Poster Sessions
Imaging and lung mechanics 0849-0860

0849

IMPACT OF DIFFERENT PEEP LEVELS ON REGIONAL COMPLIANCE MEASURED BY ELECTRICAL IMPEDANCE TOMOGRAPHY

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INTRODUCTION. To achieve the optimal level of PEEP in ALI/ARDS different concepts are still discussed. The level of PEEP should maintain recruitment and ventilation should suit the individual level of lung injury. With the help of electrical impedance tomography (EIT) the regional effect of ventilation can be monitored at bedside (1). The aim of our study was to investigate the ability of EIT to detect changes of regional compliance due to an incremental and decremental PEEP trial in experimental ARDS.

METHODS. After induction of saline lavage induced lung injury in six pigs an automatic stepwise PEEP trial was performed (10 up to 30/ 30 down to 5 cm H2O). During the PEEP trial subjects were ventilated pressure controlled (PCV, Δ8 cm H2O, respiratory rate 25, I:E 1:1, FiO2 1.0). Global ventilatory, hemodynamic and gas exchange parameters were continuously recorded. To investigate regional ventilation EIT and CT scans were realized simultaneously at a juxtadiaphragmatic thoracic level. Two non-dependent and two dependent regions of interest were defined in the tomograms. By calculating the difference of functional EIT images between different PEEP levels regional compliance (Δ VT) can be displayed. Nonparametric tests were used, $p<0.05$ was considered statistically significant.

RESULTS. The PEEP trial resulted in an increase of PaO2, tidal volume and inhomogeneous recruitment and derecruitment of regional tidal volumes in all subjects. Augmented PEEP initially increased regional compliance in the dependent lung areas, compliance started to decrease at a PEEP between 20 up to 25 cm H2O. On the decremental part a significant amount of tidal volume was gained either in dependent and non-dependent areas. Decreased regional compliance occurred first in the non dependent areas at a PEEP level of 15 cm H2O, whereas global tidal volumes still increased.

CONCLUSION. The change in regional compliance due to an incremental / decremental PEEP trial could be demonstrated by analysis of EIT. Beginning of regional derecrutiment could be displayed earlier in EIT than in global ventilation parameters. EIT can use as a tool to adapt the PEEP level to the individual degree of lung injury to maintain recruitment.

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0850

DETECTION OF TIDAL RECRUITMENT BY ELECTRICAL IMPEDANCE TOMOGRAPHY IN SALINE LAVAGE LUNG INJURY

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INTRODUCTION. Lung recruitment and collapse are highly dynamic phenomena that are difficult to monitor. Arterial oxygenation is the widely used criteria for PEEP titration in clinical practice and defining lung recruitment at bedside (1). To show if bedside electrical impedance tomography (EIT) provides a useful tool allowing a better assessment of alveolar recruitment and titration of PEEP, we compared measurements of tidal recruitment (EIT) with PaO2 and tidal volume changes in saline lavage induced lung injury.

METHODS. In six pigs ARDS was induced by lung-lavage. A stepwise PEEP trial was performed consisting of 2-minutes steps of tidal ventilation (10-30 cm H2O; 30-5 cm H2O). During the PEEP trial subjects were ventilated pressure-controlled (PCV, Δ8 mbar, respiratory rate 25, I:E 1:1, FiO2 1.0). Ventilatory, hemodynamic and gas exchange parameters were continuously recorded. EIT measurements were realized at a juxtadiaphragmatic thoracic level. Off-line we analysed electrical impedance tomograms by computing the amount of tidal recruitment at each pressure level. Tidal recruitment (ΔV EIT) was defined as the mean increase or decrease in end-expiratory global impedance (Z, mean) per breath (2). Statistical analysis was done with Wilcoxon test; $p<0.05$ was considered significant.

RESULTS. Ventilatory parameters clearly showed a recruitment of non-aerated lung areas at the descending part of the pressure ramp. In the incremental part ΔV EIT increased with a peak at PEEP levels of 20 cm H2O. At PEEP levels of 25 and 20 cm H2O in the decremental part ΔV EIT reached a steady-state. ΔV EIT decreased significantly at PEEP levels of 15 cm H2O, whereas PaO2 and VT decreased significantly at 10 and 5 cm H2O.

CONCLUSION. Tidal recruitment measured by dynamic EIT offers a more precize way detecting the process of recruitment and the beginning of lung collapse. Bedside EIT in contrast to PaO2 provides continuous information that may be of use in determining the ideal PEEP level in acute lung injury.

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0851

LUNG ULTRASOUND DETECTION OF LUNG REAERATION IN PATIENTS TREATED FOR VENTILATOR–ASSOCIATED PNEUMONIA

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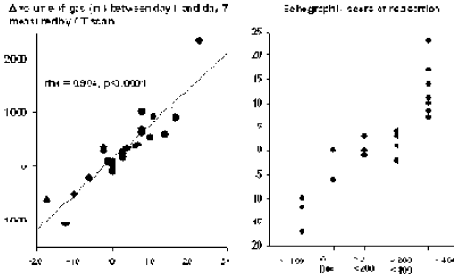
INTRODUCTION. The goal of this study was to compare lung reaeration measured by CT scan and by lung echography in patients with bronchopneumonia treated by antimicrobials agents.

METHODS. A spiral thoracic CT scan and a lung echography were performed in 24 patients with ALI related to bronchopneumonia, at day 1 and day 7. From the thoracic CT scan, volumes of gas were measured using the software lungview®(1). Lung echography was performed studying 12 regions of interest (ROI) determined using anatomical landmarks (anterior and posterior-axillary lines). For each ROI, evolution of aeration at lung echography, was scored according to table 1 (with C = Alveolar consolidation; A2 = Alveolar-interstitial syndrome; A1 = interstitial syndrome and N = normal aspect). For each patient, a global score of reaeration was calculated adding the 12 scores of each ROI. Variation of volume of gas measured with CT scan was compared to the global score of reaeration.

TABLE 1.

(1) point	(3) points	(5) points	(-5) points	(-3) points	(-1) points
A1 to N A2 to A1 C to A2	A2to N C to A1	C toN	N to C	N to A2 A1 to C	N to A1 A1 to A A2 to C

RESULTS. figures 1 and 2.



