MV) or non-invasive positive pressure ventilation (NIPPV). During a 3 month period (1/2014-3/2014), multi-pronged interventions targeting care processes were initiated including multidisciplinary education at the beginning of each month and weekly thereafter. The intervention also included creation of updated sedation and PTOT protocols, educational posters, daily checklists, super users, and periodic staff feedback on protocol adherence.

RESULTS. There were 58 patients who were on MV or NIPPV. We excluded 14 patients due to the following: comfort cares or died within 48 h from admission, transferred out of the CCU within 48 h for surgery or to the general floor, or deeply sedated and paralyzed for Hypothermia Protocol due to cardiac arrest. There was a decrease in the number of patients exposed to benzodiazepines during the interventional period (Pre-QI patients 85% (n = 45/53) vs post-QI 71% (n = 41/58), $p = 0.11$) and less continuous infusions were given. Prior to the QI initiative, PTOT was initially consulted on 34% (n = 18/53) of patients, compared to 53% (n = 31/58) of patients in the interventional period ($p = 0.055$). There was also an increase in the number of PTOT sessions in the CCU (pre-QI median of 0 [0,2] vs post-QI median of 2 [1,2] days, $p = 0.0003$).

CONCLUSION. By avoiding deep sedation and increasing compliance of updated goal-directed sedation through a QI initiative, early physical therapy can be safely initiated in patients with cardio-respiratory failure needing either MV or NIPPV.

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1048 ISOLATION MEASURES FOR PREVENTION OF NOSOCOMIAL INFECTIONS IN BURN PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

K. Raes¹, K. Blot¹, S. Labeau¹, S. Blot²

¹Ghent University, Ghent, Belgium, ²Ghent University Hospital, Ghent, Belgium

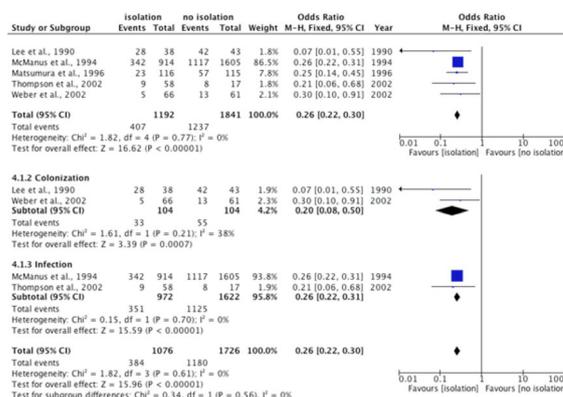
INTRODUCTION. Nosocomial infections remain a major issue among burn patients, associated with substantial morbidity and mortality. Therefore prevention of nosocomial colonization and infection through an infection control program, such as application of isolation measures, is important.

OBJECTIVES. To assess the impact of isolation measures on nosocomial colonisation and infection rates in burn units by means of a systematic review and meta-analysis.

METHODS. The MEDLINE database was systematically searched for before-after, interrupted time series, and randomised controlled trials researching the isolation measure in burn units. Random effects meta-analysis calculated odds ratios (OR) for pre- to post-intervention reduction of colonization and infection rates (number of affected patients per total number of admitted patients). The methodological quality of studies was assessed through the Downs and Black checklist. Heterogeneity and possible publication bias was assessed through funnel plots.

RESULTS. The systematic review revealed 44 studies of which 5 controlled before-after studies were eligible for inclusion in the meta-analysis. No randomized studies were identified by literature search. Meta-analysis of isolation interventions demonstrated an overall reduction in colonization and infection rates associated with implementation of isolation measures (OR 0.26 [95% confidence interval (CI) 0.22-0.30], $P < 0.0001$) (Figure). This reduction was comparable for prevention of colonization (OR 0.20 [95% CI 0.08-0.50], $P = 0.0007$) and infection rates (OR 0.26 [95% CI 0.22-0.30], $P < 0.0001$). While there was low statistical heterogeneity, clinical heterogeneity between the studies was substantial.

CONCLUSION. These results suggest that implementation of isolation measures contributes to a significant reduction of colonization and infection rates in burn patients. Nonetheless because of the lack of high quality studies, small number of studies and high clinical heterogeneity, these data should be interpreted with caution. A recommendation can be made to organize proper scientific research on isolation measures in burn units through high quality studies.



[Meta-analysis Forest plot with subgroup analysis]

1049**PATIENT FLOW MANAGEMENT IN AN INTENSIVE CARE UNIT: A PROCESS OF CONTINUOUS IMPROVEMENT**A. Mauro Azevedo¹, R. Baptista Martins Porfírio¹, E. Cristina Bergamasco¹, A. Capone Neto², B. Murata Murakami¹¹Faculdade de Enfermagem do Hospital Israelita Albert Einstein, São Paulo, Brazil, ²Hospital Israelita Albert Einstein, São Paulo, Brazil

INTRODUCTION. Management in the health area seeks solutions for a number of challenges, among which is to associate quality of patient care and cost reduction and control¹. There are many ways to achieve this goal and one of them is to enhance its productivity^{2,3}. Therefore, promoting agility in in-patient flow of an Intensive Care Unit (ICU) is an essential factor in obtaining the desired results. According to our institution's protocol, after a patient is discharged from the ICU and given a bed in the designated ward, transfer must be made within 60 min. However, several reasons can cause delay in this process. Considering the issue described above, interest arose to investigate the factors that interfere in the delay of patient transfer, identifying where there is possible room for improvement and consequently increasing productivity in the sector.

OBJECTIVES. To investigate the time spent on transferring a patient discharged from the ICU after obtaining a bed in the designated medical ward and to identify the reasons causing delay.

METHOD. A retrospective, descriptive, exploratory and quantitative study. Research was done in an adult ICU of 41 beds in a large, private, tertiary hospital, located in the city of São Paulo (Brazil). Records referring to patient discharge and transfers to the medical-surgical unit were analyzed between the months of Jun 2012 and Aug 2013.

An instrument created by the authors was used in order to collect the data, containing information on the time of patient discharge given by the management central and patient's real transfer time. When any delay was detected the reason for that occurrence was identified.

RESULTS. Data from 4788 patients were assessed. Any transfer that took more than 60 min was considered delayed.

In 68 % of cases (3274 patients) the target was met. However, in 32 % (1514 patients) transfer took more than an hour. Delay varied from 61 to 1194 min, with an average of 104 min.

In this study, the Nursing team was responsible for most delays (28.2 %; 427 cases) due to procedures that had to be done before transfer could be made. Motives concerning the patient himself were present in 371 transfers (24.5 %). Customer satisfaction and request fulfillment are part of the institution's mission. Therefore, when a patient asks for a hygienic procedure or food before transfer, his or her needs are seen to, causing delay in his transfer to the designed unit. On the basis of the data, more studies are needed in order to assess the financial impact these delays cause in the budget of ICUs.

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1050**CRITICAL CARE NURSES' KNOWLEDGE OF EVIDENCE-BASED PRACTICE ON THORACIC DRAINAGE: AN EVALUATION QUESTIONNAIRE**S. Demeulemeester¹, S. Labeau¹, S. Blot¹¹Ghent University, Ghent, Belgium

INTRODUCTION. Thoracic drainage is an important responsibility for ICU nurses. Knowledge of the related evidence-based recommendations is necessary to provide high-quality nursing care but a validated and reliable assessment tool is not available.

OBJECTIVES. To develop a reliable and valid evaluation tool for ICU nurses' knowledge of evidence-based practice on thoracic drainage.

METHODS. Fifteen nursing-related knowledge questions were identified from a review of evidence based practice on thoracic drainage. Multiple choice questions were subjected to a post hoc face and content validation by expert assessment. Based on the test results, an item analysis was performed on participants (n = 529) at the annual congress of the Flemish Society of Critical Care Nurses. (23 Nov. 2012).

RESULTS. The questionnaire contains the following items on thoracic drainage: the anatomy of the lung, indications of a chest drain (pneumothorax, hemothorax and tension pneumothorax), the thoracic drainage system (drainage collection chamber, water seal and suction control chamber), the tubing, the chest drain (placement, removing and suture of a thoracic drainage) and the complications (tension pneumothorax and occlusion of the tubing). Face and content validity was achieved for all of our 15 items. The content validity assessment revealed that preferably questions about positioning for placement of a chest tube and observation of breathing should be added. During the congress 529 questionnaires were collected (response rate 74.1 %). The item analysis revealed good results on difficulty, discriminative value and quality of response alternatives. Values for item difficulty ranged from 0.27 to 0.82 for 13 questions, while two questions had a value of > 0.90; discriminative values ranged from 0.10 to 0.70 and values for the quality of the response alternatives between 0.00 and 0.44.

CONCLUSIONS. The questionnaire is reliable and has face and content validity but not the entire content was included. Therefore two additional items were added to the existing questionnaire. This questionnaire can be used to identify educational needs about thoracic drainage.

1051**DEMAND FOR NURSING CARE IN THE INTENSIVE CARE UNIT**G. Moraes de Oliveira¹, E. Ribeiro dos Santos¹, B. Murata Murakami¹¹Faculdade de Enfermagem do Hospital Israelita Albert Einstein, São Paulo, Brazil

INTRODUCTION. The *Nursing Activities Score* (NAS) is an indicator used to measure Nursing workload in Intensive Care Units (ICU) through 23 items. Each item receives a score ranging from 1.2 to 32.0. The total score represents the sum of those values, in percentages, reaching up to 176.8 %. Each point represents 14.4 min of care¹.

In this study, we assessed the demand for Nursing care for patients with cardiovascular diseases, because it is known that the incidence of those conditions has increased, thereby a

greater number of hospitalizations is expected. In the ICU, those patients will require specialized care and team members should be well prepared to care for them with quality^{2,3}.

OBJECTIVE. To assess the demand for Nursing care through application of the NAS in the ICU.

METHOD. This is a cross-sectional descriptive exploratory field study with quantitative correlational data analysis. The research was performed in a 41-bed adult ICU in a tertiary, extra-sized private hospital located in São Paulo (Brazil). The non-probability sample included medical charts of patients admitted between 01 and 31 July 2013 with cardiovascular diseases. For data collection, an instrument consisting of two parts was used: Sample characterization and NAS items. The data collection instrument was daily applied by using data from patients charts regarding the 24 h before.

RESULTS. 28 medical charts were assessed. The population was mostly male (16, 57.14 %), between 60 and 80 years old (16, 57.14 %), with a diagnosis of cardiopulmonary arrest (5, 17.90 %). The mean hospital stay was 7.6 days. In the first 24 h in the ICU, NAS ranged between 81.50 % and 131.20 %. The discharge score ranged from 79.70 % to 107.50 %. The score reduced or stabilized during the period, except for four cases. Thereby, the mean demand for care for the sample was 97.26 % with a standard deviation of 10.03. The highest scores were related to patients with a diagnosis of cardiopulmonary arrest and longer ICU stay.

The sub-items most frequently scored were those related to monitoring and titration, laboratory examinations, medications, hygiene procedures, mobilization and positioning, support and care of relatives and patient, and administrative and managerial tasks.

CONCLUSION. 28 ICU patients with cardiovascular diseases were assessed. The average demand for care according to NAS score was 97.26 %, characterizing high dependency for Nursing care.

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1052**CRITICAL CARE NURSES' KNOWLEDGE OF EVIDENCE-BASED PRACTICE ON THORACIC DRAINAGE**S. Demeulemeester¹, S. Labeau¹, S. Blot¹¹Ghent University, Ghent, Belgium

INTRODUCTION. Thoracic drainage is an important responsibility for ICU nurses. Knowledge of evidence-based recommendations is necessary to provide high-quality nursing care.

OBJECTIVES. To evaluate ICU nurses' knowledge on thoracic drainage to identify the specific educational needs.

METHODS. We used a reliable and valid knowledge test based on 15 multiple-choice questions on thoracic drainage. Additional demographics included gender, ICU experience, number of ICU beds, and whether respondents held a bachelor-after-bachelor ICU qualification. The survey was distributed during the annual congress of the Flemish Society for Critical Care Nurses (23 Nov. 2012).

RESULTS. During the congress 529 questionnaires were collected (response rate 74.1 %). The Median score on the knowledge test was 67 % (IQR 53-73 %). Respondents with an additional ICU qualification and hospitals with more ICU beds have better score's on the test. More than 80 % of respondent have good knowledge about function and risk of the water seal. 82 % of the respondents know the use of a purse-string suture with thoracic drainage. More than 60 % of respondents know that, in case of pneumothorax, placement of the drain is apical anterior, but only 39 % know that for hemothorax the placement is basal anterior. Only 22 % of respondents know that in ventilated patients chest tubes must be removed during inspiratory phase while 65 % know to remove tubes during expiration of non-ventilated patients. 27 % of respondents know that pressure in the drainage collection chamber is the same as the intrapleural pressure. Only 45 % of respondents know that in case of occlusion, the tube has to be removed. In this regard, 40 % thinks they can milk or strip the tube while this is contra-indicated. We can conclude that there's a good knowledge on water seal and suture of thoracic drainage (> 80 % correct answer).

CONCLUSIONS. Educational opportunities exist regarding pressure in the drainage collection chamber and how to deal with tube occlusion.

1053**RISK FACTORS FOR NEONATAL HEALTHCARE-ASSOCIATED BLOODSTREAM INFECTIONS IN A NEONATAL INTENSIVE CARE UNIT**E.H. Verstraete¹, K. De Coen², D. Vogelaers¹, P. Vanhaesebrouck², S. Blot¹¹Ghent University, Internal Medicine, Ghent, Belgium, ²Ghent University Hospital, Ghent University, Neonatal Medicine, Ghent, Belgium

INTRODUCTION. Healthcare-associated bloodstream infection (HABSI) is a frequent complication in neonatal intensive care units (NICUs).

OBJECTIVES. To describe risk factors for neonatal HABSI.

METHODS. A hospital-based surveillance-program and a NIC audit system were used to identify neonatal HABSI-cases (2002-2011). HABSI is defined according to National Institute Child Health Development criteria. Neonates with a NICU stay < 3 days were excluded. Only the first episode of HABSI is considered. Severity of illness is assessed with the Clinical Risk Index for Babies (CRIB) score. Risk factors for HABSI were assessed by univariate analysis and multiple logistic regression. Gastrointestinal disease is defined as necrotizing enterocolitis and/or gastrointestinal perforation.

RESULTS. A total of 342 neonates developed HABSI in 5134 admissions (6.7 %). Factors associated with HABSI in univariate analysis are in Table 1. Logistic regression analysis revealed that independent risk factors for HABSI are: TPN (odds ratio [OR] 8.1, 95 % confidence interval [CI] 4.0-16.5), very-low-birth-weight (VLBW) (OR 3.2, 95 % CI 2.5-4.1), gastrointestinal disease (OR 2.5, 95 % CI 1.5-4.2), and surgery (OR 3.2, 95 % CI 2.5-4.2). Sub-analysis with TPN divided in short term (< 14 days) or long term administration (≥ 14 days), revealed a 5-fold-increased OR for TPN long term administration.

CONCLUSIONS. In this study HABSI was associated with VLBW, TPN, gastrointestinal diseases, and surgery. Limiting the duration of TPN remains a key point in the prevention of HABSI.

VARIABLE	HABSI (n=342)	No HABSI (n=4792)	P-value
Birth weight, gram	1732.5 (1100-2840)	2470 (1770-3235)	<0.001
≤1500 gram, n (%)	149 (43.6)	824 (17.2)	<0.001
CRIB	2 (0-4)	0 (0-1)	<0.001
CRIB ≥5, n (%)	70 (20.5)	402 (8.4)	<0.001
Days before HABSI	12.5 (7-21.5)		
Gastrointestinal disease, n (%)	23 (6.7)	55 (1.1)	<0.001
Gender, male, n (%)	196 (57.3)	2802 (58.5)	0.673
Gestational age, weeks	32.5 (28-37.3)	36 (32-39)	<0.001
≤31 weeks, n (%)	149 (43.6)	933 (19.5)	<0.001
NICU stay, days	41 (21-75)	13 (7-23)	<0.001
Mechanical ventilation, n (%)	223 (65.2)	1723 (36)	<0.001
Mechanical ventilation days	9 (4-17)	4 (2-7)	<0.001
Mortality, n (%)	36 (10.5)	252 (5.3)	<0.001
Parenteral nutrition, n (%)	332 (97.1)	3529 (73.6)	<0.001
Parenteral nutrition days	20 (12-32)	6 (0-12)	<0.001
Surgery, n (%)	126 (36.8)	702 (14.6)	<0.001

Continuous variables are reported as median (Q1-Q3)

[Table 1. Univariate risk factors for HABSI]

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Paediatric intensive care: 1054–1066

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FLUID MANAGEMENT AND CEREBRAL EDEMA IN CHILDREN WITH DIABETIC KETOACIDOSIS

D.S. Hsia¹, S.G. Tarai², A. Alimi³, J.A. Coss-Bu³, M.W. Haymond^{1,4}

¹Division of Pediatric Diabetes and Endocrinology, Baylor College of Medicine, Texas Children's Hospital, Pediatrics, Houston, United States, ²Baylor College of Medicine, Medical School, Houston, United States, ³Division of Pediatric Critical Care, Baylor College of Medicine, Texas Children's Hospital, Pediatrics, Houston, United States, ⁴Children's Nutrition Research Center, U.S. Department of Agriculture/Agricultural Research Service, Baylor College of Medicine, Pediatrics, Houston, United States

INTRODUCTION. Cerebral edema (CE) is the leading cause of mortality and morbidity in children and adolescents with diabetic ketoacidosis (DKA). In 2004, the ESPE, LWPE, and ISPAD endorsed recommendations for type and amount of fluid hydration for DKA patients aimed at reducing CE. We modified the type of IV hydration from 1/2 normal saline (77 mEq/L) to Lactated Ringer's (130 mEq/L), and decreased the total fluid volume to be administered in the first 24 h from 3500 mL·m⁻²·day⁻¹ to ≤ 2500 mL·m⁻²·day⁻¹

OBJECTIVES. To compare the incidence of CE and its morbidity/mortality among DKA patients before and after the implementation of a restrictive IV hydration protocol of 2500 mL·m⁻²·day⁻¹ with lactated Ringer's at Texas Children's Hospital.

METHODS. We identified patient records using ICD-9 codes for DKA, poorly controlled diabetes, or CE from 8/1/98 to 7/31/04 (Before) and from 8/1/04 to 8/1/10 (After). We reviewed charts to validate DKA diagnosis (glucose ≥ 200 mg/dl and HCO₃ ≤ 15 mEq/L or pH ≤ 7.3) and determine incidence of suspected CE based on clinical and radiographic evidence (i.e., altered mental status, GCS ≤ 8, or head CT). The severity of DKA was graded based on pH and bicarbonate concentration.

RESULTS. We identified 1,868 patient records. There were no differences in demographics of patients before and after the implementation. The incidence of suspected CE was 9.6 % (before) vs. 8.3 % (after). The cases who presented initially to an outside hospital (OSH) were more likely to be graded severe DKA (Odds Ratio (OR): 2.02; 95 % CI:1.62-2.52, p < 0.0001), more acidotic (OR: 2.17; 95 % CI:1.67-2.81, p < 0.0001), increased azotemia (OR:4.64;95 % CI:3.78-5.69, p < 0.0001), and develop CE (OR: 2.80;95 % CI:2.00-3.91, p < 0.0001). Overall, 13.1 % of cases from an OSH had suspected CE vs. 7.0 % of cases managed at TCH (p < 0.001) and 13.9 % vs 4.6 % (p < 0.05) before and after, respectively.

Group characteristics	Before N = 604	After N = 1264
Age (yr.)	11.4 ± 0.2	11.9 ± 0.1
% Males/females	42/58	45/55
Length of stay (days)	3.5 ± 0.2	3.5 ± 0.1
% Transfers from OSH (n)	43 % (260)	40 % (506)
Suspected CE cases	Before N = 58	After N = 105
% New onset	53 %	50 %
Total fluids in 24 h (ml/kg/day)	3125 ± 113	2736 ± 65*
Adverse outcomes as % total DKA	0.50	0.24
Adverse outcomes as % of suspected CE	5.2	2.9

[Patients Demographics and Cerebral Edema]

Mean ± SE; Adverse outcome defined as neurologic impairment or death; * p < 0.005 by t-test

CONCLUSIONS. Decreasing the rate of fluid administration during the initial 24 h to 2500 mL·m⁻²·day⁻¹ and increasing the sodium content of IV fluids did not significantly decrease the incidence of adverse outcomes in children with DKA. The patients who initially presented to an outside hospital had a more severe DKA condition.

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1055

EFFECT OF NEONATAL INTENSIVE CARE ON IMPROVEMENT OF MORTALITY AND MORBIDITY OF VERY LOW BIRTH WEIGHT INFANTS

T. Sung¹, J.W. Lee¹, Y.J. Lee¹, Y.J. Oh¹, K.H. Lee¹

¹Hallym University Medical Center, Seoul, Republic of Korea

INTRODUCTION. With recent great improvement in neonatal intensive care system, the survival rate of very low birth weight infants (VLBWI) and early preterm infants had increased tremendously in Korea as well as worldwide.

OBJECTIVES. In this study we observed changes in the outcome of VLBWI who admitted to the neonatal intensive care unit of Hallym University Kangnam Sacred Hospital in the last 8 years.

METHODS. We performed a retrospective review of 419 VLBWI who were born from 1st January 2004 to 31st December 2012. We compared the outcomes including survival rate, birth weight(BW), gestational age(GW), morbidities, and mortality between period I(2004-2009) and period II(2010-2012).

RESULTS. Overall incidence of VLBWI was 2.6 % and it was significantly higher in period II(3.7 %). Mean BW and GW were significantly decreased in period II(P < 0.00, P < 0.01). Duration of ventilator use and total oxygen treatment were not different (P > 0.05). The incidence of cervical incompetence and antenatal steroid therapy, premature rupture of membrane were higher in period II. The survival rate increased from period I (72.1 %) to period II (88.2 %). BW-specific survival rate increased in 5,00-1,000 gm and GA-specific survival rate significantly increased in 24-27 weeks. The incidences of respiratory distress syndrome(RDS), retinopathy of prematurity(ROP), sepsis, bronchopulmonary dysplasia(BPD), intraventricular hemorrhage, periventricular leukomalacia, and necrotizing enterocolitis were same except patent ductus arteriosus. The most common cause of death in VLBWI was RDS and then pulmonary hemorrhage and sepsis. The time of death was mostly less than 7 days after birth.

CONCLUSIONS. The survival rate of VLBWI was increased in period II, especially in less than 1,000 gm and below 27 weeks. This may be due to recent dramatic improvement of neonatal care. But more efforts are needed to improve outcome during initial phase and to reduce long term complication such as BPD and ROP.

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EFFICACY OF AN IGM PREPARATION IN THE TREATMENT OF PATIENTS WITH SEPSIS: A DOUBLE-BLIND RANDOMIZED CLINICAL TRIAL IN A PEDIATRIC INTENSIVE CARE UNIT

E. Kola¹, E. Celaj¹, I. Bakalli¹, R. Lluka¹, D. Sala¹, S. Sallabanda¹

¹UHC "Mother Theresa", Tirana, Albania

AIM. Additional treatments for sepsis to be administered alongside the standard therapy recommended by the Surviving Sepsis Campaign have recently undergone evaluation. Due to its anti-bacterial, anti-inflammatory and immunomodulatory properties, intravenous polyvalent immunoglobulin M (IgM)-enriched immunoglobulins (IgM preparation) has been investigated as one of these potentially valid adjunctive therapies. The aim of this trial was to assess the efficacy of an IgM preparation as adjuvant therapy in the treatment of pediatric patients with sepsis.

METHODS. In our study, 78 septic patients admitted to a pediatric intensive care unit (PICU) at the University Hospital Center "Mother Teresa" in Tirana, Albania, were randomized into two groups (intervention and control). All patients were treated according to standard PICU sepsis guidelines. Additionally, patients in the intervention group received the IgM preparation Pentaglobin[®] while patients in the control group received standard sepsis therapy, but no immunoglobulin administration.

RESULTS. The survival rate was higher in the intervention group (87 %, N = 34) than in the control group (64 %, N = 25), and this difference was statistically significant (P = 0.03). Length of stay (LOS) was also significantly shorter in the intervention group. **CONCLUSION**. In this study conducted in Albania, use of an IgM preparation, in addition to standard sepsis therapy, led to a significant increase in the survival rate as well as a significant reduction in LOS compared with placebo, when administered in PICU patients with sepsis.

KEYWORDS. bacterial infections, IgM preparation, immunoglobulin, immunotherapy, Pentaglobin[®], sepsis.