CONCLUSION. Lung reaeration can be accurately estimated with lung echography in patients with bronchopneumonia treated by antibiotics.

REFERENCE(S). (1):Am J Respir Crit Care Med:163;1444-1450.

0852

VIBRATION RESPONSE IMAGING IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE DURING MECHANICALLY VENTILATION

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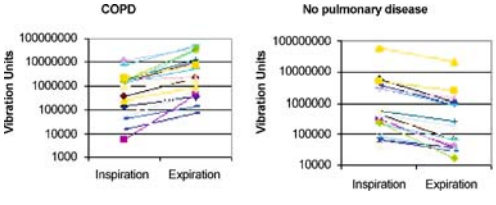
INTRODUCTION. Vibration response imaging (VRI) measures vibration response energy generated from airflow. The role of VRI in mechanically ventilated (MV) patients with chronic obstructive pulmonary disease (COPD) has not been studied before.

METHODS. VRI studies in ICU patients with COPD were compared with patients with no pulmonary disease. Twenty patients with COPD were then compared to twenty patients with no known pulmonary disease. Vibration units (VU) of the images at peak inspiration and expiration were compared. Statistical analysis was performed with t-test.

RESULTS. In normal lungs, VU during expiration (mean 1483557, stdev13073351) was lower than that during inspiration (mean 4172171, stdev4857376). In COPD the VU during expiration was higher (mean 10252516, stdev15752112) than that during inspiration (mean 1682211, stdev 3005613) (graph 1). p value 0.02



CONCLUSION. The increase in the VU during the expiratory phase in COPD patients may reflect increased turbulence causing increased vibration energy. In COPD patients there may be increased vibration during expiratory phase due to variability in reginal compliance. Air trapping and auto-PEEP are other possible mechanisms accounting for the expiratory increase in vibration energy.

0853

THE PLEURAL EFFUSION IN ALI/ARDS PATIENTS: A CT SCAN STUDY

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INTRODUCTION. The pleural effusion in patients with ALI/ARDS is a quite common finding. However, there are only few data which evaluated the presence/amount of pleural effusion and its clinical consequences. We aimed to compute the amount of pleural effusion and the impairment of gas exchange and the severity of lung disease.

METHODS. Patients were studied at PEEP 5, 15 and 45 cmH2O of airway pressure during an end expiratory pause, by lung spiral CT scan (exposure 120 Kv-250 mA). Gas exchange was measured at the two PEEP levels. The outline of the lungs and of pleural effusion were manually delineated in each image by a physician using a dedicated software (Soft-EFilm University of Milan). Lung recruitability was computed as the fraction of total lung weight which regains inflation from 5 to 45 cmH2O of airway pressure. Patients were grouped according to the median value of the amount of pleural effusion.

RESULTS. 68 ALI/ARDS patients mechanically ventilated (age 55±17 yrs, BMI 25±5 Kg/m^2, PaO2/FiO2 200±77, PEEP 11.1±3.0 cmH2O, tidal volume 8.8±1.9 ml/Kg) were enrolled. The median pleural effusion was 293 ml (range 0-1023 ml).
In table data are presented as mean ± SD.

TABLE 1.

	Lower pleural effusion	Higher pleural effusion
PaO2 (mmHg)	79±21	80±26
PaCO2 (mmHg)	42±9	41±8
Age (yrs)	50±18	60±15
Lung weight (gr)	1560±515	1441±496
Lung recruitability (%)	13±10	13±13

p<0.05 vs Lower Effusion

CONCLUSION. The presence of pleural effusion was not related to the impairment of gas exchange and to the amount of lung disease. Older patients presented a higher amount of pleural effusion probably due to a reduction of lymph drainage.

0854

ANALYSIS OF SIGMOIDAL EQUATIONS TO DESCRIBE THE PULMONARY PRESSURE-VOLUME CURVE IN ALI AND ARDS

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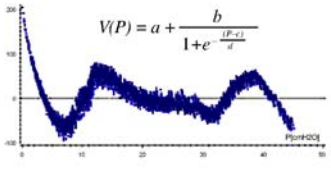
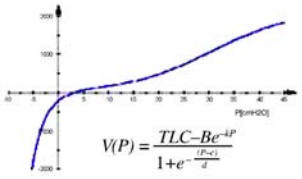
INTRODUCTION. PV-curves have been used to characterize the mechanical behavior of the respiratory system and to adjust ventilatory settings. The inflation curve has three segmentas, separated by lower and upper inflection points and an upper asymptote as overdistension increases. Models based on continuous equations give parameter estimation by fitting to the PV-data. For pathophysiologic evaluation these parameters should have some physiological interpretation based on mathematical characterization. A sigmoidal model equation and asymmetric modification was investigated regarding the mathematical evidence towards the definition of the conditions under which these models can be used.

METHODS. The PV-curves of 25 patients with ARDS were fitted to the Venegas-equation. Secondly, the behavior of a modified equation for use in asymmetric data was studied followed by a mathematical analysis about some analytical properties of this equation, to get information about the asymptotes and to establish conditions for stability.

RESULTS. Although the value of R^2 was always >99% in fitting the Venegas equation, there is no visual evidence that a sigmoidal shaped function will fit the data properly (Fig.1, plot of residuals vs. pressure). In the 5-parameter asymmetric model, we could not obtain directly the values for LIP and UIP since there is no general expression from the zeros of the third derivative as would be necessary. The values of R^2 remained unchanged and the distribution of residuals had exactly the same structure as with the symmetric model, but, despite of convergence, not all the functions had the expected asymptotic behavior (Fig2).





CONCLUSION. The Venegas model lacks of systematic bias despite good fit, and there is no advantage in increasing the number of parameters to 5 to model asymmetric data.

REFERENCE(S). Venegas et al. JAP 1998;84:389-95.

0855

INFLUENCE OF INTRA-ABDOMINAL HYPERTENSION ON RESPIRATORY SYSTEM DYNAMICS IN THE PIG

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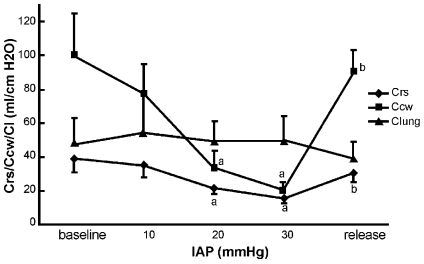
INTRODUCTION. Intra-abdominal hypertension (IAH) reduces respiratory system compliance (Crs) through elevation of the diaphragm. To be able to partitionate the effects of IAH on Crs, pleural pressure must be assessed. We used a porcine model of IAH to study the effect of IAH on chest wall compliance (Ccw) and lung compliance (Cl).