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CD64 INDEX ON NEUTROPHILS VS. CRP, PROCALCITONIN, HEMOSCORE, AS A SEPSIS DIAGNOSTIC MARKERS IN INFANTS AFTER CORRECTION OF CONGENITAL HEART DISEASE WITH CARDIOPULMONARY BYPASS

A.A. Krivoschapkina¹, A.I. Subbotovskaya², O.V. Strunin¹, A.N. Shilova², A.A. Efimov¹, I.A. Kornilov², V.S. Kozireva²

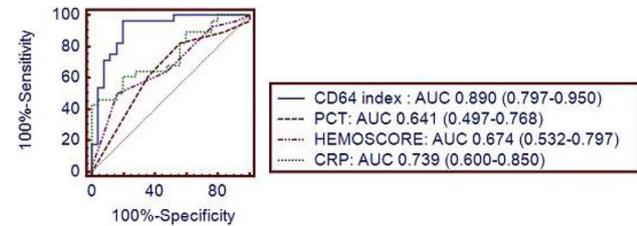
¹Novosibirsk State Research Institute of Circulation Pathology, ICU, Novosibirsk, Russian Federation, ²Novosibirsk State Research Institute of Circulation Pathology, Biochemical Laboratory, Novosibirsk, Russian Federation, ³Novosibirsk State Research Institute of Circulation Pathology, Department of Anesthesiology, Perfusion and Extracorporeal Life Support, Novosibirsk, Russian Federation

INTRODUCTION. Despite the improved development in the understanding and treatment of sepsis, it remains a common cause of morbidity and mortality in neonatal and pediatric intensive care units (ICUs)(1). Signs and symptoms of sepsis are difficult to distinguish from those of other clinical conditions causing systemic inflammatory response syndrome (SIRS), particularly in infants after cardiac surgery with cardiopulmonary bypass (CPB), which commonly can cause SIRS by itself (2). Many studies showed a limited use of procalcitonin (PCT) and C-reactive protein (CRP) as sepsis markers in infants after CPB(3).

OBJECTIVE. To investigate the possibility of use of CD64 index on neutrophils as an early marker of sepsis in infants after cardiac surgery with cardiopulmonary bypass and to compare its diagnostic and prognostic value to those of other routinely used markers.

MATERIALS. The study included 86 infants after cardiac surgery with cardiopulmonary bypass with a strong suspect of infection and probability of sepsis realisation in postoperative period. At the moment of suspicion, the CD64 index on neutrophils, PCT, CRP were determined in whole EDTA-stabilized blood. HEMOSCORE also were calculated. The patients were retrospectively allocated into 2 groups - those who developed sepsis (group 1) n = 42, and those who did not (group 2) n = 44. Data were analysed with Mann-Whitney or Chi squared tests as appropriate. ROC-analysis was used to assess markers' predictive ability. A p-value less than 0.05 was considered statistically significant. Continuous data are median (25-75 percentile).

RESULTS. The CD-64-index in the groups 1 and 2 were 2.12 (1.85 - 2.44) and, 1.40 (1.10 - 1.62), respectively P < 0.0001. The area under the curve for CD64 index was 0.890 and, at the cut-off point 1.9 had a sensitivity 76 % and specificity 88 %, positive predictive value (PPV) 86 %, negative predictive value (NPV) 79 %. CRP and HEMOSCORE also didn't show diagnostic and prognostic values comparable to CD64 index (Figure 1).



[ROC curves comparing CD64index, PCT,CRP,HEMOSCORE]

The sensitivity and the specificity of PCT at the point > 2 mmol/l were 58 % and 59 % respectively, with a PPV 58 % and NPV 59 %.

CONCLUSION. CD 64 index on neutrophils is a new good early diagnostic marker of sepsis as compared to PCT and CRP and HEMOSCORE scale for infants after cardiac surgery.

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1058 IS RED BLOOD CELL DISTRIBUTION WIDTH A USEFUL OUTCOME PREDICTOR IN CRITICALLY ILL PEDIATRIC PATIENTS?

M.-Y. Oh¹, E.J. Ha¹, S.J. Park¹, W.K. Jhang¹

¹Asan Medical Center, University of Ulsan College of Medicine, Seoul, Republic of Korea
INTRODUCTION. Recently, red blood cell distribution width (RDW) has been reported to be associated with inflammatory markers, bloodstream infection, risk of cardiovascular event, congestive heart failure, all-cause hospital mortality and long term outcome in adult patients. However, the exact mechanisms underlying these associations remain unclear and it was not thoroughly studied in pediatric patients.

OBJECTIVES. To evaluate whether RDW is associated with inflammatory markers, heart failure or clinical outcome in critically ill pediatric patients.

METHODS. We retrospectively reviewed medical records of 216 consecutive pediatric patients admitted to pediatric intensive care unit (PICU) between January 2013 and December 2013. We analyzed results of RDW, hemoglobin, lactic acid, plasma B-type natriuretic peptide(BNP), C-reactive protein(CRP), pediatric risk of mortality (PRISM) III, modified sequential organ failure assessment (mSOFA) score and pediatric multiorgan dysfunction score(pMODS).

RESULTS. There were 105 boys and 111 girls. Mean age and body weight at PICU admission were 5.1 ± 7.0 years and 18.7 ± 20.9 kg, respectively. Mean duration of PICU stay was 21.1 ± 41.2 days. PICU mortality was 10.1 % (22/216). Mean RDW at PICU admission were 15.35 ± 2.5 %. RDW showed statistically significant positive correlations with BNP, PRISMIII, mSOFA (p < 0.0001) and pMODS (p < 0.004). In patients with cardiac disease, RDW was higher than that of other patients (15.95 ± 2.14 vs. 15.11 ± 2.59, p = 0.026). However, it failed to show any association to CRP or PICU mortality. In comparison of the predictive power for the PICU mortality, PRISM III showed the largest area under receiver operating characteristic curve(0.841).

CONCLUSIONS. RDW was higher in patients with cardiac disease. It well correlated with BNP, PRISMIII, mSOFA and pMODS. However, it was not associated with CRP or PICU mortality. Further large scaled study including detailed cardiac evaluation is required.

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1059 EVALUATION OF THE EFFECTIVENESS OF A MULTIPLE INTERVENTION AIMING TO IMPROVE EARLY EMPIRICAL ANTIBIOTIC TREATMENT FOR SEVERE SEPSIS IN CHILDREN. ABISS-EDUSEPSIS PEDIATRIC STUDY

E. Esteban¹, M. Iglesias², V. Bonil³, P. García⁴, J.C. De Carlos⁵, M. Pino⁶, V. Murga⁷, F. Gómez⁸, J.D. López⁹, J. Flores¹⁰, R. Ferrer¹¹, ABISS-Edusepsis Pediatric Study Group

¹Hospital Sant Joan de Déu, Pediatric Intensive Care Unit, Esplugues de Llobregat, Spain, ²Hospital Infantil de Tamaulipas Universitari Niño Jesús, Masrill, Spain, ³Hospital de Sabadell. Corporació Sanitària Universitària Parc Tauli, Sabadell, Spain, ⁴Hospital Regional Universitario de Málaga-Carlos Haya, Málaga, Spain, ⁵Hospital Son Espases, Mallorca, Spain, ⁶Hospital Clínico Universitario de Valladolid, Valladolid, Spain, ⁷Hospital Universitario de Salamanca, Salamanca, Spain, ⁸Complejo Asistencial Universitario de Burgos, Burgos, Spain, ⁹Hospital Infantil Virgen del Rocío, Sevilla, Spain, ¹⁰Hospital Puerta del Mar, Cádiz, Spain, ¹¹Hospital Mutua de Terrasa, Terrasa, Spain

INTRODUCTION. Sepsis remains a major cause of morbidity and mortality among children

Objectives: To evaluate the impact on mortality of a multiple intervention to translate knowledge about empirical antibiotic treatment for severe sepsis into clinical practice

METHODS. Prospective, multicenter study using a before-and-after design to evaluate a multiple intervention to translate knowledge into clinical practice conducted in 34 Spanish Pediatric Critical Care Units. Patients: children admitted with severe sepsis and septic shock in the pre-intervention period (November-2011 to May-2012) and in the post-intervention period (November-2012 to May-2013). Educational intervention (workshops and meetings, posters, triptychs, mailing and on-line training simulation, www.edusepsis.org/en/training.html) from September to November-2012 (1200 physicians and nurses participated). Statistical analysis: X² test to compare categorical variables and t-student or U Mann-Whitney tests to compare continuous variables. SPSS17[®].

RESULTS. We collected 223 patients in the pre-intervention and 203 in the post-intervention period. To analyze the treatments administered we excluded 25 and 33 patients respectively referred from other hospitals. No differences were found between the pre-intervention and the post-intervention periods respect to gender (59.5 % males vs 52 %), age (median 15.73 months, P₂₅₋₇₅ 2.19-45.2 vs 8.5 months P₂₅₋₇₅ 1.93-51.75), PRISM III score (median 9 P₂₅₋₇₅ 5-14 vs 9 P₂₅₋₇₅ 5-13), presence of septic shock (52.5 % vs 57 %), underlying diseases (41.4 % vs 47 %), medical pathology at admission (83 % vs 86.4 %), community origin (62.6 % vs 64.1 %) or need for mechanical ventilation (55 % vs 54.7 %). Statistically significant differences were found with respect to time from the diagnoses of sepsis to antibiotic administration from the pre-intervention to the post-intervention period (median 60 min P₂₅₋₇₅ 21.25-134.25 vs median 30 min P₂₅₋₇₅ 15-60, p < 0.001), lactate test performed (75.2 % vs 87 %, p 0.003), blood culture before antibiotic administration (74.2 % vs 84.1 %, p 0.021) and the administration of antibiotics in the first 3 h (community sepsis) and in 1 h (nosocomial) (74.24 % vs 95.8 %, p < 0.001). No differences were found between the recommendation of fluids administration (88.7 % vs 92.9 %), SvO2 test (47.9 % vs 52.35 % or measure of CVP (51 % vs 51.7 %). Overall mortality decreased from 15.45 % to 12.9 %, p 0.456; in patients with septic shock decreased from 26.9 % to 20.8 % p 0.314, and in patients without underlying diseases was reduced from 8.6 % to 4.4 % p 0.277.

CONCLUSIONS. The intervention was effective respect to decrease the time to antibiotic, the lactate test and the extraction of blood cultures before antibiotics. Although mortality decreased by half in previously healthy children and the overall mortality was reduced, we didn't found statistically significant differences.

1060 CONSENT FOR PAEDIATRIC CENTRAL VENOUS CATHETER (CVC) INSERTION IN A TERTIARY SPECIALIST PAEDIATRIC HOSPITAL

R.P. Measuria¹, N. Jain¹, C. Moores¹

¹Alder Hey Children's Hospital, Anaesthetics, Liverpool, United Kingdom

INTRODUCTION. CVCs may be required for therapeutic, diagnostic or monitoring purposes. Their use is associated with several potentially major complications that may occur on or after insertion. In line with national guidance on consenting, it is the duty of care of the anaesthetist performing a CVC procedure to discuss these risks with the patient (or guardian in paediatric practice) to ensure valid informed consent. Minimal data exists on standardised consenting for CVC insertion.

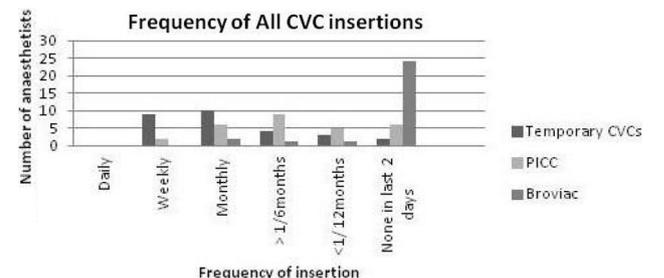
OBJECTIVES. To survey the current consent procedure by anaesthetists when planning insertion of CVCs (temporary CVCs, tunnelled 'Broviac' and peripheral invasive central catheters 'PICC lines') in Alder Hey Children's Hospital (AHCH).

METHODS. A survey was conducted to audit (using a standard of at least 90 %) whether anaesthetists consent utilising adequate quantity and quality of information for their insertion of CVCs, based on GMC and AAGBI guidelines [1, 2, 3].

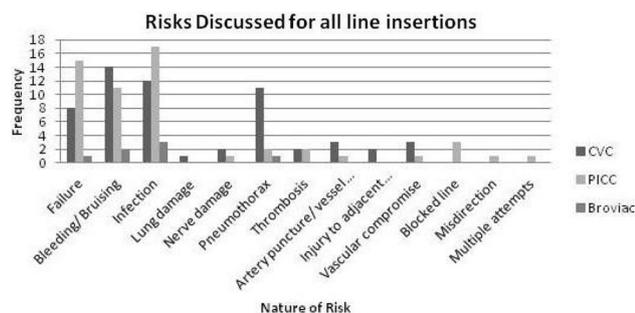
RESULTS. Twenty-eight anaesthetists of 44 anaesthetists (63.6 %) were surveyed - 19 consultants and nine speciality trainees. 66.67 % discussed risks of temporary CVC insertion with patients/guardians. Of the 66.67 %, only 5.2 % quoted statistical figures of risk and 21 % gave a qualitative incidence (i.e. 'rare' or 'common').

The same cohort inserted fewer PICC lines and even fewer tunnelled 'Broviac' lines (14.29 %). 64.29 % discussed the same risks for PICC line insertions, but only 5.56 % gave incidence values ('risk of infection < 5/1000 days'). 75 % of those that performed Broviac lines discussed risks and also gained written consent for the procedure. None of the anaesthetists had gained written consent for the other procedures.

Verbal consent as documented on the anaesthetic chart by 81.5 % of all the anaesthetists. The most commonly discussed risks for all procedures were bleeding and infection followed by pneumothorax and failure to site the line.



[Frequency of all CVC insertions]



[Risks discussed for all line insertions]

CONCLUSIONS. Obtaining consent is variable in our department with no consistency in discussing risks for CVC insertion in children. The majority of anaesthetists are not gaining fully informed consent for CVC insertion as they are not providing complete details of complications or statistical data to support their discussion.

Patients or guardians should be made aware of the potential risks of such procedures to validate consent; therefore anaesthetists need to be educated on the importance of informed consent and a standardised procedure should be developed. We will re-audit following these proposed changes in 12 months.

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1061 PROLONGED MECHANICAL VENTILATION (PMV) IN PAEDIATRIC INTENSIVE CARE UNIT

A. Pavalascu¹, S. Pérez Quesada¹, C. Zazo Sanchidrian¹, R. Reig Saenz¹

¹Alicante University General Hospital, ICU, Alicante, Spain

INTRODUCTION. The requirement for a period of mechanical ventilation usually mandates admission to an ICU. Most patients require short periods of respiratory support, but a minority require prolonged mechanical ventilation (PMV).

OBJECTIVES. To determine the characteristics and risk factors of paediatric patients who required PMV, defined as ventilatory support for more than 21 days.

METHODS. A retrospective, descriptive study of patients admitted to a paediatric 5 bed ICU at the Alicante University General Hospital for 10 years (2003-2012). Patients' age spans from 1 month to 16 years that have required invasive mechanical ventilation for more than 21 days. Clinical status at admission, reason for needing PMV, complications and the situation at discharge were recorded. The categorical variables were expressed as absolute values and percentages and quantitative variables as mean and standard deviations.

RESULTS. A total of 28 patients (64 % males), which accounts for 1.6 % of the patients admitted to the unit during this period were studied. The average age was 8 ± 7.8 years. The most common previous diagnosis was neurological/neuromuscular pathology (10 patients, 36 %), followed by healthy children (9 patients, 32 %). The PRISM at admission was 15.6 ± 7 points. The most frequent pathology that motivates ICU admission and the need for prolonged MV in our series of patients was respiratory (64 %, $p < 0.005$). 12 patients (43 %) were extubated due to clinical improvement, the average period from the intubation being 41 ± 26 days. The most common complication related to the PMV was Ventilator Associated Pneumonia (VAP): 22 patients (79 %). Of the potential risk factors associated with PVM registered (corticosteroids, muscle relaxants and vasoactive amines), the most common was the use of muscle relaxants and/or corticosteroids: 20 patients (70 %). The average ICU stay was of 47 ± 27 days. 13 patients were discharged home (46 %), of which 5 patients required home MV. 6 patients were discharged to another hospital (21 %) and 9 patients were exitus (33 %).

CONCLUSIONS. The most frequent pathology that required PMV was respiratory, followed by neuromuscular disease. The associated risk factors were the use of muscle relaxants and/or corticosteroids. The complication rate was high, being the most frequent VAP. Around half of the patients were extubated due to clinical improvement.

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1062 INDICATIONS AND COMPLICATIONS OF TRACHEOSTOMY IN PAEDIATRIC INTENSIVE CARE UNIT

A. Pavalascu¹, C. Zazo Sanchidrian¹, S. Pérez Quesada¹, R. Reig Saenz¹

¹Alicante University General Hospital, ICU, Alicante, Spain

INTRODUCTION. The frequency of tracheostomy in children has been rising in recent years with increasing of chronic underlying diseases which need prolonged mechanical ventilation (MV).

OBJECTIVES. To determine the characteristics of paediatric patients who required tracheostomy, its indications and complications.

METHODS. A retrospective, descriptive study for 6 years (2008-2013) of patients admitted to a paediatric 5 bed ICU at the Alicante University General Hospital. The patients included were those aged under 14 years who required tracheostomy. Clinical status at admission, reason for needing a tracheostomy, postoperative complications and the situation at discharge were recorded. The categorical variables were expressed as absolute values and percentages and quantitative variables as mean and standard deviations.

RESULTS. A total of 20 patients (80 % males), which accounts for 2.7 % of admitted to the unit during this period were studied. The average age was 6.25 ± 5.75 years. The most frequent previous diagnosis was cerebral palsy and neuromuscular disease (60 %), followed by malformation syndromes, metabolic diseases and prematurity. The PRISM at admission

was 12.89 ± 7.6 points. Emergency tracheostomy for acute airway obstruction was performed in 10 % of patients and elective in 90 % of patients. The most frequent indication was the prediction of the need for home MV (80 %). The average intubation period until the performing of the tracheostomy was 18 ± 12 days. Early complications (< 1 week) were recorded in 4 patients (20 %), the most frequent being pneumothorax in 2 cases, and delayed complications in 2 patients (10 %). The average hospital stay was 65.4 ± 46.7 days. 10 patients were discharged home (50 %), of which 5 patients were decannulated at discharge. The average period from the tracheostomy until decannulation was 20.5 ± 12.3 days. 7 patients were discharged to another hospital (35 %), and 3 patients were exitus (15 %).

CONCLUSIONS. The most frequent indication was the prediction of the need for home MV. The most frequent previous diagnosis was cerebral palsy and neuromuscular disease. The average intubation period until the performing of the tracheostomy was short. Early and later complications of tracheostomy occurred in a third of the patients, the most common being the pneumothorax. Our patients had high hospital stays, but most of them were discharged from hospital.

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1063 PREVALENCE AND CHARACTERISTICS OF CHILDREN WITH COMPLEX CHRONIC CONDITIONS IN A PICU

E. Vasilaki¹, E. Geromarkaki¹, S. Ili¹, A.M. Spanaki¹, D.M. Fitrolaki¹, T. Tavladaki¹, E. Blevrakis¹, G. Briassoulis¹

¹University Hospital of Heraklion, PICU, Heraklion, Greece

INTRODUCTION. Growing numbers of children with childhood-onset chronic illnesses are surviving to adulthood. Children with complex chronic conditions (CC) or malignancies (M) have considerable, on-going care needs, more so than children with acute conditions (AC) and may be increasingly represented among patients admitted to pediatric intensive care units (PICU).

OBJECTIVES. To examine the prevalence and characteristics of CC patients admitted to a single PICU and to assess whether they experience increased mortality and resource utilization measured by length of stay (LOS) and length of mechanical ventilation (LOMV).

METHODS. We evaluated consecutive admissions to a 7-bed university pediatric intensive care unit (PICU) over a 10-year period (2004-2014).

RESULTS. Among 1044 admissions, 37.2 % had complex chronic conditions, 7.7 % malignancy and 55.2 % acute illness. Longitudinally, the prevalence of CC varied between 28.3 % and 48.6 %, $p < 0.0001$. Patients with AC, M or CC differed in age (5 ± 0.2 vs. 5.9 ± 0.6 , vs. 6.6 ± 0.3 years, $p < 0.0001$), nursing workload (230 ± 6 vs. 208 ± 15 , vs. 207 ± 6 , $p < 0.03$), and LOMV (3.4 ± 0.05 vs. 3 ± 1 , vs. 3.5 ± 0.6 days, $p < 0.05$). Diagnostic categories also differed between acute and complex chronic conditions ($p < 0.0001$). Patients with CC had higher tracheostomy rates (20 % vs. 1.9 % AC vs. 1.3 % M, $p < 0.0001$) and positive admission blood cultures (CC 2.6 % vs. 1.7 % AC, $p < 0.0001$). PRISM, PELOD, TISS, LOS or mortality (AC 3.1 %, M 6.1 %, CC 4.8 %) did not differ among groups.

CONCLUSIONS. Children with CC were older and at greater risk for tracheostomy and prolonged LOMV. Since the prevalence of chronic conditions including malignancy approximates 45 %, attention must be paid to the rehabilitation care needs of patients during their PICU stay and after discharge.

1064 MORTALITY OF PAEDIATRIC PATIENTS WITH NEUROLOGICAL COMPLICATIONS ADMITTED TO A NEUROSURGICAL ICU (NICU)

P. Volpi¹, M.G. Abate², F. Sala², E. Colombo², M. Saini², D. Savo², P. Gilardi², A. Biondi³, G. Citerio²

¹Università degli Studi di Milano Bicocca, Dipartimento di Scienze della Salute, Monza, Italy, ²Neuroanestesia e Neuroanimazione, Ospedale San Gerardo Monza, Dipartimento di Anestesia e Rianimazione, Monza, Italy, ³Fondazione MBBM, Ospedale San Gerardo Monza/Università di Milano-Bicocca, Dipartimento di Pediatria e Centro Ricerca Tetamanti, Monza, Italy

INTRODUCTION. In the last years, an increasing number of paediatric patients with primary CNS disorder or with neurological complication in haematological malignancies have been admitted to our NICU. Even if long term survival of paediatric patients with oncological and haematological disorders increased¹, ICU clinicians are often reluctant to admit to the NICU patients with these pathologies. Nevertheless, children with neurological complications following oncological disorders requiring ICU admission have not been extensively studied² and clear data on outcome in this subgroup are lacking.

OBJECTIVES. To explore early and 1 month post-discharge mortality of paediatric patients admitted to a NICU with neurological disorders either primary (group 1) or in haematological malignancies (group 2).

METHODS. A retrospective analysis of prospectively collected data was performed. Children admitted in our NICU in the last 4 years were enrolled. Patient characteristics, diagnosis, presence absence of piastrinopenia, and prognosis of the haematological disorder were analysed. The need for chemotherapy during NICU admission, the reason for ICU admission (medical vs surgical), the neurological status and the need for MV at the time of NICU admission were also recorded.

RESULTS. 74 patients (male 50, mean age 9.9 ± 5.9 years) were studied. Global mortality at 1 month was 9.4 %. In Group 1 (56) 14 % required MV. Among patients admitted with primary CNS disorders, seizures and metabolic disturbances only 1 patient died for intracerebral haemorrhage (ICH). 20 (35 %) had primary CNS neoplasm among which 2 died (for respiratory failure and intracranial hypertension). In Group 2 (17) 10 (more than 50 %) patients required MV and 65 % (11) had severe piastrinopenia. Four (23.5 %) patients died, 3 because of cerebral thrombosis in lymphatic leukaemia and 1 patient died for ICH and had myeloblastic lymphatic leukaemia. Coma and piastrinopenia were not associated to mortality in the 2 groups despite all patients who died in the group 2 were comatose. MV was associated to mortality (Chi square likely hood ratio, CI95 %, $p < 0.001$) in the two groups. A trend toward an increased mortality was noticed in group 2 requiring MV and with severe piastrinopenia. No differences in mortality were disclosed between the age ranges.

CONCLUSIONS. MV was associated to mortality in the 2 groups. Neither coma nor severe piastrinopenia were associated to mortality. Patients with primary haematological disorder had higher mortality. Larger studies are needed to generate admission paths for this group of patients with focus on the stage of the disease (exordium vs remission).

REFERENCE(S). 1. Steliarova-Foucher E et al., Lancet 2004. 2. GT Bird et al. British Journal of Anaesthesia 2012

1065

QUALITY OF PALLIATIVE CARE AND BARRIERS TO PROVIDING PALLIATIVE CARE AT THE END OF LIFE AMONG INTENSIVE CARE UNIT NURSES

B. Sapir¹

¹Hadassah Medical Center, Pediatric Intensive Care Unit, Jerusalem, Israel

INTRODUCTION. ICU treatment can be unsuccessful and patients die in the ICU. Goals of care then change from saving life to palliative care at the end of life. Lack of awareness for the need for palliative care and other barriers decrease ICU quality of care at end of life. Few studies have examined staff perceptions of ICU palliative care quality of care or its barriers.

OBJECTIVE. The objectives of this study were to describe nurses' perceptions of the quality of ICU end of life care; barriers to its implementation; and the relationship between them.

METHOD. This was a descriptive correlational study. Three questionnaires (a demographic and professional characteristics questionnaire; The Quality of Dying and Death Questionnaire; and the Survey of Oncology Nurses' Perceptions of End of Life Care2) were distributed to a convenience sample of 126 ICU nurses from two hospitals.

Findings - Nurses' perceptions of the quality of palliative care provided by physicians scored a mean of 6.28/10 (SD = 1.48) and nurses' perceptions of the quality of palliative care provided by nurses had a mean score of 7.5/10 (SD = 1.23). "Education toward giving palliative care" was the lowest scoring item. The mean barrier-intensity score was 3.05 (SD = 0.76) and the mean barrier frequency score was 3.30 (SD = 0.61). The most common barrier was "having to deal with distraught family members while still providing care for the patient". A negative weak but statistically significant correlation was found between barrier frequency and perceptions of the quality of care given by the physicians ($r = -0.19$, $p = 0.03$) and nurses ($r = -0.19$, $p = 0.03$). A moderate correlation was found between barrier intensity and frequency ($r = 0.46$, $p < 0.001$). No statistically significant correlations were found between any of the demographic and professional characteristics with barrier frequency or intensity or with nurse perceptions of quality of care.

SUMMARY AND CONCLUSIONS. The lowest nursing quality of care scores were found related to palliative care education of physicians and nurses. This finding can be considered as one of the major sources for decreased quality of palliative ICU care. It is recommended that efforts be made to increase palliative care education at end of life in the ICU, in nursing schools at the basic and post-basic levels. Further research is recommended that will examine other sources of barriers.

1 Ho et al., year, journal name - abbreviation; volume: pages

2 Beckstrand et al., year, journal name abbreviation; volume: pages

1066

EFFICACY OF SUPPLEMENTAL PARENTERAL NUTRITION IN CRITICALLY ILL PATIENTS WITH INTRACRANIAL HEMORRHAGE

J. Titova¹, S. Petrikov¹, E. Klychnikova¹, E. Tazina¹, M. Godkov¹, A. Solodov¹, V. Krylov¹, A. Ryk¹

¹Sklifosovsky Research Institute for Emergency Medicine, Moscow, Russian Federation

INTRODUCTION. Supplemental parenteral nutrition (SPN) is one of the common ways to provide nutrition support with protein and energy requirement to avoid protein-energy deficiency in critically ill hypermetabolic and hypercatabolic patients (pts) with intracranial hemorrhage (ICH).

OBJECTIVES. To determine efficacy of SPN in critically ill pts with ICH in the early postoperative period (PP).

METHODS. We observed 20 pts with ICH and Glasgow Coma Scale 4-13 (age 46.8 ± 10.0 ; male - 13 (65 %), female - 7 (35 %)) in the early PP. Mortality rate was 50 % (lived pts - group 1, lethal outcome pts - group 2). We provided standard intensive care, early enteral nutrition (EN) from the 1st day in intensive care unit after neurosurgical operative procedure. We used nitrogen balance estimation to determine protein metabolism. Energy expenditure was calculated on the basis of 160 nonprotein kcal per 1gr of nitrogen intake. SPN was started on the 2-8th day of PP when EN was impossible or insufficient. We used "three-in-one" parenteral nutrition Smofkaben enriched with omega-3-acids and olive oil (Fresenius Kabi Deutschland GmbH) 1477 or 1970 ml according to energy and protein expenditure with lipid emulsion rate 0.03 - 0.04 g/kg/h.

Nitrogen excretion (NE), transferrin (TF, normal range 2-3.6 g/L), protein and albumin serum concentration, oxidative stress markers (OSM) (malone dialdehyde (MDA) (normal range 2.11-2.47 $\mu\text{mol/L}$) and total antioxidant status (TAS) (normal range 1.56-1.68 mmol/L)) were analyzed in 1-10 day of SPN.

NE, TF, OSM were determined on the 1st, 3rd, 5th, 7th and 10th day of SPN.

Protein and albumin serum concentration were defined daily.

RESULTS. SPN was started on 4 (3; 5) day of PP. Duration of SPN was 7 (4; 10) days. All pts were hypercatabolic before SPN was prescribed. NE was in 1st day of SPN 17.9 (14.5; 21.4) g/24 h, in 3rd day - 30.2 (19; 32.3) g/24 h, in 5th day - 31.9 (23.7; 38.6) g/24 h, in 7th day - 35.3 (33.1; 37) g/24 h ($p < 0.05$ as compared with 1st day) and in 10th day - 24 (23; 27.1) g/24 h ($p < 0.05$ as compared with 7th day). TF decreased in 1-5 day of SPN and increased just from 7th day of SPN (1st day - 1.52 (1.32; 1.66) g/L, 3rd day - 1.38 (1.26; 1.53) g/L, 5th day - 1.38 (1.34; 1.49) g/L, 7th day - 1.51 (1.24; 1.62) g/L, 10th day - 1.51 (1.46; 1.72) g/L).

Protein and albumin serum level lowered in 1-10 day of SPN (up to 50.4 (47.9; 55.4) g/L and 29.2 (26.2; 31.8) g/L).

We revealed increase of MDA up to 3.83 (3.53; 4.39) $\mu\text{mol/L}$ ($p < 0.05$ as compared with normal range) which was not accompanied by significant decrease of TAS (1.3 (1.19; 1.57) mmol/L in 1-10 day of SPN).

CONCLUSIONS. SPN is effective method of nutrition support in critically ill pts with ICH and could improve protein metabolism despite of severe hypercatabolic syndrome. "Three-in-one" parenteral nutrition enriched with omega-3-acids and olive oil contributed to normal balance of oxidative stress markers.

Trauma care: From bench to bedside: 1067–1080

1067

24 HOUR-ACCURACY OF CONTINUOUS NON-INVASIVE HEMOGLOBIN MEASUREMENT BY PULSE CO-OXIMETRY (SPHB) IN ICU PATIENTS WITH DIFFERENT INFLAMMATORY STATES

C.A. Reich¹, A. Glaum¹, J. Weimann²

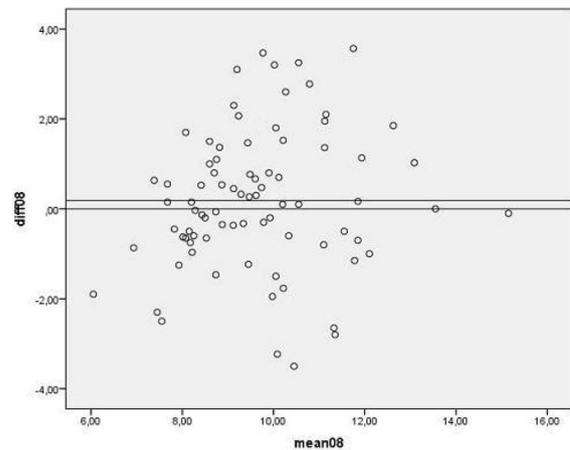
¹Charité - Universitätsmedizin Berlin, Anesthesiology and Intensive Care Medicine, Berlin, Germany, ²St. Gertrauden Krankenhaus Berlin, Anaesthesiology and Intensive Care Medicine, Berlin, Germany

INTRODUCTION. Measurement of total hemoglobin is frequent in ICU patients. Typically hemoglobin is determined via blood gas analysis in an invasive and repetitive fashion. Recently a continuous and noninvasive technique of hemoglobin measurement (SpHb) based on multiwavelength pulse co-oxymetry was introduced into clinical practice. Data regarding accuracy mostly exist for different operative settings and health volunteers over a short time period. In contrast, no data exist so far specifying accuracy and precision of pulse co-oxymetry over a period of 24 h in critically ill patients.

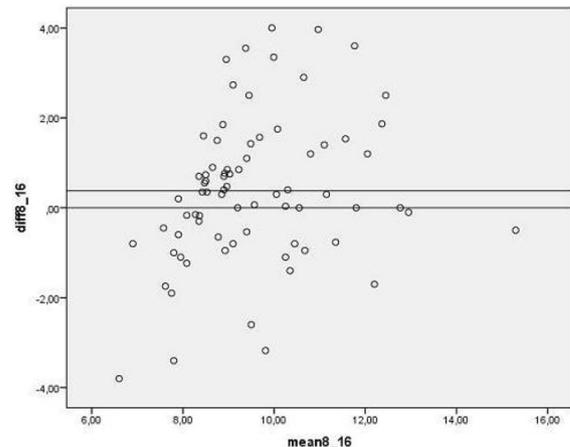
OBJECTIVES. To determine accuracy and precision of continuous non-invasive hemoglobin measurement by pulse co-oxymetry in ICU patients with various inflammatory states (ranging from "No SIRS" to "septic shock") over a period of 24 h.

METHODS. After institutional review board approval we performed a prospective observational study. Data from 81 patients (assigned to predefined subgroups according ACCP/SCCM consensus definition: No SIRS, SIRS, sepsis, severe sepsis, septic shock) of our interdisciplinary operative ICU were obtained by Masimo Radical-7 pulse co-oxymeter during a 24 h-period. For reference, arterial line blood samples were analysed at different time points during the measuring period using an ABL800 FLEX blood gas analyzer. Bland-Altman plots for 3 time periods (0-8, 9-16, 17-24, hour) were conducted (X-axis: reference method Hb in g/dl; Y-axis: [SpHb - Hb reference method] in g/dl). Influence of predefined subgroups on SpHb-accuracy was assessed by linear regression analysis.

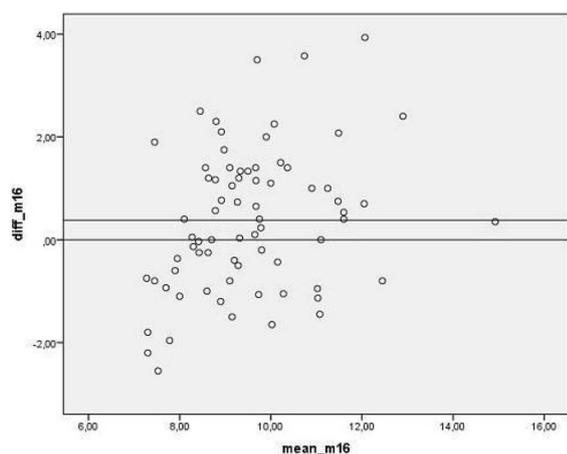
RESULTS. Compared to the reference method, SpHb showed a systematic overestimation of +2.0 % (first period), +3.7 % (second period) and +3.9 % (third period), this trend in precision was not significant ($p > 0.05$). Related standard deviations (accuracy) varied from ± 1.6 g/dl to ± 1.8 g/dl, limits of agreement between ± 3.2 g/dl and ± 3.6 g/dl. Differences between time periods were not significant ($p > 0.05$). There was no correlation between the accuracy of SpHb values and the predefined different inflammatory states.



[Accuracy SpHb first period (01-08 h)]



[Accuracy SpHb second period (08-16 h)]



[Accuracy SpHb third period (16-24 h)]

CONCLUSIONS. In ICU patients with a wide range of inflammatory states precision and accuracy of continuous non-invasive SpHb-monitoring remains stable over a period of at least 24 h. Importantly we did not find any correlation between accuracy of SpHb values and different inflammatory states. However, when interpreting SpHb-values to guide clinical decisions in critically ill patients, intensivists should be aware of limitations in accuracy of this method in ICU-patients compared to blood gas analysis.

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NON-PHARMACOLOGICAL INTERVENTIONS FOR COGNITIVE DISORDERS FOLLOWING TRAUMATIC BRAIN INJURY: A SCOPING REVIEW

J. Laroche^{1,2,3}, M.-È. Lamontagne^{4,5}, G. Sirois^{1,2,3}, R. Laforce Jr.^{6,7,8}, L. François^{9,10}, Y. Lachance¹, D. Griesdale¹², A.F. Turgeon^{9,10}

¹Université Laval, Faculty of Medicine, Department of Medicine, Québec, Canada, ²CHU de Québec, Hôpital de L'Enfant-Jésus, Physical Medicine and Rehabilitation, Québec, Canada, ³Institut de Réadaptation en Déficience Physique de Québec (IRDQP), Québec, Canada, ⁴Center for Interdisciplinary Research in Rehabilitation and Social Integration (CIRRSI), Institut de Réadaptation en Déficience Physique de Québec (IRDQP), Québec, Canada, ⁵Université Laval, Faculty of Medicine, Rehabilitation Department, Québec, Canada, ⁶Université Laval, Faculty of Medicine, Québec, Canada, ⁷CHU de Québec, Department of Neurological Sciences, Québec, Canada, ⁸CHU de Québec, Interdisciplinary Memory Clinic, Québec, Canada, ⁹Centre de Recherche du CHU de Québec, Axe Santé des Populations et Pratiques Optimales en Santé, Québec, Canada, ¹⁰Université Laval, Departments of Medicine and Anesthesiology, Division of Intensive Care Adults, Québec, Canada, ¹¹Université Laval, Faculty of Medicine, Department of Anesthesiology, Québec, Canada, ¹²Vancouver General Hospital, University of British Columbia, Department of Anesthesiology, Pharmacology & Therapeutics, Division of Critical Care Medicine, Vancouver, Canada

OBJECTIVES. Non-pharmacological interventions are commonly used for cognitive disorders and cognitive rehabilitation following traumatic brain injury (TBI). However, their effectiveness is unclear and has recently been challenged. The purpose of this scoping review was to evaluate the efficacy of non-pharmacological interventions on cognitive impairment following TBI.

METHODS. We conducted a scoping review of randomized clinical trials using the following databases up to November 2012: Medline, Embase, Cochrane Central, CINAHL, Science Citation Index, PsycInfo, PsycArticles, Biosis, OTseeker and Social Care Online. We considered studies that evaluated the effect of non-pharmacological interventions on cognition in adults with moderate or severe TBI. We evaluated the risk of bias using the Cochrane tool. Study selection, data abstraction and risk of bias evaluation were performed in duplicate by two independent reviewers.

RESULTS. Database and abstract search yielded 13 460 studies of which 57 were included (4 721 participants) in the current study. The most frequently used intervention types were "restoration/retraining" (35 studies; 2 909 participants) and "remediation/palliation" (12 studies; 1 386 participants). Only one study was double blinded (n = 24) and 4 studies reported using a sham intervention (n = 174). Domains most commonly evaluated were global cognition (22 studies; 1 971 participants), memory (27 studies; 1 515 participants) and executive functions (18 studies; 750 participants). Interventions were either performed within one year (21 studies; 1 770 participants) or beyond one year (23 studies; 942 participants) following TBI. Thirteen studies (2 009 participants) did not mention timing from TBI. The interventions had a favorable (10 studies; 716 participants), unfavorable (15 studies; 730 participants), or inconsistent (27 studies; 3 086 participants) effect on cognition. Five studies did not report the effect of the intervention (189 participants). Three studies (315 participants) were at low risk of bias.

CONCLUSIONS. Studies of non-pharmacological interventions for cognitive disorders following moderate or severe TBI in adults are heterogeneous, report different cognitive outcomes and have important methodological limitations. Current evidence does not overall seem to support the use of previously studied non-pharmacological interventions to improve cognition following moderate to severe TBI.

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PREVALENCE, RISK FACTORS, AND PROGNOSIS OF HYPONATREMIA ASSOCIATED WITH TRAUMATIC BRAIN INJURY IN EMERGENCY INTENSIVE CARE UNIT

T. Yumoto¹, A. Iida¹, E. Knaup¹, N. Nosaka¹, S. Morisada¹, T. Hirayama¹, N. Shiba¹, K. Tsukahara¹, H. Yamanouchi¹, Y. Kinami¹, M. Terado¹, K. Sato¹, T. Ugawa¹, S. Ichiba¹, Y. Ujike¹

¹Okayama University Hospital, Emergency and Critical Care Medicine, Okayama, Japan
INTRODUCTION. Hyponatremia is a common electrolyte disorder in patients with traumatic brain injury (TBI) (1).

OBJECTIVES. Our objectives were to identify clinical factors associated with hyponatremia in TBI and to investigate the relation between hyponatremia and neurological outcome.

METHODS. We retrospectively analyzed the TBI patients admitted to the emergency intensive care unit of Okayama University Hospital in Japan from Nov 2011 through Mar 2014. TBI were defined as recognized intracranial hemorrhage on CT scan or MRI. A total of 80 patients were included eventually in this study (four patients were excluded due to early death within 72 h).

RESULTS. Mean age was 52.1 ± 25.7 years, and 26 (32.5 %) were female. Mean Glasgow Coma Scale (GCS) on arrival and injury severity score were 9.7 ± 3.8 and 30.9 ± 10.9, respectively. Prevalence of hyponatremia (serum Na < 135 meq/L) and severe hyponatremia (serum Na < 130 meq/L) were 43 (53.8 %) and 13 (16.3 %), respectively. Hyponatremia has occurred at a median time of 7 days after admission. Univariate analysis showed that the age, sex, GCS on arrival, traumatic coma data bank (TCDB) CT scan categories (2) and ventilator dependent days were not associated with hyponatremia. Multivariate analysis revealed that the lower base excess on arrival and the coexisting skull base fracture were the significant risk factors for hyponatremia (odds ratio, 0.825 and 3.98; 95 % confidence interval, 0.69 to 0.98, and 1.22 to 13.0; P = 0.03, 0.02, respectively). However, there was no meaningful relation between hyponatremia and Glasgow Outcome Scale (GOS) at discharge (median time of 21 days). In our study, only TCDB classification by CT scan had significant correlation with GOS at discharge.

CONCLUSIONS. Hyponatremia is frequently complicated with TBI, and is most manifested around one week after admission. Further study should be necessary to identify how to manage in this setting (3).

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ELEVATED SERUM NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN (NGAL) IS AN EARLY MARKER OF ACUTE KIDNEY INJURY AND ASSOCIATED WITH MORTALITY IN CRITICALLY ILL MAJOR TRAUMA PATIENTS

S.J. Kim¹

¹The Catholic University of Korea, Seoul St. Mary's Hospital, Trauma and Acute Care Surgery, Seoul, Republic of Korea

INTRODUCTION. The main causes of late mortality in major trauma patients are sepsis and multi-organ failure. Acute kidney injury (AKI) is a one of important factors that effect on survival of major trauma patients. So, effective early diagnosis of AKI is important to management of critically ill major trauma patients. NGAL has been known as an early, sensitive, non-invasive biomarker for AKI.

OBJECTIVES. The aim of this study was to evaluate elevated serum NGAL levels as a predictor of an early AKI and prognostic factor in major trauma patients.

METHODS. We studied 35 major trauma patients (injury severity score > 15) admitted to the intensive care unit of a trauma hospital retrospectively. NGAL was measured using an ELISA technique upon 24 h after injuries. Presence of AKI during within 5 days after trauma was defined by the risk injury failure loss and end-stage kidney classification (RIFLE) criteria.

RESULTS. A total of 35 patients (28 male, 7 female) were studied and mean ISS was 24.6 (16-53). A cut-off point of serum NGAL was larger than 153 ng/ml. 17 patients had elevated serum NGAL level and mean NGAL level was 314 ng/ml. patients with early AKI development was 15 and mean duration of development of AKI was 1.6 days. Elevated serum NGAL levels are associated with AKI (p = 0.001), shock (p = 0.022), ISS (p = 0.031), age (p = 0.008), baseline serum creatinine (p = 0.23) and mortality (p = 0.41). Multivariate analysis showed that lactic acid (p = 0.017), base deficit (p = 0.021) and shock (p = 0.008) were statistically associated with mortality of major trauma patients.

CONCLUSIONS. Serum NGAL from 24 h of major trauma can be used as a reliable predictor of AKI and associated with mortality in major trauma patients

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FLUID ADMINISTRATION AND ITS EFFECT ON ELECTROLYTES IN CRITICALLY ILL TRAUMA PATIENTS

N. Amin¹, J.R. Prowle¹, C.J. Kirwan¹

¹Royal London Hospital, Barts Health, Adult Critical Care, London, United Kingdom

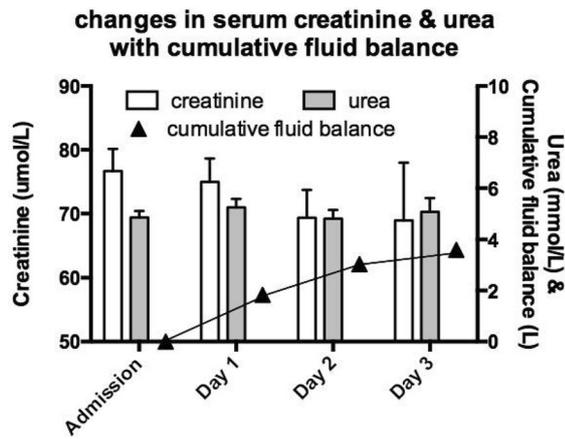
INTRODUCTION. Current evidence suggests that excessive fluid administration in critically ill patients worsens outcome, especially in those suffering major trauma. However, these patients often receive high volumes of fluid after admission to critical care and this may impact serum electrolyte concentrations and, be a source of 'dilutional' reductions in serum creatinine

OBJECTIVE. To determine fluid balance in major trauma patient admitted to ICU and the associated changes in serum urea creatinine and electrolytes.

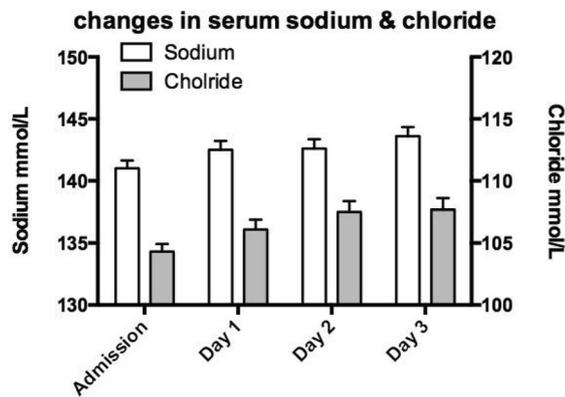
METHODS. 36 critically ill patients admitted following major trauma were analysed. Data was collected for the first 72 h from admission to critical care and excluded fluids administered in the ED or operating theatre. Results are presented as median and range, with comparison analysis by the Friedman Test (ANOVA), unless otherwise stated.

RESULTS. 36 consecutive trauma patients, 26 male, aged 39.5(15-78) were reviewed. Daily fluid balance fell consecutively (1409, 1063, 410mLs p < 0.01), leaving the cumulative fluid balance at 3599 (-761 to 9955) mLs at 72 h. The admission serum creatinine was significantly higher than day 3 (75 (39-121) v 60 (31-367); p < 0.0001) but the urea remained static (4.8 (2-8.2) to 4.3 (2-21.3); p = 0.1) (figure 1). There was only one case of creatinine defined AKI.

Sodium (141(131-150) v 143 (135-156)mmol/L; P = 0.0043) and Chloride (104(97-112) to 107(99-119)mmol/L; p = 0.0037) rose significantly with fluid administration despite the majority use of balanced crystalloid solutions (figure 2), yet the base deficit (34 patients) normalized (-2.7 to 0.5; p < 0.0001).



[Figure 1]



[Figure 2]

CONCLUSIONS. Critically ill trauma patients have a high cumulative fluid balance within the first 72 h of critical care. This is associated with significant increases in serum sodium and chloride. Median creatinine fell significantly however there was no change in urea suggesting that this decrease cannot solely be explained by haemodilution. Further studies are required to more accurately assess the effects of continued fluid administration on body fluid composition and the diagnosis of AKI.

1079 THROMBIN GENERATION IN PATIENTS AFTER SEVERE BURN INJURY

D. Adelman¹, M. Wiegeler¹, D. Bauer¹, S. Kozek-Langenecker², E. Schaden¹
¹Medical University of Vienna, Department of Anaesthesia, General Intensive Care, Vienna, Austria, ²Evangelical Hospital Vienna, Department of Anaesthesia and Intensive Care, Vienna, Austria

INTRODUCTION. Severe thermal injury triggers a systemic inflammatory response including the activation of procoagulatory and fibrinolytic pathways. (1) Early activation of the coagulation cascade and the presence of disseminated intravascular coagulation have been associated with increased mortality. The time course of different pro- and anticoagulant enzymes has recently been described, but their determination has not yet been established in clinical practice. (2,3)

Thrombin generation is a global coagulation test that permits the assessment of an individual's potential to generate thrombin and has recently become available as a fully automated laboratory test. (4)

OBJECTIVES. The objective of this study was to prospectively describe changes in thrombin generation potential in patients after severe thermal injury defined as total body surface area burned (TBSA) > 20 %. We hereby report the preliminary results of 19 consecutive patients who were admitted to the intensive care unit for burn trauma of the General Hospital of Vienna, Austria between 10/2012 and 01/2014.

METHODS. Blood samples were drawn in CTAD test tubes (Vacuette™ Greiner, Kremsmünster, Austria) the day after burn trauma (time point A), the morning after surgical excision of burn wounds (B) and on post-admission days 7 (C) and 14 (D).