METHODS. In 9 anesthetized pigs (46±3kg), ventilated with constant tidal volume (TV=9ml/kg) and 5 cmH2O PEEP, intra-abdominal pressure (IAP) was build-up from baseline (6 mmHg) to 30 mmHg and then released again to baseline. An air-filled balloon catheter was inserted in the lower oesophageal third to assess end-expiratory (Peso, ee) and end-inspiratory pressure (Peso, ei). Plateau pressure (Pplat) was measured on the ventilator. Respiratory compliances were calculated: Crs='TV/(Pplat-PEEP), Ccw=TV*0.75/(Peso, ei–Peso, ee) and Cl=TV/((Pplat-PEEP)–((Peso, ei–Peso, ee)/0.75)). Extravascular lung water index (EVLWI) was assessed by transpulmonary thermodilution (PICCO, Pulsion).

RESULTS. Ccw decreased steeply with increasing IAP, resulting in a decreased Crs (a=p<0.008 vs. baseline, b=p<0.01 vs. IAP=30). Cl did not change significantly, neither did the EVLWI (14±2ml/kg).



CONCLUSION. IAH results in decreased Crs, almost exclusively due to a decrease in Ccw because of IAP-induced diaphragmatical stiffness. Cl remained constant in parallel with EVLWI, suggesting no acute alveolar edema formation.

0856

STATIC AND DYNAMIC COMPONENTS OF ESOPHAGEAL AND CVP DURING INTRA-ABDOMINAL HYPERTENSION

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INTRODUCTION. Aim of our study was to investigate the effects of intra-abdominal hypertension (IAH) on esophageal and central venous pressure taking into consideration the different values obtained at end-expiration (i.e. in static conditions) and during tidal volume delivery (i.e. in dynamic conditions).

METHODS. Prospective, randomised and controlled trial was performed on a total of 6 female pigs (weight 18.7 ± 2.4 Kg) and 15 Sprague Dawley male rats (weight 293 ± 29 g). During anaesthesia and paralysis animals' abdomens were inflated with helium to generate intra-abdominal hypertension. Direct measurements of abdominal pressure were obtained through intra-peritoneal catheters. In the pig model esophageal and central venous pressure were continuously measured while inflating the abdomen together with invasive hemodynamic assessment. In the rat model abdomen was inflated after the random application of three levels of positive end-expiratory pressure (ZEEP, PEEP3, PEEP8) while measuring esophageal pressure. Data are shown as mean ± SD.

RESULTS. At end-expiration (i.e. in static conditions) esophageal pressures were similar before and after abdominal inflation (P=0.177). On the contrary, the dynamic component significantly rose after IAH: from 3.2 ± 0.7 cmH2O to 10.0 ± 2.3 (P<0.001) and was highly correlated with peritoneal pressure (linear regression, R2=0.708, P<0.001). Static central venous pressure rose with IAH from 4.1 ± 1.5 cmH2O to 6.7 ± 1.8 (P=0.043), more so the dynamic component (from 2.9 ± 0.8 cmH2O to 9.3 ± 3.1, P=0.02). Dynamic changes of esophageal pressures correlated with dynamic changes of central venous pressure (linear regression: r2=0.679, P<0.001). PEEP significantly influenced static esophageal pressure during IAH: 1.8 ± 1.4 cmH2O and 6.3 ± 1.5 at ZEEP and PEEP8, respectively (P=0.002), but not dynamic pressures.

CONCLUSION. Dynamic changes of esophageal pressure occur when rising intra-abdominal pressure, while end-expiratory pressure is affected by high PEEP levels. Changes in central venous pressure reflect esophageal pressure.

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0857

EFFECTS ON RESPIRATORY MECHANICS OF BRONCHOALVEOLAR LAVAGE IN MECHANICALLY VENTILATED PATIENTS

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INTRODUCTION. The effects of bronchoalveolar lavage (BAL) on respiratory mechanics have been scarcely studied, and non uniform findings have been reported.

METHODS. OBJECTIVE: 1) To investigate the effects of BAL on respiratory mechanics in mechanically ventilated patients with suspected pneumonia and, 2) to find out whether these effects are related to the extension of radiographic infiltrate and preceding respiratory mechanics measurements.
58 critically ill patients undergoing mechanical ventilation were included. BAL was performed with 150 ml of sterile isotonic saline in 3 aliquots of 50 ml. Respiratory mechanics (static compliance and airway resistance) was measured by using the rapid airway occlusion technique immediately before and after the BAL and 90 minutes later. Heart rate, arterial blood pressure and body temperature were recorded continuously in all patients.
Patients were classified according to the presence of unilateral or bilateral infiltrates.

RESULTS. Following the BAL, compliance of the respiratory system (Crs) decreased from 50.9 ± 36.1 to 35.6 ± 14.8 ml/cm H2O ($p<0.01$) and airway resistance increased from 16.2 ± 7.6 to 18.1 ± 11.3 cm H2O/L/seg ($p< 0.05$); 90 minutes later, both parameters have returned to pre-BAL values (p:ns). Patients who showed > 20% decrease in Crs had higher pre-BAL Crs than patients with less severe decrease (55.8 ± 20.1 vs 36.9 ± 14.1; $p<0.001$). On the contrary, neither pre-BAL airway resistance nor the extension of the radiographic infiltrates were related with the changes in respiratory mechanics.

CONCLUSION. 1.-BAL in mechanically ventilated patients can lead to a significant but transitory deterioration on pulmonary mechanics characterized by a decrease in Crs and an increase in airway resistance.
2.-Patients with better initial Crs showed the more severe affectation.

0858

STATIC PRESSURE VOLUME CURVES AND BODY POSTURE IN SEVERE CHRONIC BRONCHITIS

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INTRODUCTION. Previously demonstrated pronation-effects [1] might be maximized in severely hyperinflated chronic bronchitis patients. We sought to elucidate underlying mechanisms and to determine whether pronation effects are reflected by postural changes in the characteristics of inspiratory pressure volume curves.