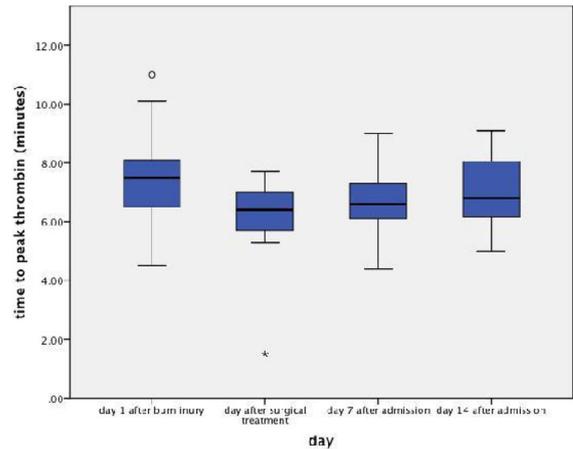
Thrombin generation was determined using the automated coagulation analyzer Ceveron® alpha TGA (Technoclone, Vienna, Austria). The fluorogenic substrate TGA substrate (SUB) (Technoclone, Vienna, Austria) and the trigger TGA reagent C (RC) High (Technoclone, Vienna, Austria) were used.

RESULTS. Nineteen patients with a mean age of 54 years (range 19 - 87 years) were included in this preliminary analysis. The mean TBSA was 33 % (range 20 - 60 %) and the median abbreviated burn severity index (ABSI) was 8 (range 4 - 12). The thrombin generation variables lag time, and peak thrombin are given in Table 1, time to peak thrombin is shown in Figure 1. There was a significant decrease in time to peak (repeated measures ANOVA, p = 0.026) but not in peak thrombin or lag time in the first 2 weeks after severe burn injury. Thrombin generation variables did not correlate with TBSA or ABSI.

CONCLUSION. In patients with severe burn injury, time to peak thrombin generation is decreasing in the first two weeks after burn trauma. Whether these changes in thrombin generation correlate with patient outcome parameters such as thromboembolic events, bleeding, or mortality will be evaluated.

Day	Lag Time (Minutes)	Peak Thrombin (nM)
	mean (SD)	mean (SD)
A	2.86 (0.47)	266 (181)
B	2.54 (0.63)	305 (165)
C	2.78 (0.39)	370 (167)
D	2.76 (0.38)	321 (196)

[Table 1]



[Figure 1]

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FUNDING. This study was supported by a grant from the Austrian Society of Anesthesiology, Resuscitation and Intensive Care Medicine and by departmental funds.

1080 PATIENT-CONTROLLED EPIDURAL ANALGESIA IS A BETTER PAIN MANAGEMENT IN THE SICU???

W.-Y. Huang¹, H.-C. Lao²

¹Mackay Memorial Hospital, Department of Critical Care Medicine, Taipei, Taiwan, Province of China, ²Mackay Memorial Hospital, Department of Anesthesiology, Taipei, Taiwan, Province of China

INTRODUCTION. Multiorgan systemic failure occurs commonly in the intensive care unit (ICU). Critical care medicine deals with potentially life-threatening patients¹. For patients sent to ICU after surgery, besides organ support, they require stable hemodynamic status which optimal pain management can offer and perioperative morbidity and mortality, length of hospital stay and medical costs can be decreased².

There are plenty of studies about the effects or benefits between different kinds of acute pain management, but little focus on ICU patients due to either less cases or more focus on specific operations.

OBJECTIVES. To determine which of three methods of pain management in patients in the surgical intensive care unit (SICU) provided the best pain control.

METHODS. A retrospective cohort study, chart review of 2663 all cause patients of a 16 beds SICU (1029 beds Medical center) between April 2011 and September 2012. Unconsciousness and uncooperative patients were excluded.

The primary points were compared with 3 different methods of pain management: P.R.N. IV Demerol/NSAID (D/N), IV- patient-controlled analgesia (PCA) and patient-controlled epidural analgesia (PCEA) under 3 different conditions: rest, movement and coughing with Visual analogue scales (VAS 0-100). Secondary point was the index of overall satisfaction.

RESULTS. 881 patients were excluded. VAS data was analyzed with SPSS 18 version—ANOVA, results are presented as mean ± SD. At rest, the PCEA group is significantly better than the other 2 groups. While at movement, there's no difference between the PCEA group and the D/N group but both of them are better than the PCA group. Under the condition of coughing, the PCEA group is better than the PCA group but worse than the D/N group. The PCEA group gets the best grade in the index of overall satisfaction; the D/N group is the second.

	Demerol/ NSAID (N = 1367)	PCA(N = 202)	PCEA(N = 213)	P Value
VAS-Rest	20 ± 15 *	20 ± 9*	14 ± 11	<0.001
VAS-Movement	32 ± 21	42 ± 13*	35 ± 13	<0.001
VAS-Coughing	36 ± 26*	59 ± 16*	53 ± 14	<0.001
Satisfaction	2.69 ± 1.58 *	2.70 ± 1.61*	1.95 ± 0.95	<0.001

* Significant difference compared to PCEA
 [VAS and satisfaction of 3 pain management methods]

CONCLUSIONS. PCEA provided better pain control at rest than the other two methods, whereas prn Demerol/NSAID was somewhat better when patients were moving or coughing. However, patient satisfaction was significantly better with PCEA.

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Impact of patient characteristics on outcome: 1081–1094

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PSYCHIATRIC DISORDERS IN A UK TERTIARY HOSPITAL INTENSIVE CARE UNIT- THE TIP OF THE ICEBERG?

M. Adlam¹, V. Metaxa¹

¹King's College Hospital, London, United Kingdom

INTRODUCTION. Despite extensive research in the consequences of Intensive Care Unit (ICU) admission on the development of psychiatric disorders (PD), surprisingly little is known about the effects of existing PD on the outcomes of critically ill patients [1-4]. The majority of the studies that have examined these associations have focused on specific patient groups with depression or schizophrenia. The reported incidence of PD in ICU in these studies varied from 8-28% [1-3] with conflicting results on length of stay (LOS) and mortality.

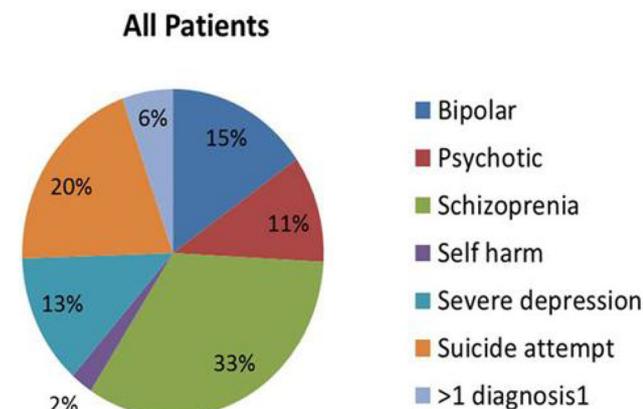
OBJECTIVES. We aimed to assess the prevalence of PD in a UK tertiary ICU and examine their effect on LOS and mortality.

METHODS. We retrospectively reviewed all admissions from January 2010 to December 2013 in a tertiary, mixed ICU that serves a London Major Trauma Centre (MTC) hospital. Data obtained were age, APACHE II score, reason for admission, LOS mortality and a diagnosis of depression, bipolar, self-harm, psychosis, schizophrenia and suicide attempt.

RESULTS. There were a total 7,428 of admissions with 294 (4%) having a pre-existing diagnosis of PD. The break down of the different diagnoses is shown in figure 1. Median APACHE II score was 17 for all admissions vs. 15 for patients with PD, and the LOS was 6 vs. 4 days ($p > 0.05$). ICU mortality was statistically different between all admissions and PD (15% vs. 11%, $p < 0.05$), whereas hospital mortality was not (21% vs. 18%, $p > 0.05$).

CONCLUSIONS. The burden of PD prior to critical illness remains elusive. Our data suggest that patients with PD in ICU are comparable to patients without in terms of severity of illness, and have a reduced ICU but not hospital mortality. Despite the retrospective nature and potential bias of the study, the results warrant further research in the diagnosis and management of this challenging patient cohort.

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[Psychiatric diagnoses in ICU (%)]

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POTENTIAL ASSOCIATION BETWEEN LOWER BODY MASS INDEX AND HOSPITAL MORTALITY IN CRITICALLY ILL JAPANESE PATIENTS

T. Yatabe¹, T. Tamura¹, K. Yamashita¹, M. Yokoyama¹

¹Kochi Medical School, Department of Anesthesiology and Intensive Care, Nankoku, Japan

INTRODUCTION. In the general population, body mass index (BMI) is a strong predictor of overall mortality, both for those with weights above and below the optimal body weight range (1). A recent observational study conducted in European intensive care units (ICU) showed that BMI is also associated with mortality (2). Although racial differences may affect mortality (3), the relationship between BMI and hospital mortality in Japanese critically ill patients remains unknown.

OBJECTIVES. We hypothesized that a lower BMI amongst critically ill Japanese patients was associated with increased hospital mortality, similar to findings noted among critically ill European patients. Therefore, we retrospectively investigated the relationship between BMI and patient outcomes in an ICU.

METHODS. We included consecutive patients who were admitted to our ICU between January 2012 and December 2013. Of these patients, we excluded those aged < 20 years, those who were not discharged by March 31, 2014, and those for whom data regarding height and/or weight were unavailable. Patients were divided into 3 groups based on their BMI at ICU admission. The underweight ("lower") group (group L) included patients with a BMI below 18.5 kg/m², the normal weight group (group N) included patients with a BMI between 18.5 and 24.9 kg/m², and the overweight/obese ("higher") group (group H) included patients with a BMI above 25.0 kg/m². Patient data were retrospectively obtained from electronic patient records. The primary outcome was in-hospital mortality, and the secondary outcome was the total length of hospital stay.

RESULTS. A total of 1616 patients were admitted to our ICU. Of these patients, 1270 were analyzed and 346 patients were excluded from the study. There were 169 patients in group L; 779, in group N; and 322, in group H. Women represented 39% of the retained study population. The median age was 71 years, and the median BMI was 22.5 kg/m². Of the sample, 82.2% were surgical patients. Overall, the mortality rate was 8.1% and the median hospital stay was 21 days. The mortality rate in group L was significantly higher than that in both group N and group H (13.6% vs. 7.8% vs. 5.9%, $p = 0.01$). The length of hospital stay was not significantly different between groups ($p = 0.30$).

CONCLUSIONS. Our retrospective study suggests that lower body mass index may be associated with increased hospital mortality in critically ill Japanese patients. Future research may focus on conducting a prospective study to ascertain the validity of the findings reported here.

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COMPLICATIONS AND TREATMENT IN THE INTENSIVE CARE UNIT FOLLOWING BARIATRIC SURGERY

T. Pasgaard^{1,2}, E. Tonnesen², H.L. Nibro²

¹Department of Anaesthesiology and Intensive Care Medicine, Randers Regional Hospital, Randers, Denmark. ²Department of Anaesthesiology and Intensive Care Medicine, Aarhus University Hospital, Aarhus, Denmark

INTRODUCTION. Bariatric surgery has become a widely used treatment for severe obesity in developed countries(1). Complications are rare, but can be fatal(2). Serious complications requiring admission to intensive care units (ICUs) are poorly described in the literature.

OBJECTIVES. This observational study describes the clinical course of patients admitted to an ICU after bariatric surgery, including information on patients characteristics, reasons for ICU admission, additional complications during ICU stay, length of stay (LOS) and mortality.

METHODS. We investigated patients admitted to the ICU at Aarhus University Hospital, Denmark following bariatric surgery during a 5-year period (Jan. 1st 2008 to Dec. 31st 2012). Information was retrieved from written and electronic medical records. Age, body mass index (BMI), comorbidity, Simplified Acute Physiology Score II (SAPSII), surgical complications, treatment in the ICU, complications during ICU stay and LOS in the ICU and hospital were registered.

RESULTS. We identified 43 patients admitted to the ICU mainly due to intraabdominal sepsis. Anastomotic leakage seen in 24 patients (56%) was the most frequent complication, followed by nine patients (21%) with internal herniation months after the bariatric surgery. Three patients were admitted due to complications after elective removal of a gastric band. The patients were relatively young with a median age at 44 years and 77% were female. The BMI was high 41 (24-56) (median and range) and Charlson's Comorbidity score(3) low, with no patients above 2 points.

Approximately two-thirds were treated with mechanical ventilation among these 61% had a tracheotomy. Circulatory support was used for approximately two-thirds of the patients and dialysis for one-fifth. 10 patients (23%) developed an intraabdominal abscess and three patients (7%) intestinal perforation outside the anastomosis leading to additional surgery. Nine patients had additional complications during the ICU stay, including rhabdomyolysis, pressure ulcers and cerebral and respiratory complications.

Median LOS in the ICU was 6 days (range 1-98), but 35 days (range 14-98) for nine patients with additional severe complications. For all 43 patients we recorded a total of 1010 days in the ICU and 2403 days in hospital. The mortality was zero.

CONCLUSIONS. After bariatric surgery some patients are at risk of severe complications and prolonged stay in ICU and hospital. Consequently the decision to treat obesity with surgery in these patients has considerable costs for the individual as well as for society, which must be addressed.

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THORACIC PATIENTS ADMITTED TO CARDIOTHORACIC INTENSIVE CARE UNIT: A RETROSPECTIVE AUDIT

M.S.W. Parkin¹

¹St George's Healthcare NHS Trust, Cardiothoracic Intensive Care Unit, London, United Kingdom

OBJECTIVES. To understand the type of patient (medical or surgical), length of stay, readmissions and mortality in thoracic patients admitted to cardiothoracic intensive care unit (CTICU).

METHOD. A retrospective clinical audit of all thoracic patients admitted to a 17 bed mixed adult cardiothoracic intensive care unit over a 12 month period (January 1st 2013 to December 31st 2013) in a large trauma hospital in London.

RESULTS. A total of 1426 patients were admitted to the unit over this period, 82 (5.7%) being thoracic patients. With 7 readmissions, meaning 75 actual patients were admitted, post-surgical 64 (85.3%), medical 2 (2.6%), emergency 7 (9.3%), work-up pre-operation/intervention 2 (2.6%). The site origin prior to admission: recovery and theatre 66.6% (50), ward 18.6% (14), emergency department 9.3% (7), other NHS Trust 5.3% (4). Readmission site prior to admission: ward (5), other NHS Trust (2). Reasons for readmission: 5 respiratory failure from the ward; 4 out of 5 having had thoracic surgery, 1 broncho-plural fistula, 1 oesophageal-plural fistula, both from other NHS Trust. Mean age and gender: 64.68 years and 65.3% men. Average length of stay for all admissions 4.00 days, for readmission group original admission 4.87 days, first readmission 5.56 days, second readmission for two patients 15.41 days, with a 50% mortality rate for patients readmitted twice. Length of stay for patients who died was 4.96 days. Mortality of the patients admitted was 11 (14.6%), 8 post surgery, 2 work-up pre-operative/intervention, 1 trauma. Mortality of the 5 patients readmitted 2 (40%), with 2 patients readmitted being transferred to other intensive care units local to them, 4 out of 5 readmissions having had thoracic surgery.

CONCLUSION. In this retrospective clinical audit 9.3% of thoracic patients discharged from CTICU required readmission to CTICU, with a mortality rate of 40%, and a length of stay increasing on readmissions up to 3.8 times and a 50% mortality rate for a second readmission.

1085**PERFORMANCE STATUS AND LONG TERM OUTCOMES OF PATIENTS WITH HAEMATOLOGICAL MALIGNANCY ADMITTED TO A SPECIALIST INTENSIVE CARE UNIT**S. Tanna¹, P.C. Gruber¹¹The Royal Marsden NHS Foundation Trust, Department of Anaesthesia and Intensive Care, London, United Kingdom

INTRODUCTION. Recent advances in intensive and oncological care have shown improved outcomes for patients with haematological malignancies admitted to the intensive care unit (ICU)¹. Few studies have looked at long term outcomes or performance status of patients with haematological malignancies following ICU admission.

OBJECTIVES. The primary aim of this study was to identify performance status and outcome of patients with haematological malignancies admitted to a specialist cancer ICU 3 years following discharge.

METHODS. Local approval was obtained to undertake this project. All patients admitted to a specialist cancer ICU with haematological malignancy as a primary diagnosis or a concurrent co-morbidity during the period 1st Oct 1 2004-30th September 2009 and alive at 3 years were included in the analysis. Survival at 3 years, performance status, hospital readmission and relapse/remission status were collected using the hospital information system and medical notes. Performance status was graded 0-5 based on WHO criteria whereby grade 0 = fully active individual able to carry on all pre-disease performance without restriction, grade 1 = restricted in physically strenuous activity but able to carry out light work, grade 2 = ambulatory and capable of all self-care but unable to carry out any work activities, grade 3 = capable of limited self-care, confined to bed/chair more than 50 % of waking hours, grade 4 = confined to the bed and unable to self care, grade 5 = dead. The data were analysed using Microsoft Excel and SPSS for windows softwareTM.

RESULTS. Of the 199 patients admitted to the ICU during the study period, 47 (24 %) were alive at 3yrs. Of the patients that were alive at 3 years, the median age of the patients were 61 (IQR 43-68), 47 % were male, 26 % were emergency admissions and mean APACHE 2 score was 14 (SD 6.8). Common reasons for ICU admission were elective surgery (34 %) and respiratory failure (23 %). Haematological diagnosis were 55 % Non Hodgkin's Lymphoma, 11 % AML, 11 % myeloma, 9 % CLL, 6 % ALL, 6 % Hodgkin's Lymphoma and 2 % CML. Most patients (75 %) had a performance status of 0 or 1 three years after discharge. The majority (94 %) were in remission from their haematological malignancy and 68 % did not require further admission to hospital.

CONCLUSIONS. Our study demonstrates that a quarter of haematological patients admitted to ICU are still alive at 3 years. The majority of these patients are in remission and have good performance status. Future studies should focus on the long term quality of life of patients with haematological malignancy that have survived ICU admission.

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1086**IMPACT OF DIFFERENT SEDATION PROTOCOLS AND PERIOPERATIVE PROCEDURES ON PATIENTS ADMITTED TO ICU AFTER MAXILLOFACIAL TUMOUR SURGERY**D. Leberher-Eichinger¹, G.A. Roth¹, B.-A. Tudor¹, C.G. Krenn¹, R. Seemann¹¹Medical University of Vienna, Vienna, Austria

INTRODUCTION. Maxillofacial tumor surgery often necessitates prolonged invasive ventilation to prevent blockage of the respiratory tract and adequate healing of anastomoses. To tolerate invasive ventilation continuously administered sedatives are recommended¹. Half-time of sedative or analgesic medication might increase if continuously administered, resulting in a prolonged weaning period also enhancing the risk of re-intubation and an extended overall duration of the ICU stay. The prolonged ICU stay vice versa triggers the occurrence of infections or thromboembolic events, seriously adding to the mortality of intensive care patients. The conflict of surgical desired "no movement" policy and currently propagated cooperative sedation regimes and their impact on medical costs is thus crossly revealed.

OBJECTIVES. The aim of our study was to check whether a change in sedation regime affects length of ICU stay as well as outcome of maxillofacial tumor surgery associated flap graft. Additionally the impact of various surgical procedures was analyzed.

METHODS. The data of 301 consecutively admitted patients after maxillofacial surgery have been retrospectively analyzed over a 5 years period in a count regression models. The first 168 patients received a sedation regimen with sufentanil and midazolam changed in the following 133 patients to remifentanyl and propofol. The impact of surgical procedures (e.g. via tracheostomy, tumor resection, neck dissection, length of operation) and the patient age and sex have been analyzed with regard of length of ICU stay.

RESULTS. Patients receiving remifentanyl and propofol were discharged earlier from ICU than patients receiving sufentanil and midazolam (2 vs 3 days, $p < 0.01$ for patients after maxillary- and 3 vs 5 days, $p < 0.001$ for patients after mandibular surgery), without any difference in flap graft outcome.

In patients after maxillary surgery, postoperative ICU stay was negatively influenced by length of operation ($p = 0.01$), the patient age ($p < 0.01$) and a necessary reconstructive transplantation ($p < 0.01$), whereas tracheotomy significantly reduced length of stay (2 vs 3 days, $p = 0.02$).

After mandibular surgery, length of ICU stay was negatively influenced by patient age ($p = 0.02$), length of operation ($p = 0.01$) and a simultaneous resection and reconstruction procedure ($p < 0.01$).

CONCLUSION. In order to achieve a compromise between disciplines involved i.e. surgical "non-movement" policy and modern sedation regimes towards awake and cooperative sedation, it is imperative to continuously evaluate and adapt sedation protocols in ICUs with respect to reduce recovery time, minimize complications and enhance flap graft survival. Surgical procedures (e.g. tracheotomy after maxillary surgery) can additionally influence postoperative outcome and length of ICU stay and should therefore be interdisciplinary considered.

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1087**OUTCOMES OF OESOPHAGEAL MALIGNANCY AT A REGIONAL UNIT**G. Rajendran¹, A. Hughes¹, B. Maddison¹, K. Kiff¹¹Broomfield Hospital, General Intensive Care Unit, Chelmsford, United Kingdom

INTRODUCTION. Oesophageal malignancy is associated with a high mortality and surgery is the only curative treatment [1]. Our Trust is a regional unit for upper gastrointestinal

surgery and the number of oesophagectomies is expected to rise as the incidence of oesophageal carcinoma increases [2].

OBJECTIVE. To identify the outcome of patients diagnosed with oesophageal carcinoma at our hospital in 2012, we studied their postoperative course (duration of mechanical ventilation (MV) and intensive care unit (ICU) length of stay (LOS), 30-day and one-year mortality). We compared the outcome of patients who underwent surgery with or without neo-adjuvant chemotherapy (NAC) to those who didn't undergo surgery.

METHODS. This is a retrospective observational study. We identified consecutive patients diagnosed with oesophageal carcinoma within our trust from the regional cancer database. Their clinical details and mortality were obtained from ICU clinical information system (Metavision[®]) and patient administration system.

RESULTS. Oesophageal cancer was identified in 68 patients in 2012. Of these, 30 (44 %) underwent surgery and 12 (40 %) of this surgical group had received NAC. Postoperative LOS in ICU was 3.9 ± 5.2 days (mean \pm SD) with 14 patients requiring MV on admission to the ICU. The duration of MV was 17.7 ± 19 h with 6 patients (20 %) requiring re-intubation and MV for 5.6 ± 7.2 days. The ICU readmission rate was 20 % and the LOS on readmission was 10.6 ± 16.3 days.

Of the 38 patients who didn't undergo surgery, 29 patients either had metastatic disease or declined surgery. Nine patients were deemed inoperable, based on the extent of tumour on the day of planned surgery, of which 8 had previously received NAC.

In the operated group, 30-days mortality was 6.7 % ($n = 2$) and one-year mortality was 16.7 % ($n = 5$). One-year mortality after NAC was 16.7 % (2/12) with surgery. 38 % (8/21) of those who had NAC were regarded inoperable and their one year mortality was 12.5 % (1/8). One-year mortality for those who undertook neither NAC nor surgery was 52 %.

CONCLUSIONS. Surgical group has better survival rate at one year compared to the non-operated group. Our mortality rate compares to previously published figures [3]. We observed no difference in mortality at one-year after surgery with or without NAC. However, following NAC a significant number of patients was considered non-operable.

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GRANT ACKNOWLEDGMENT. No grants obtained.

1088**A REVIEW OF RESPIRATORY MANAGEMENT IN SPINAL CORD INJURIES**R. Haylett¹, O. Gustafson¹, V. Fox², G. Barker²¹John Radcliffe Hospital, Physiotherapy, Oxford, United Kingdom, ²John Radcliffe Hospital, Adult Intensive Care Unit, Oxford, United Kingdom

INTRODUCTION. No UK guidelines currently exist to inform best practice in the management of patients with a traumatic cervical spinal cord injury (SCI), particularly regarding ventilatory management in the acute stage. There is limited data available concerning the outcomes of specific management pathways or adverse events encountered, leading to individual centres adopting local strategies.

OBJECTIVES. To review the respiratory management of cervical SCI patients admitted to a single general ICU in the UK.

METHODS. Retrospective data collection and analysis of all 21 patients admitted to the intensive care unit following a SCI, between October 2010 and April 2014. Clinical data was collated from the electronic notes system, including the time from admission to tracheostomy, number of failed extubations, and number of adverse events associated with failed extubations. The cost of respiratory physiotherapy associated with periods of self-ventilation, post re-intubation and post tracheostomy was also analysed.

RESULTS. 16 patients admitted during the review period suffered a cervical SCI. Of those surviving to ICU discharge, 11 (85 %) received a tracheostomy. Of those not receiving a tracheostomy, one patient was never intubated and transferred to a spinal injury centre within one week. One suffered an incomplete lower cervical SCI that showed rapid neurological recovery post spinal stabilisation. Three patients died.