METHODS. Sixteen mechanically ventilated (for 16-36 h) patients with chronic bronchitis exacerbation were studied in preprone semirecumbent, prone, and postprone semirecumbent postures. Respiratory system intrinsic positive end-expiratory pressure (PEEPi, rs) exceeded 12 cm H2O. Respiratory system, lung, and chest wall pressure volume curves were constructed from functional residual capacity. Hemodynamics, respiratory mechanics, gas-exchange, and lung volumes were determined at zero external PEEP.

RESULTS. End-expiratory lung volume always exceeded opening volume. Prone position versus preprone semirecumbent resulted in 20% reduced pressure at the lower inflection point (LIP) and 17% increased volume at the upper inflection point (UIP) of the lung pressure volume curve (both $P < 0.05$). Prone positioning also reduced airway and additional lung resistance, increased lung compliance, and reduced lung volumes and PEEPi, rs. In the prone position, oxygenation was improved {PaO2/inspired O2 fraction rose from 198 ± 5 to 382 ± 9 mm Hg (mean ± SEM), $P < 0.05$}, and PaCO2 was reduced {from 52.2 ± 0.8 to 43.5 ± 0.7 mm Hg, $P < 0.05$}. In multiple linear regression analysis, postural decreases in PEEPi, rs and additional lung resistance independently predicted postural decreases in the LIP pressure of the lung pressure volume curve and PaCO2, respectively ($r2 = 0.93$ and 0.83, respectively, both $P < 0.001$).

CONCLUSION. In severely hyperinflated patients, pronation reduces the LIP pressure and increases the UIP volume of the lung pressure volume curve. Pronation effects on ventilation homogeneity (reflected by additional lung resistance) and PaCO2 are maximized, thus implying that pronation can be useful during early controlled ventilation.

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0859

GENERATION OF A SINGLE PULMONARY PRESSURE-VOLUME CURVE DOES NOT DURABLY AFFECT OXYGENATION IN ARDS

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INTRODUCTION. During a study protocol, performing a static pressure-volume (PV) measurement could durably affect oxygenation and could therefore interfere with the early evaluation of a therapeutic intervention performed just after PV measurement. The aim of the present study was to investigate the time-effects on gas exchange and hemodynamics of a single static PV measurement by a super syringe and by the constant-flow method in ARDS patients.

METHODS. We performed a prospective, randomized and controlled interventional study in an intensive care. Seventeen patients with early ARDS ventilated with a tidal volume of 6.9±1.0 ml/kg, a plateau pressure of 27±7 cmH20 and a PEEP of 10 cmH20 were submitted to three successive one-hour periods in a randomized order: following a PV curve using a 2-liter syringe (PVSS, insufflated volume = 1824±381 ml, plateau pressure = 46±9 cmH2O), following a PV curve using the constant-flow method on the ventilator (PVCF, insufflated volume = 1120±115 ml in ZEEP after 20 sec of expiratory pause, plateau pressure = 46±11 cmH2O) and during a control period. The maximal airway pressure allowed during PV measurement was 60 cmH2O. PEEP was set on 10 cmH2O immediately after PV measurement. PaO2, PaCO2 and mean arterial pressure were recorded each minute.

RESULTS. PV measurement did not significantly affect PaO2, PaCO2, mean arterial pressure and lung mechanics. Two patients presented a sustained increase in PaO2>20% after PVCF (> 60 min). Two patients presented a decrease in PaO2>20% after PVSS, which was sustained in one. These latter patients had an upper inflection point identified on the PV curve. After PVSS, PaCO2 increased by more than 10 mmHg in 2 patients and returned to baseline values after 15 min. One patient presented a decrease in mean arterial pressure > 10 mmHg for less than 5 min after PVSS and one patient after PVCF.

CONCLUSION. Evaluation of the effects of a strategy aiming at improving oxygenation can be reliably recorded early after a single PV measurement which is not followed by a change of PEEP level. PV measurement by the constant-flow method improves oxygenation in a limited number of patients.

0860

LUNG MECHANICS OF A SOLITARY LOBAR ATELECTASIS

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INTRODUCTION. The mechanics of a lobar atelectasis has not been thoroughly studied due to lack of a suitable model. We have developed a model of dense lobar collapse [1] in which we studied the mechanics of, 1) the whole lung before and after atelectasis formation, 2) the non-atelectatic lung after atelectasis formation and, 3) the lobar atelectasis. We were interested whether lower inflection point (LIP) indicate the beginning of recruitment and upper inflexion point (UIP) indicate the end of recruitment.

METHODS. In 6 anesthestized and ventilated pigs, a bronchial blocker (BB) was inserted in the right lower lobe, the BB-cuff was inflated and the air of the isolated lobe exsufflated. The lobe was selectively lavaged with saline. Functional residual capacity (FRC) was obtained before atelectasis formation as well as the pressure-volume (PV) relations of the respiratory system, chest wall, and lungs were determined (slow intermittently occluded insufflation up to an airway pressure of 40 cmH_2O followed by exsufflation to 0 airway pressure). After establishing the atelectasis, FRC and the PV-relations were obtained with the BB-cuff insufflated (in the non-lavaged, non-atelectatic part of the lungs) or with the BB-cuff exsufflated (the whole lung including the atelectasis). In addition, a slow intermittent insufflation was done selectively in the atelectasis.

RESULTS. The inspiratory PV-loop of the whole lung after the atelectasis formation followed the non-lavaged part of the lungs up to about 15 cmH_2O transpulmonary pressure, where a steep increase in slope occurred (i.e. LIP) and this increased inclination of the slope continued up to about 25 cmH_2O where slope decreased (i.e. UIP) and joined the PV-curve of the whole lung obtained before the atelectasis formation. The expiratory parts of the slope the lungs before and after atelectasis formation were almost identical. The slope obtained from the isolated atelectasis where horizontal to a LIP at 10 to 15 H2O where it became almost vertical.

CONCLUSION. This study supports the considerations that LIP indicates the pressure where an atelectasis starts to recruit and UIP the pressure where the recruitment of an atelectasis is complete.

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Poster Sessions
Therapeutic approaches in severe sepsis
0861-0873

0861

EFFICIENCY ASSESSMENT OF COMBINATION EFFERENT THERAPY FOR THE PATIENTS WITH MOFS

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INTRODUCTION. Purpose: To assess the influence of regimes of renal replacement therapy (RRT) rendered to the patients with MOFS.

METHODS. 40 patients (32 males and 8 females) were examined, average age is 38.7 years; all were treated at R&D ER named after N.V. Sklifosovsky in 2004-2005. Reasons – MOFS: 14 patients had severe acute pancreatitis, 11 – heavy multitrauma, 5 – acute mediastinitis, 4 – obstetrics pathology, 2 – severe pneumonia, 1 - cholecystitis, 1 – drug disease and 2 – heavy vascular pathology with gangrene of legs. 26 patients had sepsis. Estimation of ARF according to RIFLE criteria: 8 patients had R criterion, 6 – I criterion, 26 –F. The efferent therapy was rendered to all the patients: CVVH, CVVHD or their combination (1st group) to 20 patients, combination of intermittent HD and CVVH or CVVHD (2nd group) to 16 patients, HD in intermittent regime (3rd group) to 4 patients. The influence of renal replacement therapy (RRT) regimes on survival was assessed with the help of Cox's F test. The following values were used as interdependent variables: treatment duration, volume and velocity of introduction of replacement solution (VRS), volume and velocity of introduction of dialyzing solution, volume of ultrafiltrate. Influence of RRT regimes on the ARF severity was estimated by MANOVA.

RESULTS. While estimating the CCR regimes the sure influence of velocity of the replacement solution on mortality in case of CVVH was found out in both 1st and 2nd groups. As a result of data analysis the sure influence of VRS CVVH on the time of normalization of the concentration function of kidney (NCFK) was noted. (B=-3.99*10E-02, p=0.029) and duration of oligoanuria (B=-6.36*10E-03, p=0.039. In spite of the fact that intensity and duration of kidney malfunction in the 1st and 2nd groups differed greatly, there are no significant differences in mortality.

CONCLUSION. Velocity of introduction of the replacement solution in CVVH is a sure factor that influences mortality, time of kidney functional recovery. There is no significant difference in mortality in CVVH, CVVHD treatment in comparison with information on their combination with intermittent HD.

0862

MORTALITY OF SEPTIC SHOCK PTS WITH ACUTE RENAL DYSFUNCTION REQUIRING RRT: A MATTER OF DIALYSIS DOSE?

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INTRODUCTION. Recent literature data suggest a correlation between mortality and morbidity and Renal Replacement Therapy (RRT) dialysis dose in acute renal dysfunction (ARD). The authors evaluate the impact of Post-dilution Continuous Veno-Venous Hemofiltration (CVVH) dialysis dose on mortality and recovery of acute renal dysfunction (ARD) in Septic Shock (SS) Pts at 15 days after stopping RRT.

METHODS. A retrospective study on PTS with SS-ARD-RRT over a 4-yr period (2001-2005) in a 8-bed ICU. ARD was defined on RIFLE criteria according to GFR/creatinine or urine output. Renal function recovery (RFR) was assessed by dialysis dependence at 15 days after stopping RRT. Data are presented as number or percentage and evaluated with T Student Test and variance analysis.

RESULTS. During the study period 39 PTS with SS and ARD requiring CVVH were evaluated. The mean age was 60.76±14.4yrs, M:F=27:12. SAPS II and SOFA score were respectively of 55.2±15 and 12.89±2.8. At the start of CVVH (T0) all PTS were mechanically ventilated and treated with vasopressors (mean NE, EPI and DOPA were 0.67±0.49, 0.12±0.2 and 1.5±2.6γ/Kg/min). PTS were assigned to RIFLE categories: R=3, I=8, F=26, ESRD=2. T0 mean creatinine level was 4.2±2.2mg/dl and diuresis was 31±35ml/h. The authors compared PTS treated with CVVH mean ultrafiltration rate (UF)<25ml/kg/h (n=21, groupA) with UF>25ml/Kg/h (n=18, groupB). Both groups of PTS were similar for age, severity scores, hemodynamic profile, LOS, VAM days, creatinine level and urine output at TO (p>0.05). Groups were significantly different for the percentage of Failure PTS: 76% in group A, 55% in group B. (Table 1).

TABLE 1.

	GROUP A (n=21)	GROUP B (n=18)	p value	ALL PTS
MeanUF rate (ml/Kg/h)	19.69±3.97	30.1±5.67	p<0.05	24.5±7.1
Days of CVVH	8±5.8	9.4±10.9	NS	8.7±8.5
RFR in survivors	66%	87%	p<0.05	78%
15 days mortality %	43%	11%	p<0.05	28%

CONCLUSION. This is the first literature report on dialysis dose in conventional CVVH in PTS with severe SS and ARD. These data suggest that a higher RRT dialysis dose (>25ml/kg/h) seems to have a positive impact on survival and probably on renal recovery in ARD severe SS PTS.

0863

INTEREST OF "PULSE" HIGH VOLUME HEMOFILTRATION (PHVHF) IN SEPTICK SHOCK

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INTRODUCTION. The purpose of this study was to evaluate the effect of PHVHF on hemodynamics and outcome in patients with septic shock. The primary end point was the mortality at 28 days, secondary was hemodynamic and organ failure evolutions and at last the comparison with previous studies (1,2)

METHODS. Prospective study in two centers (France and Belgium) in which 38 patients with septic shock were included. All patients were treated by PHVHF with ultrafiltration rate of 100 ml.kg-1.h-1 for 4 hours and 35 ml.kg-1.h-1 the next 20 hours. Changes in hemodynamic variables and doses of norepinephrine required were measured regularly and the biological parameters were tracked daily and all data were analyzed using ANOVA for repeated measurements. Patients were defined as hemodynamic responders if catecholamine doses required decreased more than 50% with hemodynamic improvement. Comparison between expected versus observed mortality was made by a CHI2 test.

RESULTS. The mean SAPS II was 65 and mean age was 60 years. The global observed mortality was 50% versus an expected mortality of 77% (p<0.05). Twenty three patients were hemodynamical responders with a mortality of 17% and fifteen were not and all died. Responders and non-responders characteristics (SAPSII, age, organ failure…) were comparable at the beginning, excepted the weight, because the responders were significantly lower in body weight (70 versus 85 kg). All the parameters (hemodynamic and biologic) improved in the responders group while non-responders had more hepatic failure.