There were 12 failed extubations, an average of 1.7 per patient. Patients that were extubated spent on average 1.4 days self ventilating, and received an average 8.9 h of physiotherapy input in this time (6.4 h per day). During periods post re-intubation, patients spent on average 5.5 days receiving mechanical ventilation, with an average 14.7 h of physiotherapy input during this time (2.7 h per day).

There were complications associated with failed extubations and re-intubations. These include frequent episodes of physiotherapy and lung volume recruitment/airway clearance, one emergency tracheostomy to manage a difficult airway, one pneumothorax, and two bronchoscopies. There were no adverse events post tracheostomy.

The average time from admission to receiving a tracheostomy was nine days. Patients then spent on average 22.4 days with the tracheostomy, and received an average of 35 h of therapy in this time (1.6 h per day).

CONCLUSIONS. This limited review suggests that the majority of patients admitted to this general ICU with a cervical SCI will benefit from a tracheostomy to facilitate weaning from mechanical ventilation and physiotherapy management. A delay in tracheostomy and subsequent failed extubations are associated with several adverse events. Those that receive a tracheostomy experience fewer respiratory complications and the cost related to respiratory physiotherapy is reduced.

1089**RETROSPECTIVE OBSERVATIONAL STUDY OF OBSTETRIC ADMISSIONS AND OUTCOMES TO HIGH DEPENDENCY UNIT IN AN IRISH TERTIARY HOSPITAL 2011-2013**F. Kavanagh¹, A. Kumar¹, I. Browne¹, O. Roseag¹¹National Maternity Hospital, Department of Anaesthesia and Critical Care, Dublin, Ireland

INTRODUCTION. Pregnancy and labour usually progress uneventfully however serious complications can occur and develop rapidly, necessitating critical care admission and support. Successive confidential enquiries have highlighted deficiencies in this area and suboptimal care leading to increased morbidity and mortality¹. The National Maternity Hospital is the largest maternity hospital in the Republic of Ireland where a total of 8,954 babies were delivered in 2013. It is a stand alone institution and on site facilities include a 2 bed dedicated anaesthesia lead High Dependency Unit.

OBJECTIVES.

1. To examine how the HDU service within a level 2 stand alone maternity hospital is utilised.

2. To examine the number of transfers to tertiary level ICU that occur annually.

METHODS. A retrospective observational study was carried out from January 2011 to January 2014 specially looking at the following parameters: admitting diagnosis, demographics, length of stay and the number of admissions requiring transfer for tertiary level care.

RESULTS. In total 29,344 deliveries occurred. 376 HDU admissions were recorded in this period representing 1.28 % of all admissions. The average age of patients admitted to the HDU was 34. The predominant reasons for admission were hypertensive disease of pregnancy (49.7 %), haemorrhage (antepartum/post partum) (36.4 %), sepsis (4.2 %) and other reasons (11.1 %) including cardiac rhythm disturbances, neurological complications and pre existing medical disease. In 2013 average length of stay was 2 days. 6.1 % of those admitted to HDU required transfer for tertiary level ICU care in other centres during the study period, this represented 0.07 % of all deliveries.

CONCLUSION. There is significant demand within our institution for HDU care for our patients, with the number of admissions increasing in 2013. The main admitting diagnoses are hypertensive disease of pregnancy and haemorrhage with an increase in the number of patients being admitted for management of sepsis in 2013. This highlights the increasing awareness, recognition and management of this condition in pregnancy. The increased number of HDU admissions in 2013 could also be explained by the recent introduction of an early warning score for the deteriorating patient in our hospital but this would require further evaluation. The low number of transfers of patients to other tertiary centres underpins the importance of an anaesthesia lead service.

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OUTCOMES OF SEVERE ACUTE PANCREATITIS IN A REGIONAL INTENSIVE CARE UNIT

G. Jones¹, A. Watkins¹, A.R. Wilkes², L. Middleton¹, M. Vijayakumar¹

¹Intensive Care Unit, Morriston Hospital, Swansea, United Kingdom, ²Department of Anaesthetics, Cardiff University, Cardiff, United Kingdom

INTRODUCTION. The estimated annual incidence of acute pancreatitis in the UK is around 10-20/million population (1). Approximately 25 % of these patients develop severe acute pancreatitis (SAP) requiring prolonged intensive care admissions with an associated high mortality. (1)

OBJECTIVES. We aimed to review the incidence, management & outcome of patients admitted with SAP to our regional pancreas referral Intensive Care Unit (ICU) and to evaluate the prognostic role of the scoring systems used in our unit: Acute Physiology and Chronic Health Evaluation (APACHE) II and Intensive Care National Audit and Research Centre (ICNARC) prediction models.

METHODS. Retrospective analysis of all patients admitted with a primary diagnosis of acute pancreatitis between October 2011 and October 2013 using the unit's ICNARC database, e-discharge summaries and IMPAX digital imaging system

RESULTS. 43 patients were admitted with a primary diagnosis of SAP against a total of 2285 admissions during the two-year period. Data could only be collected for 40 patients. The most common aetiologies were Idiopathic (47.5 %), gallstones (25 %) and alcohol (20 %). The APACHE II & ICNARC scores, length of stay and mortality data are displayed on Table 1.

APACHE II score*	17 (12-20)*
ICNARC score*	19 (15-28)*
Median Length of stay (LOS) in ICU & Hospital (days)	10 & 23
ICU & Hospital Mortality (%)	30 % & 21.4 %
Empirical Antibiotics (%)	40 %
Number of CT scans in ICU	2(1-3)*, Range 0-9

[Table 1, *Median (Interquartile range)]

35 % (14/40) of patients required Renal replacement therapy (RRT) and 71.4 % (10/14) of those requiring RRT died. 15 % (6/40) underwent CT Guided drainage (3 of whom had subsequent necrosectomy), 10 % (4/40) underwent minimally invasive necrosectomy, 15 % (6/40) underwent open laparotomy and 1 patient had an embolization procedure

The area under receiver characteristics curve for the APACHE II and ICNARC scores were 0.85 and 0.83 respectively and hence were similar in outcome prediction for our patient population.

CONCLUSIONS. The ICU mortality of our patient population with SAP was 30 %. Patients with SAP who require ICU continue to be resource intensive, have a high mortality and a prolonged length of stay. The requirement of RRT was associated with poor outcome. Both the APACHE II and ICNARC prediction models were similar in outcome prediction in our patient population.

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IMPACT OF TOTAL SERUM BILE ACIDS IN CRITICALLY ILL PATIENTS

K. Rutter^{1,2}, T. Horvatis^{1,2}, A. Drolz^{1,2}, G. Fauler³, G. Heinz⁴, M. Hülsmann⁴, M. Trauner², V. Fuhrmann^{1,2}

¹University Medical Center Hamburg-Eppendorf, Department of Intensive Care Medicine, Hamburg, Germany, ²Medical University of Vienna, Div. of Gastroenterology and Hepatology, Vienna, Austria, ³Medical University of Graz, Clinical Institute of Medical and Chemical Laboratory Diagnostics, Graz, Austria, ⁴Medical University of Vienna, Division of Cardiology, Vienna, Austria

INTRODUCTION. Cholestasis is a frequent finding in critically ill patients associated with increased mortality. There is limited data regarding the clinical impact of total serum bile acids (TBA) in critically ill patients available.

OBJECTIVES. Aim of the study was to evaluate the impact of total serum bile acids on 28-day-mortality in critically ill patients.

METHODS. Critically ill patients admitted to the intensive care unit (ICU) were included in this study. TBA (µmol/l) on admission were assessed in all patients. Patients

characteristics including admission diagnosis, severity of illness and 28-d-mortality were documented. SPSS (version 21.0.0.1) was used for statistical analysis. P values < 0.05 were considered as statistically significant.

RESULTS. 119 patients (74 male), with mean age of 64 ± 14 years and mean SAPS II score on admission of 56 ± 23 were included in this study. Overall 28-d-mortality was 19 %. Main admission diagnoses were cardiogenic shock in 39 %, post-surgical in 23 %, septic shock in 10 %, cardiopulmonary resuscitation in 14 % and others in 14 %. Mean TBA in the total cohort were 5.0 ± 10.3. TBA were significantly higher in patients with septic (10.6 ± 19.8) and cardiogenic shock (5.6 ± 12.1) compared to post-surgical patients (2.4 ± 4.7; p < 0.05). TBA correlated with alkaline phosphatase levels (r = 0.49; p < 0.001) and gamma-glutamyl levels (r = 0.50; p < 0.001) but not with bilirubin levels on admission (n.s.). In patients that died within 28 days, TBA were significantly elevated (median, IQR: 5.3 (0.8-10.1) vs. 1.2 (0.6-4.2); p < 0.05). TBA were significantly associated with 28-d-mortality independent of age, sex and bilirubin (HR:1.05; 95 % CI: 1.01-1.09; p < 0.05). AUROC of TBA for predicting 28-d-mortality was 0.7. Sensitivity was 55 % and specificity 78 % for prediction of 28-day-mortality at a cut-off of TBA > 5. **CONCLUSION.** Total serum bile acids in critically ill patients are significantly associated with 28-d-mortality.

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MORTALITY AND LONG-TERM FUNCTIONAL STATUS AFTER DISCHARGE FROM A MEDICAL ICU: A COMPARISON BETWEEN ELDERLY (≥ 80 YEARS) AND YOUNG (< 80 YEARS) ICU PATIENTS

R.P. Oliveira¹, C. Teixeira¹, J.G. Maccazi², J.S. Haas², C.R. Cabral², T.F. Tonietto², J.H.D. Barth², A. Savi², N.B.D. Silva¹

¹Universidade Federal de Ciências da Saúde de Porto Alegre, Clínica Médica, Porto Alegre, Brazil, ²Moinhos de Vento Hospital, Adult ICU, Porto Alegre, Brazil

INTRODUCTION. Admission of elderly patients to the intensive care unit (ICU) is frequently and it will grow in the near future. The hospital- and post-discharge mortality and disability in activities of daily living (ADL) post-ICU-discharge is high; however, the results of the studies have been very heterogeneous and depending on the reason for ICU admission and previous diseases.

OBJECTIVES. To investigate the mortality, and disability in ADLs and reduction in autonomy in 24-months after ICU discharge, comparing elderly (≥ 80 years) and young (< 80 years) ICU medical survivors patients.

METHODS. Prospective cross-sectional cohort study. Data were collected in two mixed ICUs (31-bed, closed ICU in a private hospital; and 18-bed, open ICU in a university hospital) by interview by telephone 2 years after ICU-discharge, and compared with data collected during ICU-stay. The baseline characteristics, pre-existing diseases, *Lawton-ADL* (L-ICU) index, *Karnofsky* (K-ICU) index, scores of severity of disease, and data on respiratory, cardiovascular, and dialysis treatments were recorded during the period of ICU stay. Complications during ICU-hospitalization, survival status at ICU and at hospital discharge were also recorded. After 24 months, were collected *Lawton-ADL* (L-24mo) and *Karnofsky* indices (K-24mo), and cognitive assessment by Six-Item Screener.

RESULTS. One thousand two hundred fifty-six patients were admitted in two ICU during the study period. At 24 months, 79 (32.2 %) patients aged ≥ 80 years and 421 (43.3 %) aged < 80 years were alive and could be evaluated. Elderly patients have poor functional status at 24 months compared with young patients L-24mo: 25.7 ± 9.7 vs. 16.6 ± 12.9 (p < 0.0001) and K-24mo: 82.9 ± 14.4 vs. 66.8 ± 21.2 (p < 0.0001). Total functionality recovery occurred more likely in younger patients (*Lawton-ADL*: OR 1.71 [95 % CI 1.31-2.23], and *Karnofsky* index: OR 1.69 [95 % CI 1.30-2.19]). Only younger patients were able to improve their functional status after 24 months. Immediately after ICU discharge, the elderly had more cognitive deficits (18 % vs. 3.5 %, p < 0.0001) compared to younger patients. Two years after ICU discharge this difference was maintained (23.4 % vs. 10.6 %, p < 0.0001).

CONCLUSIONS. In our study elderly critically patients have poor functional status at 24 months compared with young patients and more cognitive deficits even after two years of discharge ICU. The intensive care is a devastating experience for the elderly.

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OUTCOME AND IMPROVEMENT OF SOME LABORATORY PARAMETERS FOLLOWING POLYMYXIN B-IMMOBILIZED FIBER TREATMENT IN SEPTIC SHOCK

Y. Sakamoto¹

¹Saga University, Saga, Japan

INTRODUCTION. Direct hemoperfusion using a polymyxin B-immobilized fiber column (DHP-PMX; Toray Industries Inc., Tokyo Japan) was first developed 1994 and has been used for the treatment of septic shock. Positive clinical data, such as an increase in systolic blood pressure (SBP) and an improved PaO₂/FIO₂ ratio, have also been reported. On the other hands, recently some papers showed the relationship between sepsis and ADAMTS13 that cleaves von Willebrand factor multimers, and inhibits thrombus formation and, seemingly, inflammatory reactions.

OBJECTIVES. 29 septic shock patients using 2-6 h DHP-PMX were retrospectively reviewed to examine improved rate of any sepsis related factors after DHP-PMX and to analyze relationship between outcome and sepsis related factors.

METHODS. We checked level of many factors before PMX treatment, after PMX treatment and 1 day after PMX treatment.

RESULTS. The average patient age was 63.25 ± 13.13 years; 17 of the patients were men and 12 were women. The mean APACHE II score was 28.76 ± 8.64, and the mean SOFA score was 11.72 ± 4.52 before DHP-PMX. The APACHE II score was significantly higher (p < 0.00001) and the SOFA score was significantly higher too (p = 0.0005) in expired cases than in survived cases.

A Chi square test showed that the survival rate in surgical group was significantly better than in medical group (p = 0.0027). The survival rate of surgical group (84.2 %) was judged to be very good because the predicted survival rate based on the APACHE II score (25.0) was only 46.5 %. On the other hand, the survival rate of medical group (35.3 %) was almost equal to that predicted by the APACHE II score (30.6; predicted survival rate, 27.4 %). AEA, 2-AG and PAI-1 were significantly improved after DHP-PMX treatment. Survival

cases were significantly low ADAMTS13 level in every phase (pre PMX-DHP treatment, post PMX-DHP treatment and 1 day after treatment).

CONCLUSIONS. We observed a relationship between outcome and the low serum ADAMTS13 levels in septic shock patients treated by DHP-PMX. Therefore we suggested the benefit of ADAMTS13 examination for effective forecasting of DHP-PMX treatment.

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EVALUATION OF PROGNOSTIC LABORATORY DATA ON SURVIVAL DURING PROLONGED EXTRACORPOREAL LIFE SUPPORT

H.S. Son¹, H.J. Kim¹, J.S. Jung¹, K. Sun¹

¹College of Medicine, Korea University, Department of Thoracic and Cardiothoracic Surgery, Seoul, Korea, Republic of

INTRODUCTION. Improving ECMO management, prolonged ECMO support occur frequently. However, a few study were performed to evaluate adequate prognostic factor for survival during ECLS (Extracorporeal life support). Laboratory data correlated with end organ dysfunction can be useful for prognosis of ECLS. Therefore, we investigated prognostic factor to predict successful survival in prolonged ECMO.

OBJECTIVES. Our purpose is to find helpful laboratory data for prediction of survival after ECLS.

METHODS. This study reviewed retrospectively the patients who treated with ECMO between 2009 and 2014. We excluded the patients who shorter than 3 day long support and younger than 15 years old. All values were collected such as demographic, clinical, and laboratory data during ECLS. Laboratory data were divided each post-ECLS 0 day, 1 day and 3 day.

RESULTS. Forty-three patient were enrolled this study.(89 patients were excluded according to study design) Mean ECLS time were 329.36 ± 284.81 h. Weaning from ECMO were 25/43(58.1 %). Overall survival were 13/43 (30.2 %). In univariate analysis, age, sex, renal replacement therapy were significant prognostic factors. In serial laboratory data, blood urea nitrogen (BUN), international normalized ratio(INR) have significant predictive values for survival at post-ECLS 1 day and 3 day. (P-value < 0.05).

CONCLUSIONS. In this study, BUN and INR showed predictable values during ECLS between post-ECLS 1 day and 3 day. These can be useful tools to predict survival after ECLS.

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Bleeding, sedation & haemodynamic instability: 1095–1108

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IMPACT OF REMOTE ELECTRONIC MONITORING AND TELE-INTENSIVE CARE UNIT BASED ALGORITHM IN MONITORING PACKED RED CELL TRANSFUSION BEHAVIOR FOR ANEMIA OF CRITICAL ILLNESS: LONGITUDINAL MULTI-YEAR EXPERIENCE FROM A SINGLE COMMUNITY HEALTH SYSTEM IN THE UNITED STATES OF AMERICA

N. Li¹, D. Simonds², R. Alva³, T. Wyatt⁴, M. Ramaswamy²

¹Moses Cone Hospital, Internal Medicine Reidency Program, Greensboro, United States,

²LeBauer Health Care and Cone Health, Pulmonary and Critical Care, Greensboro, United States,

³LeBauer Health Care and Cone Health, Pulmonary and Critical Care Medicine, Greensboro, United States,

⁴Cone Health System, Department of Elink Critical Care, Greensboro, United States

INTRODUCTION.

- Anemia in the ICU is common and the most common therapeutic approach is the transfusion of stored allogenic packed red blood cell (PRBC) which is potentially harmful. In 2009 the Society for Critical Care Medicine (SCCM) outlined hemoglobin (Hgb) < 7 gm % as indication for transfusion in the ICU. Despite this, physicians continue to transfuse PRBC at higher Hgb thresholds.

- VISICU eICU program is a registered trademark of Philips Healthcare. In the USA it serves more than 350 hospitals. eICU aims to improve critical care delivery by remote monitoring, blending medicine with technology, and adopting patented processes.

- Cone Health is a multi-hospital, community health system in the city of Greensboro, NC, USA. It has over 100 ICU beds spread across multiple specialties with variable models of care ("open" and "closed"). Since 2007 bedside coverage for all ICU's is backed up eICU.

OBJECTIVES. - In 2010, the department of medical intensive care agreed to evaluate and improve transfusion practices for anemia of the critical illness across the whole health system **METHODS.** - We took advantage of the proprietary computer algorithm used by eICU that tracked PRBC transfusion in anemia of critical illness. The system provided quarterly global feedback for each ICU. -The active intervention took place in late 2010 and early 2011. More than fifteen didactic lectures to various target audiences (ICU nurses, physicians, surgeons, oncologists, cardiologists etc.) were delivered. After this, a less active approach was adopted by sharing quarterly VISICU data to the medical ICU team that was vested in this performance initiative and through individual direct feedback on ad-hoc basis to physicians of other service lines.

RESULTS.

- For the years 2008, 2009 & 2010, only 14.9 %, 18.6 % & 16.8 % of PRBC transfusion was appropriate (i.e., transfused at Hgb < 7gm %). This improved significantly in 2011 and was sustained in 2012 at 39.2 % & 40.2 % respectively

- Performance improvements though seen across all ICUs was most significant in the closed medical ICU at the flagship hospital (> 59 % for 2011 and 2012).

- The results were independent of severity of illness, and ICU patient census.

CONCLUSIONS.

- Didactic lectures complemented by sustained, feedback blended with an eICU program improved physician practice performance in this large community health system in the USA. Physicians most likely to change were those directly vested in the performance improvement program. Despite these efforts, a majority of ICU patients continue to receive PRBC at higher transfusion thresholds than indicated.

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UTILITY OF EMPIRICAL MODELS OF HEMORRHAGE IN DETECTING AND QUANTIFYING BLEEDING

M. Guillaume-Bert¹, A. Dubrawski¹, L. Chen¹, A. Holder², M.R. Pinsky², G. Clermont²

¹Carnegie Mellon University, Auton Lab, Pittsburgh, United States, ²University of Pittsburgh, School of Medicine, Pittsburgh, United States

INTRODUCTION. Hemorrhage is a life-threatening condition that, if not detected and treated early, may lead to cardiovascular shock. We hypothesized that a Machine Learning (ML) based approach to build informative models from hemodynamic data could reliably and consistently detect onset of bleeding, estimate bleed rate and the amount of blood lost.

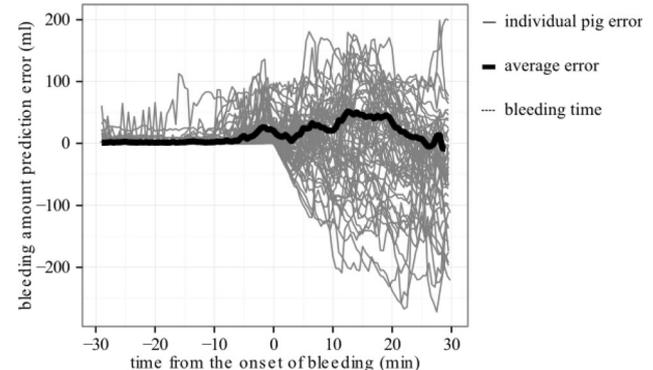
METHODS. Previously healthy pigs were anesthetized, intubated, ventilated and instrumented with routine invasive hemodynamic monitoring equipment prior to and during controlled hemorrhage (5, 20 and 60 ml/min) to a mean arterial pressure of 30-40 mmHg. Multiple commonly monitored physiologic variables collected in the process were used as inputs of a prototype ML system trained to identify bleed onset, bleed rate, and the amount of blood lost. Training and evaluation of models were done using leave-one-subject-out cross validation protocol. In addition, ML models provided descriptions of the importance and impact of each physiologic variable.

RESULTS. Empirical evaluation shows the ability to reliably detect bleeding at a rate of 20 ml/min after the loss of 61 ml of blood at an average interval between false alerts of 30 min, and reliable detection after 102 ml loss on average at false alert of interval of 5 h (see fig. 2).

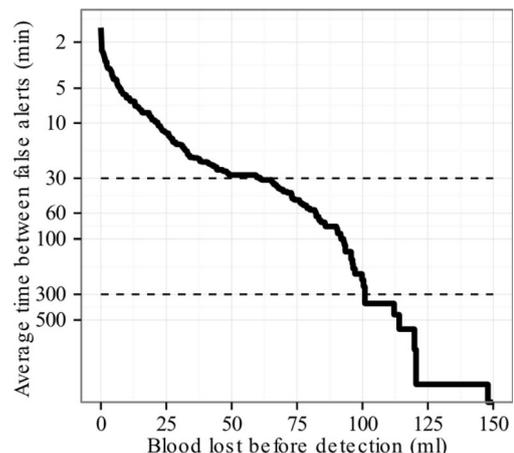
Fig. 1 shows the bleeding prediction error according to the duration of bleeding. The analysis of the ML models assesses and ranks the importance of each vital sign, and each derivative feature of it. Obtained results highlight the importance of multiple vital signs, particularly of the Central Venous Pressure waveform, once normalized and featurized for use in the ML system.

CONCLUSIONS. ML approach is feasible to model common physiological data and it can be used to enable efficient and robust detection, tracking and characterization of bleeding. ML based tools could also be used to inform the understanding of physiological responses to bleeding.

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[Fig 1]



[Fig 2]

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PRE-OPERATIVE PROGNOSIS OF PREDISPOSITION FOR BLEEDING-INDUCED CRASH

A. Dubrawski¹, L. Chen¹, F. Liu¹, G. Clermont², M.R. Pinsky²¹Carnegie Mellon University, Auton Lab, Pittsburgh, United States, ²University of Pittsburgh, School of Medicine, Department of Critical Care Medicine, Pittsburgh, United States

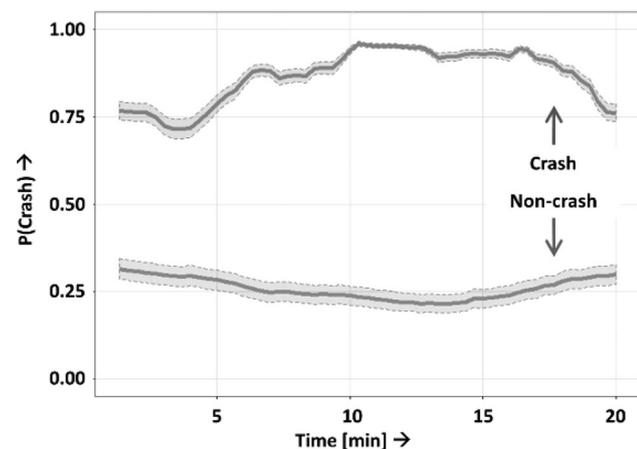
INTRODUCTION. The ability to estimate probability of emergence of a profound instability during surgery prior to its beginning could be particularly useful in reducing risk and harm to surgical patients. We studied a Machine Learning (ML) approach to prognose the likelihood of crash in healthy pigs subjected to severe hypovolemic stress induced by controlled hemorrhage.