CONCLUSION. Observed mortality was significantly better than the expected one. Hemodynamic improvement has a good prognostic value in term of survival. The weight is an important parameter, not only for the hemofiltration dose adaptation but perhaps also for the specific inflammatory status in the overweight population which could explain the hemodynamic response difference. In the previous study (2), all the patients were responders with HVHF (50 ml.kg-1.h-1) maintained during 96 hours in comparison with this study and the old one (1) where some patients were also non responders.

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0864

HEMOPERFUSION WITH POLYMYXIN-B CARTRIDGE PROTECTS FROM SEPSIS-RELATED ACUTE KIDNEY INJURY

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INTRODUCTION. Recent studies suggested the key role of apoptosis in the pathogenesis of sepsis-related Acute Kidney Injury (AKI); a direct toxic effect of inflammatory mediators and LPS on proximal tubular epithelial cell (PTEC) has been demonstrated. The aim of this study was to investigate the effects of hemoperfusion with Polymyxin-B (PMX-B) cartridge on pro-apoptotic activity of plasma from severe septic patients on cultured PTEC.

METHODS. Patients with suspected GRAM- infection and at least three SIRS criteria and one organ failure (Marshall score) were randomly assigned to two different treatments: a first group (TREATMENT) underwent two hemoperfusion treatments with PMX-B for 2 h, at time 0 and after 24 h, a second group (CONTROL) underwent all standard treatments, according to the Surviving Sepsis Campaign guidelines. Apache II score was calculated in all patients. SOFA and ADQI-RIFLE score were evaluated at the beginning of the study and after 72 h. Plasma from patients was collected at time 0, after 24 and 72 h in both groups. At the same times serum creatinine, hourly diuresis, tubular enzymes and proteinuria were measured. Immortalized PTEC cultures were stimulated with plasma derived from both groups. Proliferation and apoptosis were evaluated by XTT and TUNEL assays, respectively. In addition, the modulation of Fas and Fas-Ligand expressions and Caspase-3, -8 and -9 activities were studied. Plasma from normal volunteer was used as negative control. Clinical management was standardized by protocols in both groups

RESULTS. Ten consecutive patients were enrolled. After 72 h, SOFA was significantly reduced in the TREATMENT (N = 5) as compared to the CONTROL (N= 5) group (p<0.05). There was a reduction in plasma creatinine for treated group and an increase for the control, although both were not significant. Incubation with plasma derived from TREATMENT at time 0 and from CONTROL at time 0 and 72 h showed a significant increase of PTEC apoptosis in comparison to plasma of healthy volunteers (p<0.005). In contrast, the number of apoptotic PTEC was significantly reduced after incubation with plasma collected at the end of PMX-B treatments (24 h) and after 72 h (p<0.001). The reduction of PTEC apoptosis was confirmed by decreased caspases activities and by down-regulation of Fas. These phenomena were associated to a significant decrease of Pto/Cro (Proteinuria/ Creatininuria ratio) and of urine levels of tubular enzymes

CONCLUSION. Our data support the hypothesis that hemoperfusion with PMX-B cartridge protects from sepsis-related AKI by reducing the pro-apoptotic activity on PTEC.

0865

TREATMENT OF SEPTIC PATIENTS WITH A NOVEL ENDOTOXIN ADSORBER COLUMN. RESULTS OF A PILOT STUDY

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INTRODUCTION. Endotoxemia leading to endothelial activation and loss of vascular resistance by increased production of nitric oxide is an important factor in the development of distributive shock and multiorgan failure in septic patients. The removal of endotoxin from the circulation has thus been advocated as a treatment option in sepsis. We report the results of a pilot study on the first application of a novel Endotoxin adsorption column (ET-Adsorber, Gambro, Sweden) in septic patients.

METHODS. Patients were included if they met the following criteria: 2 or more SIRS criteria, a plasma-endotoxin concentration of 0.1 EU/ml in the chromogenic Limulus Amebocyte Lysate (LAL) test, a clinical indication for the placement of a dialysis catheter. Clinical and laboratory data were recorded at least once daily, haemodynamic data were obtained by transpulmonary thermodilution (PiCCO, Pulsion Medical Systems, Munich). Values before and after treatment sessions were compared. During treatment, plasma is pumped through the adsorption column made of a hydrophilic vinyl copolymer modified with an arginine ligand after being separated from blood in a plasma filter, and then returned to the blood stream. Five treatments per patient were performed on consecutive days.

RESULTS. Ten consecutive patients were included (8m, 2f, age 56.2 ± 10.7 years). Sepsis resulted from nosocomial pneumonia (n=3), spontaneous bacterial peritonitis (n=2), peritonitis (n=2), liver abscess, soft-tissue infection and an unknown source in one case each. Initial APACHE II score was 29.7 ± 8.7, mean SOFA score before the first treatment was 14.5 ± 4.5. Plasma-endotoxin before the first treatment had a median of 0.70 EU/ml (range: 0.11 – 2.4). Hospital mortality was 40%. 49 treatment sessions were performed. Mean arterial pressure increased from 80.76 ± 15.7 mmHg to 88.16 ± 16.7 mmHg while noradrenaline could be reduced from 4.0 (0 – 29)μg/min to 2.2 (0-29)μg/min. There was an increase in Global Enddiastolic Volume from 744.6 mL m-2 to 784 mL m-2. Changes in Cardiac Index (CI), Systemic Vascular Resistance Index (SVRI) were not significant. There were no complications attributable to endotoxin adsorption. One patient had a hypertensive reaction that subsided after cessation of the adsorption treatment.

CONCLUSION. In septic patients during endotoxin adsorption the dose of vasopressors could be significantly reduced while MAP levels increased suggesting an improved vasotonus. A randomized trial investigating this treatment option in patients with sepsis is warranted.

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0866

RELATIVE ADRENAL INSUFFICIENCY IN CIRRHOSIS WITH SEPTIC SHOCK. EFFECTS OF TREATMENT ON SURVIVAL

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INTRODUCTION. Relative adrenal insufficiency is defined as an abnormal adrenal response to stress (basal cortisol levels < 15 μg/dL and/or an increase < 9 μg/dL after corticotropin stimulation). In non-cirrhotic patients with septic shock its incidence is about 10-40%. However, there are no data in cirrhosis. This study was aimed to determine the incidence of relative adrenal insufficiency in cirrhotic patients with septic shock and to evaluate the effects of treatment on survival.

METHODS. Prospective, non-comparative study in a consecutive series of cirrhotic patients with septic shock. Determination of cortisol levels at baseline and one hour after corticotropin stimulation (250 μg) in the first 72h of ICU admission. Administration of intravenous hydrocortisone in those patients with abnormal adrenal response.

RESULTS. Twenty-five patients were included (Child A/B/C: 0/6/19). The incidence of adrenal insufficiency in the total series was 68% (17 patients). Adrenal dysfunction was extremely frequent in patients with severe liver failure (Child C: 84% vs. Child B: 17%, p=0.006). No other significant differences were observed in the baseline characteristics between patients with and without adrenal insufficiency. Intensive care unit and hospital mortality rates were 24% and 28%, respectively. This mortality rate significantly differs from that observed in a previous series from our group which included 48 cirrhotic patients with septic shock with similar clinical characteristics in whom adrenal insufficiency was not investigated (71%, p=0.001).

CONCLUSION. Relative adrenal insufficiency is extremely frequent in cirrhotic patients with severe liver failure and septic shock. Treatment with hydrocortisone seems to improve survival in these patients.

0867

STEROIDS EFFECT ON HEART RATE (HR) AND BLOOD PRESSURE (BP) VARIABILITY

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INTRODUCTION. Septic shock is associated with impairment of the sympathovagal balance (SVB) that may contribute to circulatory failure. We assessed HR, SBP and DBP variability in septic shock patients with and without adrenal failure (AF) and also hydrocortisone (HSHC) effect on spectral components in patients with AF.

METHODS. Finger BP and pulse intervals were measured using a finger photo plethysmography over 30 minutes (Finapres 2300, Ohmeda, Trappes, France). Spectral analysis of HR, SBP and DBP were performed with using FFT (1) to determine their low (LF) and high (HF) frequency components. LFnu and HFnu corresponded to normalised LF and HF. For each signal, LF reflects sympathetic modulation. For HR, HF and LF/HF ratio reflect vagal activity and SVB, respectively. AF was defined upon plasma cortisol level before and after Corticotropin test. Group 1 included 47 patients with and without AF. Group 2 included 23 patients with AF who were randomly treated with HSHC or placebo. Measurements were done at onset of septic shock. In Group 2, spectral analysis were also done 7 days later. Difference were tested with Mann-whitney test.

RESULTS. Baseline characteristics did not differ between patients with and without AF and those treated or not with HSHC.

TABLE 1.
LFnu components according to the presence of AF

	Adrenal Failure (n=29)	No Adrenal Failure (n=18)	p
LFnu-HR	0.14±0.07	0.2±0.10	0.01
LFnu-SBP	0.16±0.05	0.21±0.07	0.01
LFnu-DBP	0.027± 0.05	0.14± 0.12	0.0003

TABLE 2.
Effect of HSHC on LF components

	HSHC (n=10)	No HSHC (n=13)	p
ΔLF/HF	1.52±2.60	0.46±2.24	0.009
ΔLFnuDBP	0.005±0.01	-0.005±0.06	0.02

CONCLUSION. This study suggests that sympathetic activity is altered in septic shock with AF and that is improved by HSHC.

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0868

PLASMA VOLUME EXPANSION INDUCED BY HES130/0.4 IS SIMILAR IN SEPTIC AND NON SEPTIC PATIENTS

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INTRODUCTION. In order to assess the ability of the HES 130/0.4 to remain in the intravascular space in case of capillary leak associated to sepsis, we compared the hemodilution induced by an HES 130/0.4 infusion in two groups of patients requiring fluid therapy: a septic group (SG) and a non septic group (NSG). We evaluated the variation of hematocrit, albuminemia and protidemia over a period of 8 hours after infusion.

METHODS. This is a prospective study conducted in an ICU of a tertiary teaching hospital.
Inclusion was realized during the last fluid administration. The patients received 500 mL of 6% HES 130/0.4 over a 15 mn period. Thereafter no more fluid was administered for the next 8 hours. Hematocrit, albuminemia and protidemia analysis were performed before infusion (H0) and 1 (H1), 2 (H2), 3 (H3), 4 (H4) and 8 (H8) hours thereafter. Additional blood sample were collected for 2 septic patients and 2 non septic patients for starches plasma dosage and in vivo molecular weight assessment one, four and eight hours after infusion.

RESULTS. Twelve patients were included in each group. In both group the H1 values were always significantly lower than H0 values for all three hemodilution markers. The H3 and H1 values were never significantly different suggesting that even in septic patients, HES may remain within the intravascular space. The comparisons between SG and NSG were not significant whatever the marker considered. The dosages of HES performed in four patients showed a persistence of HES over the period of the study.

CONCLUSION. Our study provides evidence of starches-induced haemodilution in septic patients. The immediate effect of 500 mL of 6% HES (130/0.4) was similar to the effect observed in non-septic patients requiring volume expansion. The duration effect of a single infusion of HES 130/0.4 is observed for at least three hours in septic and non septic patients. We could demonstrate that this haemodilution effect was related to the presence of starches within the vascular space.

0869

INFLUENCE OF DIFFERENT STRATEGIES OF VOLUME REPLACEMENT ON THE ACTIVITY OF METALLOPROTEINASES - 9

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INTRODUCTION. Excessive production of matrix metalloproteinases, such as MMP-9, is linked to tissue damage, degenerative inflammatory disorders and anastomotic leakage after large bowel surgery. The aim of this study was to verify whether different strategies of fluids administration can reduce the MMP-9 expression.

METHODS. 1) In vitro experiment: we tested the hypothesis of a direct inhibition of MMP9 by the fluids used perioperatively, i.e. Ringer's lactate (RL), poligeline (E), and Iow-molecular Hydroxyethylstarch (HES); 2) In vivo experiment: 36 consecutive patients undergoing colon surgery were randomized to receive either RL, E or HES. MMP-9 and tissue inhibitor of metalloproteinases (TIMP-1) were measured immediately after anesthesia induction (T0), whithin one hour (T1) and 72 hours (T2) after the end of surgery from venous blood samples; MMP-9/TIMP-1 ratio was calculated as an index of equilibrium between the action of MMP-9 and its inhibition.