METHODS. Previously healthy pigs were anesthetized, intubated, ventilated and instrumented with routine invasive hemodynamic monitoring equipment prior to controlled hemorrhage, and a set of routine vital signs have been collected during this period of stability. Then, all pigs were subject to severe hypovolemic stress induced by a slow bleed at 20 ml/min until mean arterial pressure (MAP) decreased to 30 mmHg and then they were held at that MAP for 90 min prior to reinfusion of colloid/crystalloid mix (hextrend) ml per ml shed blood. If during the 90 min hypovolemic state the MAP decreased to < 20 mmHg for 10 s, or to < 30 for 10 min, then pigs were considered crashing and immediately resuscitated with the colloid/crystalloid solution, to prevent cardiac arrest and death. 4 in 28 pigs crashed, but all were successfully resuscitated from their profound hypovolemic state. We used ML approach to predict probability of crashing using only data collected during stable period prior to the onset of induced bleeding.

RESULTS. We evaluated reliability of the resulting model using leave-one-pair-of-subjects-out cross-validation protocol where each pair consisted of one crash and one non-crash pigs for 4-24 = 96 unique pairs. We assembled test results separately for crash and non-crash pigs and computed the average "crash" scores and their confidence limits respectively. We then drew temporal plots of those statistics over the pre-bleeding period, truncating a few initial and a few ending minutes of it because of substantial noise observed in raw data during setup periods before anesthesia and before surgery. The results (Fig. 1) show remarkably significant separation between crash probability score distributions obtained for crash and non-crash test pigs throughout the period of pre-surgery stabilization.

CONCLUSIONS. Our prototype ML based approach to prognose likelihood of bleeding-induced crash using routine, continuously monitored vital signs, yielded very promising results. It could also help identify the key drivers (features supporting predictions) that might inform pre-operative decisions to clear patients for surgeries as well as issuing reliable risk warnings before surgeries take place.

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[Fig. 1]

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IMPLEMENTATION OF A DELIRIUM DAILY SCREENING TOOL AND CLINICAL OUTCOMES

R.D.S. Townsend¹, F.S. Neres¹, J.M.S.d. Andrade¹, A.C.T. Raupp¹, F.L. Dexheimer Neto^{1,2}, M.C. Prestes¹, A.M. Santana¹, R.V. Cremonese¹¹Hospital Ernesto Dornelles, Unidade de Terapia Intensiva, Porto Alegre, Brazil, ²Universidade Federal do Rio Grande do Sul - Bolsista CAPES 9869-13-1, Programa de Pós Graduação em Ciências Pneumológicas, Porto Alegre, Brazil

INTRODUCTION. Delirium is associated with negative outcomes and is frequently underrecognized in the ICU. International guidelines recommend systematic screening for adequately management of Delirium and suggest that it may improve outcomes.

OBJECTIVES. To compare clinical settings before and after the implementation of a systematic monitoring of Delirium in our daily practice.

METHODS. We performed an observational comparative study in a 23 bed general ICU in a south Brazilian hospital.

After the development of a mobile application that guides the examiner through the Confusion Assessment Method (CAM-ICU) and creates a database, patients were screened three times a day, from March to August of 2013. The results were compared to data from the same period of the previous year.

RESULTS. A total of 944 patients were monitored for Delirium from March to August of 2013.

When we compared the data from the two observational period (2012 and 2013, respectively), there was a slightly difference in medium age (60,5 × 58,6 years, p = 0,005) but no

significant difference in terms of medium APACHE II score (18 X 19, p = 0,21), length of mechanical ventilation (3,9 X 4,3 days; p = 0,49), ICU length of stay (3,8 x 3,9 days; p = 0,43) or ICU's mortality rates [23,2 % X 25,8 %; p = 0,39]. Interestingly, the administration of midazolam by continuous infusion increased by 34 % and fentanyl infusion increased 44 % in the period of 2013, however there was no significant difference in the prescription of intermittent antipsychotic, analgesic or sedatives drugs.

CONCLUSIONS. Monitoring, as an isolated method to deal with delirium, seems to be insufficient to improve patient outcomes. Probably systematic screening should be incorporated to a wider delirium management protocol to ameliorate care.

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THE TRADITIONAL HERBAL MEDICINE YOKUKANSAN AS AN ADJUNCTIVE SEDATIVE IN THE INTENSIVE CARE UNIT

T. Tsubo¹, E. Hashiba², H. Okawa², K. Hirota²¹University of Hirosaki, School of Medicine, Intensive Care Unit, Department of Anesthesiology, Hirosaki, Japan, ²Hirosaki University Hospital, Intensive Care Unit, Hirosaki, Japan

INTRODUCTION. Sedatives used in the intensive care unit (ICU) include midazolam, propofol, dexmedetomidine and opiates. Some patients, however, are resistant to these drugs. The Asian traditional herbal medicine yokukansan (TJ-54) is used in Japan to treat behavioral and psychiatric symptoms of dementia (BPSD) and has been approved for restlessness and agitation. Recently this drug was used to alleviate delirium in postoperative patients.

OBJECTIVES. To evaluate the effects of yokukansan as an adjunctive sedative in the ICU. **METHODS.** This study involved 15 patients resistant to ordinary sedatives, with resistance defined as the ineffectiveness of two combinations sedatives at usual doses. Each patient was administered 2.5 g yokukansan orally or by nasogastric tube and evaluated 1 h later by the Richmond Agitation Sedation Scale (RASS) and the Bispectral Index (BIS).

RESULTS. Yokukansan was markedly effective in four patients, effective in seven and ineffective in two. Mean onset time was 28.3 ± 4.0 min, mean administrative time was 1.9 ± 1.3 h, and clinical duration ranged from 2 to 8 h. Mean RASS score improved from 1.4 ± 0.6 to -0.6 ± 1.0 (p < 0.05), and mean BIS decreased from 92.3 ± 6.3 to 57.0 ± 15.6 (p < 0.05; Figure). There were no changes in respiratory rate, blood pressure and heart rate.

CONCLUSIONS. Yokukansan, a Kampo prescription composed of seven herbaceous plants, was developed as a cure for restlessness and agitation. Yokukansan has been reported to act as an antagonist at serotonin 1A and dopamine 2 receptors. Geissoschizine methyl ether, an alkaloid in uncaria hook, is a major ingredient of yokukansan. Yokukansan was effective as an adjunct sedative in the ICU.

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1100

A NATIONAL SURVEY OF SEDATION AMONG JUNIOR ANAESTHETISTS

M. Khpal¹, A. Myers², D. Konu¹¹Barnet General Hospital, Anaesthesia and ICU Department, London, United Kingdom, ²Croydon University Hospital, Anaesthesia and ICU Department, London, United Kingdom

INTRODUCTION. Sedation is a continuum extending from alert consciousness to complete unresponsiveness [1]. Conscious sedation should be safe since cardiorespiratory support is not required [2]. Loss of verbal response mandates care identical to that required for general anaesthesia (GA) and is outside the remit of non-anaesthetists [2]. An audit of upper GI endoscopies under sedation showed that inappropriate practice lead to morbidity and mortality as high as 1/200 and 1/2000 respectively [3]. Still, many administering sedation have no formal training and do not follow guidelines [4].

AIM. Anaesthetists are assumed to be confident in administering sedation and well placed to safely convert to GA when required. This may be true for senior anaesthetists but there is minimal evidence detailing experience of juniors. This survey reviews sedation practice by trainee anaesthetists in an attempt to examine safety of current practice and identify training issues.

METHODS. A survey was distributed at a national anaesthesia course attended by 68 anaesthetic trainees from all over UK. The survey was paper based, confidential and completed on a voluntary basis. Responses were collected and analysed using Microsoft Excel.

RESULTS. Response rate was 78 % (69 % were anaesthetists in their first year of training, and 31 % in the 2nd or 3rd year). Only 17 % reported receiving formal training in sedation. Only 40 % were aware of sedation guidelines yet 96 % had administered sedation. 65 % did not know the recommended depth of sedation. 37 % had needed to request senior help due to complications. 82 % encountered complications including respiratory depression (64 %) and loss of consciousness (51 %). Some administered sedation in inappropriate locations i.e. wards (16 %) and A&E Minors (6 %). 20 % did not routinely pre-assess patients as for a GA.

CONCLUSIONS. This survey suggests many junior anaesthetists feel they have received insufficient training in sedation. While most fully monitor their patients, 20 % had not pre-assessed them. 37 % required senior assistance- possibly since they were in remote or unsupported sites where complications are more difficult to manage. This small survey suggests a variation in practice among trainees and scope to improve core training pertaining to sedation. A larger survey would be valuable for confirming these results and assisting in development of a sedation training programme.

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MULTI-TIER GROUND TRUTH ELICITATION FRAMEWORK WITH APPLICATION TO ARTIFACT CLASSIFICATION FOR PREDICTING PATIENT INSTABILITY

D. Wang¹, L. Chen¹, M. Fiterau¹, A. Dubrawski¹, M. Hravnak², E. Bose², D. Wallace³, M. Kaynar³, G. Clermont³, M. Pinsky³

¹Carnegie Mellon University, Auton Lab, Pittsburgh, United States, ²University of Pittsburgh, School of Nursing, Pittsburgh, United States, ³University of Pittsburgh, School of Medicine, Department of Critical Care Medicine, Pittsburgh, United States

INTRODUCTION. Robust health monitoring systems would identify alerts due to artifact (e.g. noisy signals or loose sensors) and distinguish them from alerts signifying actual instability. We sought to apply Machine Learning (ML) to distinguish artifact from real alerts, but it requires a library of expert-annotated data to establish ground truth. To facilitate the expert annotation process, we prototyped an Active ML protocol of multi-tier alert annotation elicitation that yields accurate alert adjudication models at minimal effort from a team of expert clinicians.

METHODS. The data, collected from continuous noninvasive monitoring system for heart rate (HR) respiratory rate (RR), systolic and diastolic blood pressure (BP), and peripheral pulse oximetry (SpO₂) contained 1582 alert periods defined as exceedances over pre-set stability thresholds (HR < 40 or > 140, RR < 8 or > 36, systolic BP < 80 or > 200, diastolic BP > 110, SpO₂ < 85 %). The Active ML algorithm selected a batch of alerts which were then presented to multiple reviewers working individually. Each reviewer was asked to score the alerts on an annotation confidence scale ranging from -3 (artifact) to 3 (true alert). Alerts scored with substantial disagreement or low confidence were pushed to a jury committee of clinicians for discussion and consensus annotation. The alerts that could not be agreed upon were put in a “freezer” and not used in modeling (Fig 1).

RESULTS. We collected 1941 annotations from 7 expert clinician reviewers on 450 unique alerts (HR: 60, BP: 80, RR: 80, SpO₂: 230), among which 32.5 % of BP, 50 % of SpO₂, and almost no HR or RR alerts had scores requiring escalation to the 2nd tier review. Results show that consensus for alerts initially conflicted improved significantly as a result of the committee review (kappa statistic increased from -0.19 to 0.29 for BP, and from -0.10 to 0.28 for SpO₂, Fig. 2). A preliminary artifact adjudication model built using the resultant consensus-derived “ground truth” annotations showed that identification of SpO₂ artifact was achieved early and not improved when 50 % more annotated training data was added to the model. This suggests that the proposed annotation process can yield accurate ground truth evidence with reduced human effort.

CONCLUSIONS. We implemented a multi-tier framework to elicit ground truth from multiple reviewers to support development of a prototype of the automated artifact adjudication system. The initial results show that precious human expertise can be utilized efficiently and without loss of performance of the resulting models of instability.

GRANT ACKNOWLEDGMENT. NIH NINR R01NR013912; NSF 0911032, NSF 1320347.

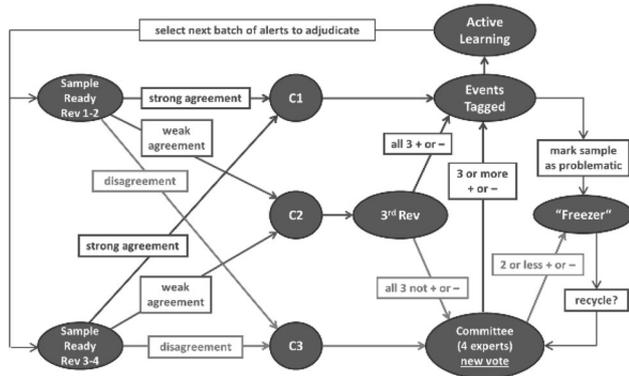


Figure 1: Flow chart of the prototype adjudication protocol.

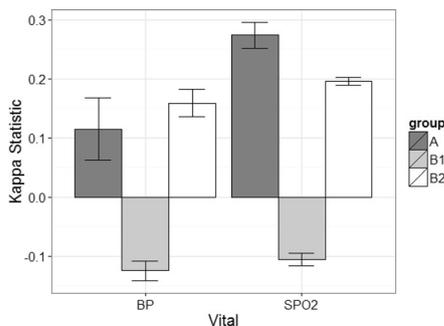


Figure 2: Kappa statistic for reviewed alerts. A: alerts adjudicated at the 1st step; B: alerts escalated to the committee level, B1 and B2: kappa before and after the committee review, respectively.

1102
DECREASES IN EXHALED CARBON MONOXIDE IN PATIENTS EXPERIENCING MULTI-ORGAN FAILURE

M. Kida¹, Y. Shima¹, N. Shibata¹, M. Tanaka¹, T. Nakashima¹, K. Miyamoto¹, Y. Kawazoe¹, T. Yonemitsu¹, K. Ueda¹, Y. Iwasaki¹, S. Yamazoe¹, S. Kato¹

¹Wakayama Medical University, Emergency and Critical Care Medicine, Wakayama, Japan

INTRODUCTION. Carbon monoxide (CO), an endogenous gaseous substance, is a mediator that maintains homeostasis through vasodilation and its anti-inflammatory effects. Heme oxygenase 1 (HO-1) is a general cytoprotective mechanism against oxidative stress. HO-1 catabolizes heme to bilirubin and CO. Exhaled CO may reflect oxidative stress, and may thus be useful in the detection and management of the conditions of the critically ill. **OBJECTIVES.** To assess the exhaled CO reliability of NO-dependent vasodilation and bilirubin metabolism in critical patients.

METHODS. We investigated 35 patients put on a mechanical ventilator in our ICU. We evaluated exhaled CO output (VCO), arterial carboxyhemoglobin (CO Hb), total bilirubin (T-Bil), guanosine 3’5’-cyclic monophosphate (cGMP), and SOFA (sequential organ failure assessment) scores after stabilizing the ventilator setting at FiO₂ 1.0 for 30 min. We then examined these variables’ relationships. Correlation among variables were assessed with Pearson’s correlation coefficient and expressed in r and P values.

RESULTS. There was significant correlation between VCO and CO Hb and VCO and T-Bil levels (r = 0.46, P < 0.01 and r = 0.56, P < 0.01). VCO was found to be negatively correlated with SOFA score and cGMP (r = 0.37, P < 0.05 and r = 0.33, P < 0.05).

CONCLUSIONS. The data showed that exhaled CO decreased in patients experiencing multi-organ failure. This may be due to the suppression of CO production or enhanced CO metabolism when organ failure progresses. As a result, there is a possibility that cGMP increases and affects circulation.

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DEVELOPMENTAL STUDY OF THE EFFECTS OF BALANCED RESUSCITATION IN POST-OPERATIONAL PATIENTS AFTER DIGESTIVE SURGERY IN ICU

R. Gutierrez-Rodriguez¹, I. Macias-Guarasa¹, M.D. Arias-Verdu¹, R. Rivera-Fernandez²

¹Carlos Haya University Hospital, Malaga, Spain, ²Carlos Haya University Hospital, Intensive Care Unit, Malaga, Spain

OBJECTIVE. to study the changes in resuscitation and initial handling of fluids after emergency digestive surgery and its link to observed mortality.

METHODS AND MATERIALS. retrospective, descriptive comparative study of ICU patients after emergency digestive surgery between 2009 and 2010, and 2010 and 2011. variables: demographics (sex, age, hospital and ICU mortality) associated co-morbidity according to Charlson Index, gravity according to scores, APACHEII and SOFA. Evaluation of fluid therapy administered during the first 24 h of the post-operative period, both to cover base needs and as part of a balanced resuscitation (alternation between saline solution, isosmolar substances, plasmalyte, ringers is permitted) and non-balanced (where an exclusive resuscitation is performed with a single type of serum such as saline at 0.9 %, colloids or simply blood products). Other variables: multiple transfusions during admission and in the immediate post-operative period (more than 4 concentrates of hemates > 900 cc of plasma or > 2 pools of platelets), renal dysfunction, pulmonary complications and metabolic acidity. Significance rated at P < 0.05. X2 for qualitative variables and T-student for quantitative variables.

RESULTS. we studied 150 patients after emergency digestive surgery, mainly secondary to sepsis of biliary or urinary origin. 62 were admitted between 2009-2010 and the rest, 88, were admitted 2011-2012. Mean age was 59 ± 16, scores, SOFA 2.4 ± 3.1, APACHE II 20.4 ± 7.3 y Charlson index 1.2 ± 2.5. Mean ml serum in the first 24 h, for the 2009-2010 group, (7,449.25 ± 11,319), and ml of saline at 0.9 %, (4,075 cc ± 7,833 cc) compared to the 2011-2012 group, general serum (2300 ± 1110 cc), saline (1440 ± 333 cc), with no significant differences between groups. In the univariable analysis, not receiving a balanced resuscitation, 27 % showed no significant link to a greater production of metabolic acidity, coagulopathy or a greater positive balance of fluids. Significant differences were observed P < 0.05 in patients who presented a non-balanced resuscitation, and the percentage of multiple transfusions in the first 48 h, 69 %, vs 39 %. There was a greater incidence of renal dysfunction according to RIFLE, 57 % vs 52.2 %. Equally those patients who were resuscitated with colloids 15 %, presented a greater incidence of nosocomial infections, 54.5 % vs 30 %, P < 0.001, and multiple transfusions during surgery 36.4 % vs 30 %. Resuscitation with blood products, 9 %, presented 97.7 % highly positive balance, P < 0.05, and multiple transfusions in the first 48 h, 50 % vs 12 %.

CONCLUSIONS. this study suggests that complications caused by a poor management of fluids following emergency digestive surgery were linked more with the type of fluids than with the ml received.

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ARTIFACT ADJUDICATION FOR VITAL SIGN STEP-DOWN UNIT DATA CAN BE IMPROVED USING ACTIVE LEARNING WITH LOW-DIMENSIONAL MODELS

M. Fiterau¹, A. Dubrawski², L. Chen³, M. Hravnak⁴, M.R. Pinsky⁵, G. Clermont⁶

¹Carnegie Mellon University, Machine Learning, Pittsburgh, United States, ²Carnegie Mellon University, Robotics, Pittsburgh, United States, ³Auton Laboratory, Pittsburgh, United States, ⁴University of Pittsburgh, School of Nursing, Acute and Tertiary Care, Pittsburgh, United States, ⁵University of Pittsburgh, School of Medicine, Critical Care Medicine, Pittsburgh, United States, ⁶University of Pittsburgh, School of Medicine, Pittsburgh, United States

INTRODUCTION. Artificial (false) alerts in physiologically unstable monitored patients cause alarm fatigue in clinical staff. Training a machine learning classifier for automatic artifact adjudication requires that a subset of data must first be labeled by clinicians, which consumes precious time.

OBJECTIVES. Demonstrate the use of active machine learning to select which multi-variate vital sign (VS) alerts should be labeled by experts for the purpose of training a classifier to distinguish true alerts from artifacts to reduce labeling effort yet still achieve highly accurate automated alert adjudication

METHODS. We collected noninvasive VS data including ECG-derived heart rate (HR), respiratory rate (RR), systolic and diastolic blood pressure (BP), and pulse oxygen saturation (SpO₂). Our monitoring system alerts whenever any VS exceeds pre-set stability thresholds

(HR < 40 or > 140, RR < 8 or > 36, systolic BP < 80 or > 200, diastolic BP > 110, SpO₂ < 85 %). 812 samples (10 % of the available alerts) were annotated by two experts as artifact or true alerts, of which 240 corresponded to alerts related to SpO₂. The raw monitoring data were then processed to extract features independently from each VS during the alert time over threshold and 4 min preceding its onset (alert period). The features include common statistics (mean, standard deviation, minimum, maximum), and features inspired by domain expertise (data duty cycle [% of non-missing data during alert period], minimum and maximum of first order differences, slope of a linear fit to data, etc.). We used machine learning system called ActiveRIPR to predict SpO₂ alerts, treating the expert-labeled data as the pool of samples available for active learning. We performed 10-fold cross-validation, training the ActiveRIPR model on 90 % of the samples and using the remainder to calculate the learning curve.

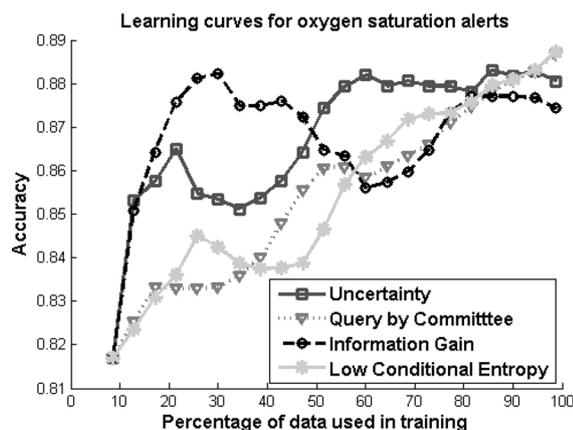
RESULTS. Figure 1 shows a comparison of how the model accuracy varies as the samples are labeled for SpO₂ alert adjudication using different sampling functions specific to active learning (Uncertainty, Query-by-Committee, Information Gain and Conditional Entropy). Table 1 shows the number of samples needed to achieve target AUC accuracies of 0.85 and 0.88, averaged over all cross-validation folds. An accuracy of 0.85 (0.88) can be achieved by labeling 18 % (25 %) of all available samples using the Uncertainty (Information Gain) scoring function.

CONCLUSIONS. Alerts issued by VS monitoring systems can be accurately classified as artifacts/real alerts by an automated classification system which requires that only a small fraction of available reference data be manually labeled to train the classifiers.

GRANT ACKNOWLEDGMENT. NIH NINR R01NR013912; NSF 0911032, 1320347

	Target Accuracy	
	0.85	0.88
Uncertainty	18 %	55 %
QbC	46 %	48 %
InfoGain	21 %	25 %
CondEntropy	43 %	46 %

[Percentage of samples needed for classification]



[Learning curves]

1105 MORTALITY PROGNOSTIC FACTORS OF PATIENTS WITH SYSTEMIC AUTOIMMUNE DISEASE ADMITTED TO THE INTENSIVE CARE UNIT

P.I. Doti¹, E. Coloma Bazán¹, I. Rodríguez Pinto¹, S. Fernández Mendez², O. Escoda¹, P. Castro Rebollo², G. Espinosa Garriga¹, J.M. Nicolás²

¹Hospital Clínic, Department of Autoimmune Diseases, Barcelona, Spain, ²Hospital Clínic, Medical Intensive Care Unit, Barcelona, Spain

OBJECTIVES. To describe clinical features and identify mortality prognostic factors of patients with systemic autoimmune diseases (SAD) admitted in a medical intensive care unit (ICU).

METHODS. Retrospective observational study including all patients with SAD admitted to a medical ICU of a tertiary referral centre between January 1999 and December 2013. Only patients with the diagnosis of SAD according to accepted criteria made prior to ICU admission or during hospitalization were selected. Patients with short term irreversible disease and those with an ICU stay less than 48 h were excluded. The reason for ICU admission, clinical follow-up, immunosuppressive treatment and outcome were collected. Mortality prognostic factors were identified through logistic regression analysis.

RESULTS. Eighty patients accounting for 87 ICU admissions (53 (66.3 %) women) with mean (SD) age of 55.2 years were included. Seven patients were admitted twice. Thirty-two (36.8 %) patients had systemic vasculitis; 25 (28.7 %) patients had systemic lupus erythematosus (SLE); 8 (9.2 %) systemic sclerosis; 7 (8.0 %) dermatomyositis; 5 (5.7 %) had Sjögren's syndrome, 3 (3.4 %) primary antiphospholipid syndrome, 3 (3.4 %) cryoglobulinemia and 4 (4.5 %) other. The reasons for ICU admission were infection in 32 (36.8 %), followed by autoimmune disease flare-up in 19 (21.8 %). Other complications related or not with the SAD were present in 29 (33.3 %) patients. The mean Acute Physiology and Chronic Health Evaluation (APACHE II) at admission was 16.3 (6.7) (range 0-31). At the end of follow-up, 33 (41.3 %) patients had died, 11 (13.8 %) during the stay at ICU, 9 (11.3 %) during hospitalization, and 13 (16.3 %) after hospital discharge. Respiratory failure at the ICU admission [p = 0.004, CI 2.2-74.9] and the development of acute renal failure during the admission [p = 0.008, CI 2.1-125.0] were independently related to death. The presence of interstitial lung disease as a comorbid disease [p = 0.009, CI 1.6-32.6] was also an independent prognostic factor to die during the admission. In addition, corticosteroid therapy with more than 20 mg/day in the previous year of ICU admission [p = 0.043, CI 1.0-20.5], the development of acute renal failure during ICU admission [p = 0.020, CI 1.4-57.7] and the previous diagnosis of interstitial lung disease [p = 0.038, CI 1.1-26.3] were

independently related to increased risk of death in the ICU. Furthermore, longer ICU stays [p = 0.036, CI 1.00-1.1] were related with higher mortality during hospitalization.

CONCLUSIONS. The most prevalent SAD admitted to a medical ICU was systemic vasculitis followed by SLE being infections the main reason for admission. The occurrence of respiratory and renal failure, the presence of interstitial lung disease, the use of high dose of corticosteroid in the previous year of admission and longer ICU stays were factors associated with increased risk of mortality.

1106 ACUTE PANCREATITIS- CASUISTRY OF 4 YEARS IN AN INTENSIVE CARE UNIT

S.C. Alves¹, B. Amaral¹, M. Isidoro¹, R. Carvalho¹, C. Diogo¹, A. Ramos¹

¹HPP Hospital de Cascais, ICU, Cascais, Portugal

INTRODUCTION. Acute pancreatitis (AP) is an inflammatory process of the pancreas. The latest classifications are based on severity factors such as (peri)pancreatic necrosis and organ failure.

OBJECTIVES. To characterize patients admitted in the Intensive and Intermediate Care Unit with AP.

METHODS. Retrospective cohort of admitted patients between March 2010 and March 2014. Variables as sex, age, length of stay, AP etiology, need of invasive mechanical ventilation (IMV), renal replacement techniques (RRT) or aminergic support, imagiological findings, increased RCP in the first 48 h, antibiotic, nutrition in the first 48 h, surgery and death. Data were analysed using SPSS, version 21. The results with a clear association in the univariate analysis (p-value<0.1) were selected for the multivariable analysis. **RESULTS.** A total of 52 patients were included with a median age of 66.8 years old (± 16), 24 (46 %) were women. The most frequent etiologies were lithiasic (50 %), alcoholic (25 %), hypertriglyceridemia (10 %) and post ERCP (6 %). IMV was required in 22 patients (42 %), RRT in 16 (31 %) and aminergic support in 21 (40 %). Imagiological findings were detected in 24 patients (46 %). Aspiration punction was performed in 5 patients. 90 % of the patients had increased RCP in the first 48 h and in 54 % antibiotic therapy was performed. 42 % of the patients had any type of microbiological isolation. 21 % of the patients were on zero diet, 44 % started enteral feeding and 35 % started total parenteral nutrition (because of clinic severity). 15 patients (29 %) underwent surgery (13 pancreatitis's complications, 2 cholecystectomy), 3 patients made therapeutic ERCP and 3 patients were submitted to plasmapheresis. 31 % of the patients died. In an univariate analysis, 4 variables were significantly associated with mortality: need of IMV, RRT, aminergic support and surgery. In a multivariate analysis, it wasn't identify any factor with statistical impact on mortality.

CONCLUSIONS. AP is a common condition in intensive care, with a significant mortality. Organ failure seems to be important in the patients' outcome.

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1107 ARE THERE ANY PREDICTORS FOR A PATHOLOGICAL CRANIAL CT SCAN IN MEDICAL ICU PATIENTS?

M. Messer¹, T. Lahmer¹, R.M. Schmid¹, W. Huber¹

¹Klinikum rechts der Isar, II. Medizinische Klinik, München, Germany

INTRODUCTION. Disorders of consciousness are common in critical ill patients. Because of several potential differential diagnoses such as intracranial bleeding or ischemia, one of the most important diagnostic tools is a cranial CT (cCT) scan. However, transporting of critical ill patients for diagnostic reasons can be associated with increased risk for the patient and complications.

OBJECTIVES. The present study was conducted to identify predictors for a pathological cCT scan in medical ICU patients with a disorder of consciousness.

METHODS. We analyzed retrospectively a cohort of 276 patients with a cCT scan during their stay on a medical ICU. We included all patients with a disorder of consciousness and excluded patients with pre-existing neurological disorder.

Analyzed were age, sex, anisocoria, liver disorder, vasopressor therapy, ventilation, paO₂, paCO₂, pH, anion gap, bilirubin, urea, creatinine, lactate, INR, pTT, platelets, hemoglobin, sodium, potassium, calcium, glucose and TISS and SAPS II score as potential predictors for a pathological cCT scan. A pathological cCT scan was defined with findings of intracranial bleeding, ischemia or edema.

RESULTS. 63/276 patients (22.8 %) had a pathological cCT scan. Patients with a pathological finding in the cCT scan were significantly younger (57.6 y vs. 63.5 y, p = 0.011) and had a longer ICU stay (10.3 d vs. 6.0 d, p = 0.029). Anisocoria was found more often in patients with a pathological cCT scan, but not statistically significant (19/63 vs. 42/213, 30.2 % vs. 19.7 %, p = 0.079, sensitivity 30.2 %, specificity 80.3 %). The observed laboratory parameters were identical between both groups except for creatinine, that was statistically significant lower in patients with a pathological cCT scan (1.51 vs. 1.83 mg/dl, p = 0.026). TISS and SAPS II score were nearly identical in the two groups (21.5 vs. 22.17, 34 vs. 34.7), as well as vasopressor therapy (62 % vs. 66 %), ventilation (67 % vs. 65 %) and liver disorder (33 % vs. 32 %). In multivariate binary regression analysis, younger age (p = 0.015) and longer ICU stay (p = 0.015) were the only parameters independently associated with a pathological cCT scan.

CONCLUSIONS. A pathological cCT scan is common among medical ICU patients with a disorder of consciousness. Younger age and longer ICU stay were independently associated with a pathological cCT scan. However, neither clinical signs nor laboratory parameters are helpful as predictors for risk assessment of an intracranial pathological process. Therefore a cranial CT scan is mandatory in cases of disorders of consciousness.

1108 THE NEW HANDHELD INFRARED PUPILLOMETER MAY BE FAVORABLE IN MONITORING PUPIL DIAMETER, RATHER THAN CONVENTIONAL MEASUREMENT

H. Miyazaki¹, T. Sakai¹, S. Mochizuki¹, R. Furuya¹

¹Yokohama National Medical Center, Emergency Medicine, Yokohama, Japan

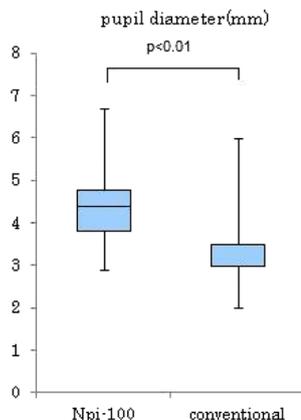
INTRODUCTION. The diameter of pupil has been routinely measured to assess the function of brain stem. However this measurement is common activity in the healthcare facilities such as ICU, it usually measured by simple visual inspection with or without

indicated ruler. Recently, a handheld infrared pupillometer was introduced into the clinical practice. The device measured diameter of pupil and the speed of the light reflex. Scant literature revealed the usefulness of the device.

OBJECTIVES. This study intended to evaluate whether the new device shows accurate measuring performance and has easiness of use.

METHODS. All nurses who were enrolled in this study were taught the standard method which was issued by the manufacture. Measurements were done by the MPI-100 and conventional method, visual inspection or using an indicated ruler. The Neurological pupil index (NPI) was also recorded to evaluate the accuracy of the index. The index was considered that it should be above 3 in healthy subjects. All nurses evaluated the easiness of using the NPI-100 by the scale of 1-5 (5 is most ease). Statistical analysis was performed by paired student's t-test for pupil diameter differences between two methods.

RESULTS. Thirty-four participants were enrolled in this study. The mean working years in ICU was 6 (range 1-27 years). Sixty-eight pupils were measured by using the conventional method and the handheld infrared pupillometer. The mean pupil diameter measured by conventional and pupillometer were 3.3 ± 0.8 mm and 4.4 ± 0.8 mm, respectively. Median easiness score of the device was 4 out of 5, the range of upper and lower quartile was 3.5-5. All cases except one case, it was above 3 which is thought to be the normal range.



[Difference of diameters]

CONCLUSIONS. The handheld infrared pupillometer (MPI-100, Neurooptics, CA USA) has been newly introduced into Japanese market. Most of East Asian population have black eyes, it may be somewhat difficult to distinguish the pupil. The manufacturer mentioned that the device could measure the pupil diameter regardless ethnicities, however no literature proved it. In this study, the device consistently measured the diameters, except a few cases, such as moving eye or blinking during the procedure.

This study shows that the nurses tended to measure pupil diameters smaller than values measured by the pupillometer. This might lead under estimation of pupil diameter when the intracranial pressure was increased. The easiness of using the device was assessed as "very easy" by most of nurses. The Npi seemed precise when it measured healthy subjects, but it may need further investigation to prove clinical benefit.

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1109

THE RELATIONSHIP BETWEEN DELIRIUM AND LONG-TERM COGNITIVE DYSFUNCTION IN CRITICALLY ILL PATIENTS

J.R. Azevedo¹, W.S. Montenegro¹, C.C. Oliveira¹, D.P. Rodrigues¹, S.C. Souza¹, V.F. Araujo^{*}

¹Hospital Sao Domingos, Intensive Care Unit, Sao Luis, Brazil

INTRODUCTION. Patients who survive critical illness often develop long-term cognitive dysfunction. Delirium, an acute neurobehavioral syndrome that is common in critically ill patients is associated with increased mortality and may be associated with long-term cognitive impairment.

OBJECTIVES. We conducted a prospective cohort study in a population of critically ill patients undergoing prolonged mechanical ventilation in order to test the hypothesis that delirium correlates with long-term cognitive impairment.

METHODS. All adult patients undergoing mechanical ventilation for at least 24 h, admitted to a general ICU between January 2012 and December 2012 were enrolled. We excluded patients with severe neurodegenerative or cognitive disorders including: acquired mental illness or congenital mental retardation, traumatic brain injury or stroke resulting in moderate to severe cognitive impairment, severe dementia of any etiology; patients with a history of substance abuse and those with auditory, visual and language deficits. The Research Ethics Committee of the São Domingos Hospital approved the study protocol. Written informed consent was obtained from all patients or their authorized surrogates. Patients underwent two daily evaluations for delirium (morning and evening) using the CAM-ICU (Confusion Assessment Method for the ICU).

After at least 3 months of hospital discharge, global cognition was evaluated by one of the study authors. For evaluation we used the Mini-Mental State Examination (MMSE), a tool for general assessment of cognition, validated for use in Brazil.

RESULTS. From January to December 2012, 86 patients were enrolled for the study, 26 of these patients died during the hospitalization. The remaining 60 patients were eligible for the cohort. Eleven patients died before testing, 10 were lost to follow-up and 3 refused to submit to the assessment of cognition. Thirty-six patients were analyzed. The mean age was 63.5 years, cognitive ability was assessed after 13.8 months on average (9 - 20), 24 patients had delirium during the study period (Table 1). Seventy-five percent of the patients with delirium for 3 days or more presented cognitive dysfunction. In logistic regression analysis delirium was an independent predictor of cognitive impairment (OR = 4.5; p < 0.05).

CONCLUSIONS. In critically ill patients submitted to prolonged mechanical ventilation delirium is an independent predictor of cognitive impairment.

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1111

EARLY PREDICTION OF DELIRIUM IN ICU PATIENTS (E-PRE-DELIRIC): MULTINATIONAL DEVELOPMENT AND VALIDATION OF AN EARLY DELIRIUM PREDICTION MODEL FOR INTENSIVE CARE PATIENTS

A. Wassenaar¹, M. van den Boogaard², T. van Achterberg^{1,3}, A. Slooter⁴, M. Kuiper⁵, M. Hoogendoorn⁶, K. Simons⁷, E. Maseda⁸, N. Pinto⁹, C. Jones¹⁰, A. Luetz¹¹, A. Schandl¹², W. Verbrughe¹³, L. Aitken¹⁴, F. van Haren¹⁵, R. Donders¹⁶, L. Schoonhoven^{1,17}

¹Radboud University Medical Center, Scientific Institute for Quality of Healthcare, Nijmegen, Netherlands, ²Radboud University Medical Center, Department of Intensive Care Medicine, Nijmegen, Netherlands, ³KU Leuven, Centre for Health Services and Nursing Research, Leuven, Belgium, ⁴University Medical Centre Utrecht, Department of Intensive Care Medicine, Utrecht, Netherlands, ⁵Medical Centre Leeuwarden, Department of Intensive Care Medicine, Leeuwarden, Netherlands, ⁶ISALA Clinic, Research Department of Anesthesiology & Intensive Care, Zwolle, Netherlands, ⁷Jeroen Bosch Ziekenhuis, Department of Intensive Care Medicine, 's-Hertogenbosch, Netherlands, ⁸Hospital Universitario La Paz, Department of Intensive Care Medicine, Madrid, Spain, ⁹Medway Maritime Hospital, Anaesthetic Department, Kent, United Kingdom, ¹⁰Whiston Hospital, Ward 4E (Critical Care), Prescot, United Kingdom, ¹¹Charité - Universitätsmedizin Berlin, Department of Anesthesiology and Intensive Care Medicine, Berlin, Germany, ¹²Karolinska University Hospital Solna, Department of Anesthesiology, Surgical Services and Intensive Care Medicine and Department of Neurobiology, Care Science and Society, Stockholm, Sweden, ¹³Antwerp University Hospital, University of Antwerp, Department of Critical Care Medicine, Edegem, Belgium, ¹⁴Princess Alexandra Hospital, Intensive Care Unit, Brisbane, Australia, ¹⁵The Canberra Hospital, Intensive Care Unit, Canberra, Australia, ¹⁶Radboud University Medical Center, Department for Health Evidence, Nijmegen, Netherlands, ¹⁷University of Southampton, Faculty of Health Sciences, Southampton, United Kingdom

INTRODUCTION. Delirium incidence in Intensive Care Unit (ICU) patients is high and associated with poor outcome. Identification of high-risk patients may facilitate its prevention. We developed and validated an early ICU delirium prediction model.

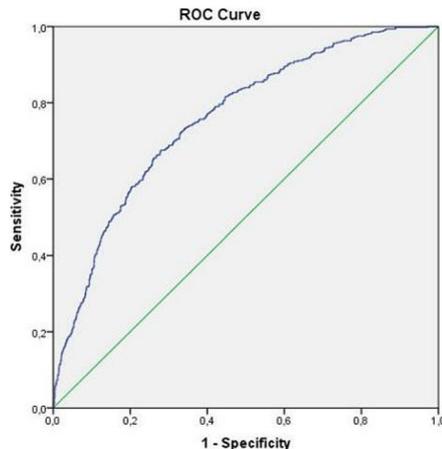
OBJECTIVE. To develop and validate a model based on data available at ICU admission to predict delirium for the entire ICU length of stay and to evaluate its performance related to the moment delirium occurs.

METHODS. Prospective cohort study in thirteen ICUs from seven countries. Data of eighteen candidate delirium predictors were collected at ICU admission. Delirium was assessed using the confusion assessment method-ICU (CAM-ICU). Multiple logistic regression analysis was used to develop the early prediction (E-PRE-DELIRIC) model on data of the first two-thirds and validated on data of the last one-third of the patients from every participating hospital. The performance of the model was determined using the area under the receiver operating characteristic curve (AUROC) and calibration was assessed graphically.

RESULTS. In total 2,914 patients were included. The E-PRE-DELIRIC model consists of nine predictors assessed at ICU admission: age, history of cognitive impairment, history of alcohol abuse, urea level, admission category, urgent admission, mean arterial blood pressure, use of corticosteroids, and respiratory failure (table).

Variable	Regression coefficient	Odds ratio (95 % C.I.)
age	0.025	1.025 (1.017-1.033)
history of cognitive impairment	0.878	2.406 (1.700-3.404)
history of alcohol abuse	0.505	1.657 (1.170-2.347)
admission category: [1] surgery [2] medical [3] trauma [4] neurology/neurosurgery	[1] RC [2] 0.370 [3] 1.219 [4] 0.504	[1] RC [2] 1.448 (1.058-1.982) [3] 3.384 (1.997-5.735) [4] 1.655 (1.064-2.575)
urgent admission	0.612	1.843 (1.326-2.563)
mean ABP at the time of ICU admission	0.006	0.994 (0.988-1.001)
use of corticosteroids	0.283	1.327 (0.996-1.768)
respiratory failure	0.982	2.670 (2.099-3.396)
urea level at time of ICU admission	0.018	1.018 (1.006-1.031)

[Variables and coefficients E-PRE-DELIRIC model]



[AUROC E-PRE-DELIRIC]

The AUROC to predict delirium for the complete ICU length of stay was 0.75 (95 %CI 0.73-0.77) in the development and validation data set (figure). The model was well calibrated. Delirium that occurred later during ICU admission could be predicted more accurately, AUROC increased from 0.70 (95 %CI 0.67-0.74, < 2 days) to 0.81 (95 %CI 0.78-0.84, > 6 days).

CONCLUSIONS. Using the E-PRE-DELIRIC model patients' risk for ICU delirium can be predicted at admission, allowing early delirium preventive interventions in patients with a high delirium risk.

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COMPARATIVE PERFORMANCE OF THREE RISK PREDICTION MODELS FOR DELIRIUM IN THE INTENSIVE CARE UNIT AFTER CARDIAC SURGERY, AND ASSOCIATION WITH FAST-TRACK FAILURE

J.L. Mu¹, A. Lee¹, P.P.N. Leung¹, C.H. Chiu¹, M.J. Underwood², G.M. Joyn¹

¹The Chinese University of Hong Kong, Department of Anaesthesia and Intensive Care, Hong Kong, Hong Kong, China. ²The Chinese University of Hong Kong, Division of Cardiothoracic Surgery, Department of Surgery, Hong Kong, Hong Kong, China

INTRODUCTION. Delirium after cardiac surgery may occur in up to 52 % of patients [1] and is associated with poor patient outcomes. There are several validated and reliable delirium risk models for use in critically ill patients [2,3] and cardiac surgical patients [4]. The association between delirium and fast-track failure is unknown.

OBJECTIVES. To compare the performance of the original PRE-DELIRIC [2], internationally externally recalibrated PRE-DELIRIC [3] and Katznelson's [4] delirium risk prediction models, and examine the association between delirium and fast-track failure.

METHODS. The ongoing study was conducted at a Hong Kong university hospital in patients undergoing emergency and elective cardiac surgery from July 2013 to February 2014. All postoperative patients were screened by ICU nurses three times a day using the Richmond Agitation Sedation Scale and the Confusion Assessment Method for the ICU. The area under the receiver operating characteristic (AUROC) curve and the Hosmer-Lemeshow (HL) goodness of fit test were used to determine discrimination and calibration of the models. Fast-track failure after elective cardiac surgery was defined as ICU length-of-stay > 48 h, ICU readmission and/or 30-day mortality [5].

RESULTS. Of the 192 patients (118 males:74 females, mean age = 60 ± 10 SD) years, 23 (12.0 %) had delirium - 9 hyperactive, 6 hypoactive and 8 mixed types. The performance of the three delirium risk models are shown in Table 1. Fifteen of 175 (8.6 %) failed fast-track elective cardiac surgery. Delirium was associated with fast-track failure (RR = 8.70, 95 % CI: 3.63 - 20.85).

Model	AUROC (95 % CI)	HL test
Original PRE-DELIRIC [2]	0.76 (0.69 - 0.82)	P < 0.0001
Recalibrated PRE-DELIRIC [3]	0.76 (0.69 - 0.82)	P = 0.10
Katznelson [4]	0.72 (0.65 - 0.79)	P = 0.12

[Table 1. Performance of delirium risk models]

CONCLUSIONS. One in eight cardiac surgical patients were at risk of ICU delirium. The original PRE-DELIRIC model over-predicted the risk of delirium. The recalibrated PRE-DELIRIC [3] and Katznelson [4] delirium risk prediction models had acceptable discrimination and calibration properties. Delirium was associated with fast-track failure.

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1113

ONGOING CHALLENGES IN USING RASS AND CAM ICU

K. Zamoscick¹, C. Whitley¹, J. Preller², Cambridge Delirium Group

¹Addenbrooke's Hospital, JVF ICU, Cambridge, United Kingdom, ²Addenbrooke's Hospital, ICU, Cambridge, United Kingdom

INTRODUCTION. Delirium (brain dysfunction) is a common complication during critical illness. It is important to actively screen for and decrease the risk factors. The use of sedatives is an important contributor, which should be carefully modulated. Tools such as the Richmond Agitation and Sedation Scale (RASS) to monitor the level of sedation and the Confusion Assessment Method for the Intensive Care (CAM-ICU) to screen for delirium are commonly used in ICU. We have previously reported on the challenges of instituting a screening programme and the attitudes of nurses towards brain failure.

OBJECTIVES. We present an audit of compliance after 4 years and suggest a simple algorithm to decrease the use of Unable to Assess (UTA).

METHODS. We conducted an audit of 5 x 24-hour time points over a 5-week period in our 20-bedded university hospital ICU. Serial screening observations on 78 patients were included.

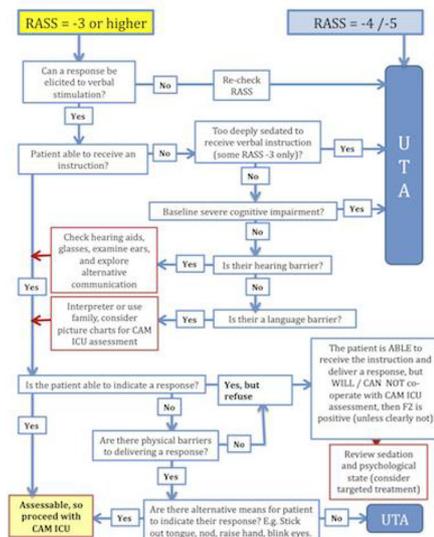
RESULTS. 90 % of patients had 87.5 or more of the hourly RASS scores recorded. Some challenges remains such as correct recording in muscle-relaxed patients. Despite ongoing training, compliance with twice daily CAM ICU scoring remains challenging.

CAM ICU should be used for all patients with a RASS of minus 2 and higher and can be used for some patients with RASS minus 3. UTA remained over-used at 22 % of assessed patients, while the use of UTA could be justified in only 48 % of these.

Feature 1 and 2 of CAM ICU were most consistently scored. To further rule delirium in or out some still underuse feature 3, which likely is a training issue, with feature 4, by design being use least, but therefore also applied the least well.

CONCLUSIONS. Despite embedding training in RASS and CAM ICU in core ICU nursing training some challenges remains to be addressed. The use of agency staff and work pressure when using less than 1:1 nursing significantly contributes to non-compliance with all the elements of CAM ICU. We continue to develop algorithms to guide staff past these obstacles and audit the results.

UTA Algorithm



[Unable to Assess Algorithm]

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1114

PREVALENCE OF CEREBRAL AUTOREGULATION IMPAIRMENT IN NON-NEUROLOGICAL MECHANICALLY VENTILATED PATIENTS AND ITS RELATIONSHIP WITH DELIRIUM, SEPSIS AND SEDATION

C. Subira¹, C. Dominguez¹, S. Cano¹, I. Catalan¹, O. Rubio¹, G. Rognoni¹, J.M. Alcoverro¹, R. Fernandez¹

¹Fundacio Althaia, Critical Care Department, Manresa, Spain

INTRODUCTION. Cerebral autoregulation (CA) is the physiological response that maintains cerebral blood flow despite changes in blood pressure. Impairment of CA has been clearly demonstrated in severe brain trauma, but few studies described CA in ventilated patients without neurological pathology.

Hypothesis: The CA can be impaired in mechanical ventilated patients and it can be associated with worse clinical outcome.

METHODS. Prospective observational study performed in the general ICU of a University Hospital. In mechanically ventilated patients, we monitored cerebral blood flow by transcranial Doppler within the first 48-h of admission and repeatedly every 72-h while the patient was under MV. We evaluated CA by the Mx coefficient, considering CA impairment at Mx > 0.3. Studied covariables were: sepsis, severity scores, and use of statin, steroids, and sedatives (propofol, midazolam, morphine, fentanyl). We recorded as outcome variables: delirium score, length of ICU stay and hospital mortality. Variables were compared by Fisher exact tests and Mann-Whitney U-tests, when appropriate.

RESULTS. From 28 studied patients, 13 (46 %) showed impaired CA. Patients with impaired CA were older (72 ± 8 vs. 62 ± 13 yr.; p = 0.02), but both groups were similar in gender, medical history and severity scores at admission (APACHE II, SAPS 3, and SOFA). We found no differences between groups in the use of statins (26 % in maintained CA vs 7 % in impaired CA; p = ns), steroids (53 % in maintained CA vs 38 % in impaired CA, p = ns), and type of sedatives, or in length of ICU stay (12 IQR = 10 days in maintained CA vs 8 IQR = 9 days in impaired CA). Impaired CA patients showed a non-significant lower incidence of sepsis (on admission or during ICU stay) 46 % vs. 73 %; p = ns. Impaired CA patients had a higher incidence of delirium (75 % vs. 25 %; p = 0.04), and a non-significant trend to higher hospital mortality (38 % vs. 26 %; p = ns).

CONCLUSIONS. In our study almost half patients under MV had impaired CA. Patients with impaired CA were older and developed delirium more frequently. We were unable to demonstrate relationships between impaired CA and type of sedation, sepsis, length of stay and mortality.

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INCIDENCE AND RISK FACTORS OF DELIRIUM IN A SURGICAL INTENSIVE CARE UNIT

S. Oh¹, H. Lee², H.G. Ryu²

¹Seoul National University College of Medicine, Department of Surgery, Seoul, Korea, Republic of, ²Seoul National University College of Medicine, Department of Anesthesiology and Pain Medicine, Seoul, Korea, Republic of

INTRODUCTION. Delirium in critically ill patients is associated with increased mortality, prolonged intensive care unit (ICU) and hospital length of stay and long-term cognitive impairment.

OBJECTIVES. The aim of current study is to evaluate the incidence and risk factors of delirium in critically ill patients in surgical intensive care unit (SICU).

METHODS. We performed a retrospective study of development of delirium from November 1, 2012, to September 30, 2013. A total of 325 patients admitted to SICU for more than 24 h were enrolled. Patients were evaluated for development of delirium using the Confusion Assessment Method for ICU Patients (CAM-ICU). We evaluated risk factors for the development of delirium with univariate and multivariate analysis.

RESULTS. Of the 325 patients, delirium was developed in 89 (27.4 %) patients. Multivariate analysis demonstrated that age (adjusted OR 1.05, 95 % CI 1.02-1.07), intraoperative red blood cell (RBC) transfusion (adjusted OR 0.89, 95 % CI 0.81-0.98), APACHE II score (adjusted OR 1.10, 95 % CI 1.05-1.15), stroke (adjusted OR 3.05, 95 % CI 1.37-6.79), intraoperative administration of midazolam (adjusted OR 3.97, 95 % CI 1.68-9.40) were independent risk factors of delirium.

CONCLUSIONS. Postoperative delirium in ICU is related several risk factors. Patients with higher age, intraoperative RBC transfusion, higher APACHE II score, stroke and intraoperative administration of midazolam have higher risk for development of delirium.

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1116

DELIRIUM AS A PREDICTOR OF MORTALITY IN ELDERLY CARDIOVASCULAR PATIENTS

K. Sato¹, T. Taniguchi¹

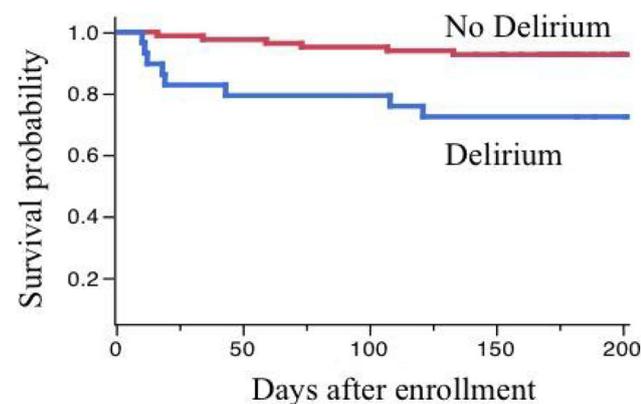
¹Kanazawa University Hospital, Kanazawa, Japan

INTRODUCTION. Delirium, an acute brain dysfunction, is poor prognostic factor in critically ill mechanically ventilated ICU patients. Because of the progress in the modern cardiovascular intervention, many geriatric patients with several co-morbid medical illnesses have undergone invasive procedures. Although delirium is one of the common geriatric conditions during post procedural and medical cardiovascular care, impact of delirium on outcomes is poorly understood.

OBJECTIVES. To access the impact of delirium on outcomes in cardiovascular patients.

METHODS. The study was single center, prospective cohort study enrolling consecutive nonsurgical cardiovascular patients 65 years of age or older admitted to ICU. We excluded mechanically ventilated patients. Patients were followed up for development of delirium using the Confusion Assessment Method for the ICU. Primary outcomes included 6-month mortality and overall hospital length of stay.

RESULTS. Of 111 patients, 29 developed delirium during their ICU stay. Baseline characteristics including age, charlson comorbidity index, SOFA score at admission were significantly higher in delirious patients. Moreover, e-GFR and Hematocrit at admission were significantly lower. Cardiac risk factors, blood pressure, left ventricular ejection fraction (LVEF), C reactive protein, medications (angiotensin-converting enzyme inhibitor and/or angiotensin receptor blocker, beta blockers, antiplatelets, statins, diuretics) were similar. Patients who developed delirium had higher 6-month mortality rates ($p = 0.0008$) and spent 10 days longer in the hospital than those who never developed delirium ($P = 0.0005$). Using a multivariable Cox proportional hazards model to adjust for covariates (including age, charlson comorbidity index, LVEF, Hematocrit, e-GFR), delirium was independently associated with higher 6-month mortality (adjusted hazard ratio 3.08; 95 % confidence interval, 1.09-9.4; $P = 0.035$).



[Kaplan-Meier Analysis of Delirium]

CONCLUSIONS. Delirium was a useful predictor of prognosis for elderly cardiovascular patients.

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ELIMINATION KINETICS OF PROPOFOL IN THOSE RECEIVING LONG TERM PROPOFOL INFUSIONS

J.H. Ryu¹, R. Shulman¹, D. Brealey¹

¹University College London Hospital NHS Foundation Trust, Division of Critical Care, London, United Kingdom

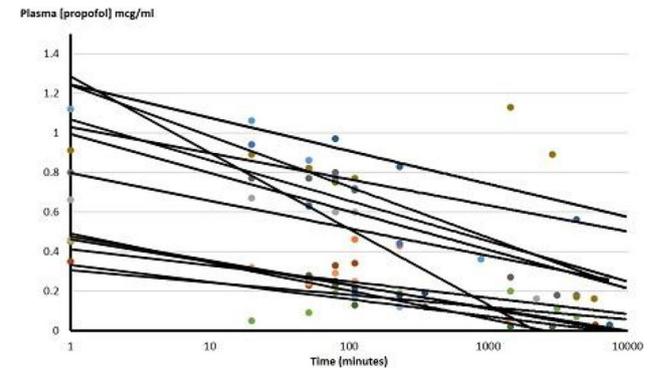
INTRODUCTION. Propofol is a commonly used sedative on the intensive care unit (ICU) because, compared to other readily available sedatives, it is easy to titrate, relatively

predictable and has no active metabolites. Propofol is highly lipid soluble and is mainly metabolised by the liver to inactive metabolites. The half time of a propofol bolus is short as a result of re-distribution into the lipid rich, poorly perfused areas of the body (third compartment). Following the cessation of prolonged infusions this third compartment may act as a reservoir to maintain plasma levels; altered protein binding and liver blood flow may also alter its kinetics during critical illness. Examining propofol levels in patients has been technically demanding and time consuming so there has been little work in the area. The development of the Pelorus 1500 (Sphere Medical) device enables blood or plasma propofol levels to be measured easily on the ward.

OBJECTIVE. To determine the time taken for propofol to become undetectable in the plasma of critically ill patients following the cessation of a prolonged infusion (48 h).

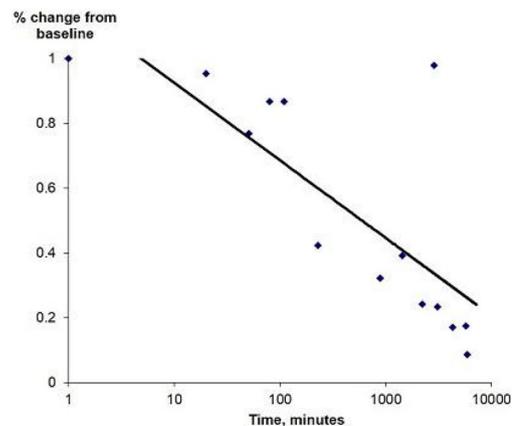
METHODS. The study had the appropriate permissions granted. Agreement to take part in the study was obtained from the next-of-kin or patient. Blood sampling was performed prior to cessation of the infusion and then at 10, 30, 60, 90, 120 min with further samples being taken every 24 h until the blood sampling line was removed or propofol was undetectable. The blood was centrifuged and the plasma frozen prior to analysis with the Pelorus 1500.

RESULTS. 14 patients on the general, adult ICU were enrolled. Continuous propofol sedation was given to tolerate mechanical ventilation. The average duration of propofol sedation was 130 h (SD 130 h). 14 patients had sampling at sequential time points, (not all time points achieved) and the [propofol] vs time for the individuals are displayed in graph 1.



[Individual propofol elimination]

8 patients had baseline and sequential sampling and a percentage decrease in plasma [propofol] from baseline is shown in graph 2.



[% change in [propofol] from baseline]

CONCLUSIONS. Although this data is preliminary, it does show a long projected elimination time for propofol from the plasma of the critically ill and a marked variation in half life. Though these patients were very rapidly awaké following the cessation of propofol it is unclear the neurological impact very low concentrations may have on higher functions (e.g. executive functions), warranting further investigation.

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1118

EFFICACY AND SAFETY OF DEXMEDETOMIDINE IN AGITATED ICU PATIENTS

C. Iasonidou¹, S. Papoti¹, P. Ioannidis², S. Kehagias¹, G. Roidos¹, N. Kapravelos²

¹G. Papanikolaou, Thessaloniki, Greece, ²G. Papanikolaou, B ICU, Thessaloniki, Greece

INTRODUCTION. In mechanically ventilated ICU pts, the interruption of conventional sedative and analgesic drugs is associated with high incidence of agitation or delirium. This effect is related with increased length of ICU stay and risk of morbidity and mortality.

OBJECTIVES. To determine the efficacy and safety of dexmedetomidine in controlling agitation or delirium in mechanically ventilated pts during weaning from conventional deep sedation (midazolam, propofol, opioids).

METHODS. This observational study evaluated 32 mechanically ventilated adult ICU pts, mixed group (medical/surgical), who developed agitation or delirium on weaning from conventional sedation. DEX infusion was initiated and titrated to obtain target RASS 0 to -2. We did use loading dose to avoid hemodynamic deterioration. Additional sedation or analgesia was given if required to obtain the target RASS. We evaluated RASS at 4, 8, 12 and 24 h after DEX initiation. Also Arterial Pressure and Heart Rate were recorded during the time of DEX infusion. Other measures included duration of mechanical ventilation before and after initiation of DEX and length of ICU stay.

RESULTS. 32 pts were enrolled, 23 males and 9 females. Mean age was 51.6 years and mean APACHE II score 13.28. Pts were ventilated for a median time of 73.37 h (10-240) before enrollment. Median maximum infusion dose of DEX that required was 0.9 µg/Kg/h (0.2-1.9) with a mean infusion time of 98.65 h (14-288). Importantly, we observed that higher infusion dose was required in pts who suffered from head injury. In this subgroup DEX started after the initial stabilization. Target RASS was obtained after initiation of DEX infusion at 4 h in 31.2 %pts, at 8 h in 15.6%pts, at 12 h in 12.5 %pts, at 24 h in 34.3%pts and > 24 h in 6.2 %pts. The longer required time was associated with increased length of prior conventional sedation. Additive sedation or analgesia was required in 9.8 % and 35 % respectively. Hypotension and need for vasopressors (noradrenaline) were recorded in 12.5 %pts and bradycardia in 3.1 %pts. The mean time of ICU stay was 14.5 days (2-60). 2 patients died after unrelated clinical deterioration.

CONCLUSIONS. Dexmedetomidine is effective and safe in rapid controlling of agitation or delirium in ICU pts and facilitating the weaning from mechanical ventilation. Our study is limited because of its observational nature and the small number of pts. Further studies need to confirm these findings and evaluate the role of Dexmedetomidine especially in agitated pts with head injury.

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RISK FACTORS ASSOCIATED WITH DELIRIUM IN MECHANICAL VENTILATED PATIENTS

M. Busico¹, D. Intile², N. Irastorza², A.L. Alvarez³, G. Plotnikow², F. Villarejo¹, P. Desmercy²

¹Clinica Olivos, ICU, Buenos Aires, Argentina, ²Sanatorio Anchorena, ICU, Buenos Aires, Argentina, ³Clinica Bazterrica, ICU, Buenos Aires, Argentina

INTRODUCTION. Delirium is a common manifestation of acute brain dysfunction in critically ill patients on mechanical ventilation (MV). Its associated with poor short-term outcomes and may result in adverse effects years after ICU discharge.

OBJECTIVES. Describe risk factors for delirium in patients with mechanical ventilation. **METHODS.** Prospective observational multicentric study in patients over 18 years admitted to the ICU during 10 months with more than 24 hs of MV. Patients with cognitive impairment or who refused to participate on the study were excluded. Delirium was evaluated through the CAM-ICU (Argentine version) daily. Factors related to delirium as severity on admission (APACHEII), comorbidities (Charlson index), acquired weakness (MRC), drugs utilization and parameters of MV and weaning were evaluated daily during ICU stay. Multivariable logistic regression analyses were performed to investigate risk factors. The significance level was $p < 0.05$.

RESULTS. 181 patients received more than 24 hs of MV and 84 were included. From 79 patients evaluated, 57 (72 %) developed delirium during 3[2-6] days. Delirium was associated with prolonged ICU stay [10[6.7-13] vs 13[9-23.5] days $p = 0.0075$] and hospital stay [17[13-32.5] vs 25[15-39.5] days $p = 0.05$]. Use of more than 45 mg of midazolam (BDZ), age and coma as cause of mechanical ventilation were risk factors for developing delirium, however progress in rehabilitation evaluated by standing up on the ICU was protective for delirium. The multivariate analysis is shown on table 1.

CONCLUSIONS. Our results show that delirium occurs frequently on patients with MV and prolongs ICU and hospital stay. The reduction of benzodiazepines and the development of programs for early rehabilitation could be targets for prevention and treatment of delirium.

Variable	OR (IC 95 %)	p
>45 mg BDZ	8.96(1.71-46.92)	0.009
Coma	24.7(2.08-293.5)	0.011
Age	1.07 (1.02-1.12)	0.008
Stand Up ICU	0.14(0.04-0.51)	0.003

[Multivariate Analysis]

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DEXMEDETOMIDINE IN CRITICALLY ILL PATIENTS: AN 11 MONTH - EXPERIENCE

C. Chapuis¹, C. Catoire¹, J. Picard², P. Lavagne², J.-F. Payen^{2,3}

¹CHU de Grenoble, Pharmacie, Grenoble, France, ²CHU de Grenoble, Pôle Anesthésie-Réanimation, Grenoble, France, ³Université de Grenoble, Joseph Fourier, Grenoble, France

INTRODUCTION. Dexmedetomidine (DEX) was introduced in France in March 2013. This α_2 -adrenoreceptor agonist has been successfully compared with midazolam and propofol, showing a reduced time to tracheal extubation and more ability to communicate with caregivers (1). We report our 11-month experience in a 15- bed surgical intensive care unit (ICU).

OBJECTIVES. To describe patients who were eligible for DEX, and to evaluate the cost of the drug.

METHODS. Basic data were collected from March 2013 to January 2014 for each patient treated with DEX, including reasons for admission, DEX doses and duration of therapy, and side effects. Drug costs and consumption were obtained from the pharmacy database. Patients eligible for DEX were monitored every 4 h using sedation scale (RASS) and pain (BPS, VAS). The drug infusion (10 mcg/ml) started at 0.6 mcg/kg/hour with no loading dose, and infusion rate was titrated up to 1.4 mcg/kg/h.

RESULTS. Over 620 patients admitted during the study period, 92 patients (15 %) were treated with DEX (table 1). There was no agitation with DEX used for cessation of sedation. There were 2 discontinuations of the treatment due to severe bradycardia (< 45 bpm), and only 3 treatment failure. Three patients were successfully treated with DEX for insufficient

analgesia. Direct drug cost was calculated at 72 586 euros. Meanwhile, requirements for neuroleptic (tiapride, levomepromazine) and anxiolytic drugs (clorazepate) were reduced by 35 % (1068 euros) during the study period.

Age, years	54.5 (15-88)
Gender (male)	69 (75 %)
Weight, kg	73.5 (45-110)
Admission category: Trauma; Surgery; Medical;	43 (46 %); 26 (29 %); 23 (25 %);
Main reason for ICU admission: Mono trauma; Poly trauma; Digestive surgery; Thoracic surgery; Respiratory failure; Sepsis; Self-poisoning; Others	14 (15 %); 29 (32 %); 16 (17 %); 7 (8 %); 8 (9 %); 5 (5 %); 5 (5 %); 8 (9 %)
DEX indication: Cessation of sedation; Agitation; Non mechanically ventilated patients; Confusion, delirium tremens, analgesia; Additive to deep sedation	49 (53 %); 24 (27 %); 10 (11 %); 5 (5 %); 4 (4 %);
Total dose, mcg	2901 (61-38 862)
Treatment duration, hours	67.5 (3-837)
Length of stay, days	13.8 (1-89)

[Patients and indications (median, range or %)]

CONCLUSIONS. We confirm DEX as being of potential interest to favor cessation of sedation and ventilation weaning. Considering its direct costs, the indications of DEX use should be anticipated according to the recruitment of each ICU.

REFERENCE(S). 1-Jakob et al. Dexmedetomidine vs Midazolam or Propofol for Sedation During Prolonged Mechanical Ventilation. JAMA. 2012; 307: 1151-60

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PREVALENCE, RECOGNITION AND MANAGEMENT OF DELIRIUM IN A CARDIOTHORACIC INTENSIVE CARE UNIT (CTICU) WITHIN A LONDON TEACHING HOSPITAL

J. Bailes¹, M. Moore¹, A. Crerar-Gilbert¹

¹St George's Healthcare NHS Trust, Cardiothoracic Intensive Care, London, United Kingdom

INTRODUCTION. Delirium is associated with poor outcomes and is an independent predictor of death in intensive care patients. Each additional day spent delirious is associated with a 20 % increased risk of prolonged hospitalisation and a 10 % increased risk of death [1].

OBJECTIVES. A prospective, observational cohort study of 100 CTICU patients. The main objectives were to calculate the prevalence and to measure the recognition and treatment of modifiable risk factors associated with this syndrome in line with national guidelines [2].

METHODS. Surgical and medical patients admitted to CTICU were included. Each patient was screened for delirium using the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU). Patients with a GCS < 8 were excluded.

RESULTS. 100 patients (age range 27-90, median age 71) were included with a 62:38 male:female ratio. 72 were surgical and 28 were medical admissions. Patients' mode of ventilation was self, non-invasive or mechanical. The prevalence of delirium in this cohort was 24 %. Of these positive cases, 69 % had hyperactive and 31 % had hypoactive forms at diagnosis. 10 % of hypoactive patients were diagnosed prior to screening with the CAM-ICU. Regarding modifiable risk factors, every patient was assessed for dehydration, hypoxia, infection, pain, immobility and poor nutrition. However, 63 % were assessed for polypharmacy, 40 % for sleep disturbance and 0 % of patients for sensory disturbance as a cause of their delirium. Regarding management; it was noted that half of patients received non-pharmacological methods by ensuring effective communication and prompting. Once drug treatment was initiated; haloperidol and risperidone were used 1st line. No other atypical antipsychotics or benzodiazepines were used. In addition, half of patients were sedated with propofol, opioids or clonidine.

CONCLUSIONS. This study demonstrates that delirium has a prevalence in our CTICU that is currently under-recognised and under-treated. The prevalence obtained in this study is comparable to [1] which found 26 % in mixed surgical and medical patients within the CTICU. (More studies have been conducted within non-CTICU cohorts with prevalences ranging 20-80 %). As would be expected in a CTICU environment, organic causes were well recognised and treated. However, areas such as polypharmacy and sleep/sensory disturbance were under-assessed. The key point from this study is that the majority of under-recognised cases were due to hypoactive forms of delirium. Therefore, we suggest that the CAM-ICU should be used as a tool to screen for these patients.

REFERENCE(S). 1. Delirium in the Cardiovascular ICU: Exploring Modifiable Risk Factors. J McPherson et al. Critical Care Medicine 2013; 41 (2): 405-13. 2. NICE clinical guideline 203: Delirium: diagnosis, prevention and management. National Institute for Clinical Excellence. 2010

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DELIRIUM AND EARLY PHYSICAL THERAPY (DEPTH): A QUALITY IMPROVEMENT (QI) PROJECT IN CORONARY CARE UNIT (CCU): AN IMPROVEMENT IN ATTITUDES THROUGH EDUCATION

D.R.S. Reddy¹, S.J. Lee², J.K. Pannu², P.K. Guru², M.O. Al-Qadi², L.M. Welper³, M.P. Disdier Moulder⁴, T.H. Tajouri⁵, J.P. Bois⁵, R.J. Le⁵, R. Kashyap⁶, B.J. Selim², Delirium Early Physical Therapy (DEPTH) QI Team

¹Mayo Clinic, Division of Pulmonary Critical Care Medicine, Rochester, United States, ²Mayo Clinic, Division of Pulmonary and Critical Care Medicine, Rochester, United States, ³Mayo Clinic, Department of Nursing, Rochester, United States, ⁴Mayo Clinic, Hospital Pharmacy Services, Rochester, United States, ⁵Mayo Clinic, Division of Cardiovascular Diseases, Rochester, United States, ⁶Mayo Clinic, Department of Anesthesiology, Critical Care Medicine, Rochester, United States

INTRODUCTION. Despite compelling evidence advocating for adopting standard measures to reduce ICU acquired delirium, there is still inconsistency in monitoring delirium and sedation levels [1]. In patients with respiratory failure, delirium can be reduced through a QI initiative aimed at using goal directed sedation and routine delirium monitoring [2,3]. This study aims to address the knowledge gap on the impact of these interventions in the coronary critical care population and the methodology on changing medical practice attitudes and culture.

OBJECTIVES.

- 1) Assess physician and nursing staff attitudes and knowledge on delirium, sedation, and physical therapy (PT).
- 2) Implement a 3 month intervention that includes staff education to address knowledge gap in recognizing and treating delirium.
- 3) Increase delirium recognition and treatment by consistent use of the Confusion Assessment Method (CAM-ICU).
- 4) Increase use and acceptance of a new goal directed sedation protocol with Richmond Agitation Sedation Scale (RASS) target of 0 to -1.

METHODS. At an academic coronary care unit, staff attitudes and knowledge was collected via an institutional online survey tool. Baseline data (10/2013 to 12/2013) was compared to data from the interventional period (1/2014 to 3/2014).

RESULTS. The pre-QI survey was taken by 71 participants (46 % physicians, 53 % nurses) compared to 50 in post-QI (56 % physicians, 44 % nurses). Post-QI there was an increase use of goal directed sedation using RASS to titrate sedation, considering RASS of 0 to -1 as the ideal goal. Post QI, more staff felt the patients were over-sedated compared with pre-QI. Also, there was an increased number of staff who preferred bolus over continuous infusion for sedation. More people post-QI chose to treat agitated delirium with haloperidol or quetiapine over increasing sedation with benzodiazepines. In the post-QI period there was a decrease number who rated PT “not important or hazardous” in intubated patients. Whereas for sedation, there was an increased preference for non-benzodiazepine over benzodiazepine use (see Table 1). Through our QI intervention, there was a decrease in the number of missed CAM-ICU monitoring (157/558 time vs 118/596 times, $p = 0.001$). Therefore, there

were more delirium days detected via our QI of enforcing CAM-ICU (pre 28 days, post 65 days) and more people detected and treated (pre 7 people, post 17 people) $p = 0.017$.

CONCLUSIONS. Through a survey conducted via Define-Measure-Analyze-Improve-Control (DMAIC) and Plan-Do-Study-Act (PDSA) cycle along with rigorous education and awareness, we showed improvement in attitudes within the multidisciplinary teams towards using goal directed sedation, less use of benzodiazepines and initiating early physical therapy for CCU patients.

REFERENCE(S). 1) CHEST 2010; 138(5):1224-1233. 2) Critical Care Med 2013; 41:1435-1442. 3) Arch Physical Med Rehabilitation 2010; 91:536-42

	Pre-QI (n = 71)	Post-QI (n = 50)	p-value
RASS use	(n = 46) 64 %	(n = 39) 78 %	0.16
RASS goal 0 to -1	(n = 30) 42 %	(n = 37) 74 %	0.001
Feel patients are oversedated	(n = 12) 17 %	(n = 10) 20 %	0.81
Prefer continuous infusion	(n = 57) 79 %	(n = 31) 62 %	0.038
Prefer Non-benzodiazepine	(n = 44) 61 %	(n = 34) 68 %	0.57
Prefer Benzodiazepine	(n = 24) 33 %	(n = 15) 30 %	0.70
Treat delirium with haldol or quetiapine	(n = 47) 65 %	(n = 39) 78 %	0.22
PT not important or hazardous while intubated	(n = 30) 42 %	(n = 13) 26 %	0.083

[Table 1. Comparison of Pre and Post QI Intervention]

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