RESULTS. 1) In vitro experiment: the presence of HES in the MMP9 assay system showed a strong inhibition of the enzymatic activity compared to RL; 2) In vivo experiment: MMP-9 and TIMP-1 plasma levels did not differ among the three groups at the baseline while those levels increased significantly at the end of surgery. At this time, the MMP-9 plasma levels as well as MMP-9/TIMP-1 ratio were significantly higher in RL and E groups than in HES group. These results were confirmed 72 h after surgery.

TABLE 1.
MMP-9/TIMP-1 ratio

	RL	E	HES
T0	0.13±0.02	0.17±0.04	0.13±0.03
T1	0.43±0.06*	0.39±0.07*	0.23±0.04#
T2	0.25±0.06	0.23±0.03	0.14±0.03#

*Data are mean ± SE; *p<0.05 compared to baseline; #p<0.05 compared to other groups*

CONCLUSION. Our study demonstrates for the first time that HES 130/04 decreases the circulating levels of inflammatory mediators and inhibits the MMP-9 expression in patients undergoing abdominal surgery.

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0870

NEUTROPHIL ELASTASE INHIBITOR REDUCES RESUSCITATED FLUID VOLUME IN SEVERELY BURNED PATIENTS

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INTRODUCTION. Neutrophils elastase (NE) plays an important role in systemic inflammatory response. On the other hand, thermal injury derives systemic inflammation and requires high volume fluid resuscitation caused by increasing vascular permeability. Inhibition of NE attenuates inflammation responses may leads to reduction of fluid volume requirement in severely burned patients. This study tested the hypothesis that neutrophil elastase inhibitor, sivelestat, attenuates the resuscitated fluid volume (RFV) in severely burned patients.

METHODS. 12 severely burned patients whose burn index (BI) showed from 20 to 50, were enrolled in this study. Fluid resuscitation was performed using lactate Ringer solution according to Baxter formula during the initial 24hrs. High dose ascorbic acid therapy (66mg/kg/hr for initial 24hrs) was administered in all patients. They were divided into two groups as Sivelestat group (S group; n=6) and control group (C group; n=6). In S group, sivelestat sodium hydrate was infused at the rate of 0.2mg/kg/h immediately after ICU admission. Parameters, such as RVF, severity (APACHE II, SOFA score), lung injury score (LIS), ICU duration and Ventilator free day were compared in two groups.

RESULTS. Three patients, one in S group and two in C group, were died in ICU. These were died suddenly caused by acute myocardial infarction and massive pulmonary embolism. There were no significant differences in parameters except RFV and LIS changes. RFV of S group showed significantly lower than that of C group. LIS showed significant increase in C group than in S group.

CONCLUSION. Sivelestat simultaneously showed the reduction of RFV and the attenuation of lung injury in severely burned patients. This study indicates that inhibition of NE reduces RFV which leads to the attenuation of lung injury.

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0871

STATINS AND CREATINE KINASE IN THE CRITICALLY ILL

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INTRODUCTION. Observational and laboratory data suggest statins may have a role in the prevention and treatment of sepsis (1). Recruitment of patients to any proposed randomised trial of statins in severe sepsis may be limited if there are a large number of patients taking regular statins prior to their acute illness, or a large number of patients with high creatine kinase (CK) concentration prior to enrolment. As part of the planning process for the Simvastatin in severe Sepsis Trial (SimSepT), the first RCT of its kind, all CK values measured on our ICU from the previous 12 months were retrieved. The incidence of chonic statin use prior to admission to ICU was recorded in patients screened during the first month of the trial.

METHODS. The CareVue clinical information system at Oxford was examined to find all recorded CK values between November 2004 and October 2005. In the first month of SimSepT all admissions to two ICUs (Oxford and Brighton) were prospectively screened, and statin use prior to ICU admission was recorded.

RESULTS. 887 patients were admitted to Oxford adult ICU during the one year period to October 2005. Of these 132 (14.8%) had a CK concentration measured. 81(61.3%) were above the normal range and 44(33.3%) were above 5 times the upper limit of normal. In the first month of SimSepT 111 patients were screened. 27 (24.3%) were taking a statin on admission to ICU. Of the 19 patients admitted with sepsis 4 (21.1%) were taking a statin. Only one of these patients had a CK concentration measured.

CONCLUSION. We have shown that there is a high incidence of statin use at admission to ICU in patients, including those with sepsis. These issues may significantly reduce recruitment rates to any trial of statins in the critically ill, and trials should be designed with this in mind. A significant proportion of patients also have a raised CK, and trial designers will need to decide if these patients can be excluded on clinical grounds or if CK levels need to be measured on all potential trial subjects.

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0872

EFFECTS OF POLYCLONAL IGM IN SEPTIC SHOCK ACCOMPANIED BY SEVERE RESPIRATORY FAILURE: A RANDOMIZED TRIAL

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INTRODUCTION. Mortality due to acute respiratory failure accompanied by septic shock is around 70%. A recent meta-analysis suggested that polyclonal immunoglobulin treatment may be beneficial in these patients (1).

METHODS. In this prospective randomised controlled study we investigated the effects of polyclonal immunoglobulin treatment in patients with acute respiratory failure due to septic shock.
33 patients with early septic shock accompanied by severe respiratory failure were randomly allocated to receive 5ml kg-1 (predicted body weight) Pentaglobin® (16 patients) or equivalent amount of placebo (17 patients), respectively via 8 hour IV-infusion for three consecutive days. 8-day and 28-day mortality and daily Multiple Organ Dysfunction Scores were calculated. Serum C-reactive protein and procalcitonin levels were measured daily. For statistical analysis two-way ANOVA was used.

RESULTS. Daily MODS showed multiple system organ failure which did not change significantly during the eight days. Median length of ICU stay, the length of mechanical ventilation, length of vasopressor support during the total interval of ICU stay and survival were nearly identical in Pentaglobin and Placebo group. After the eight day study period there was a trend towards improved survival in the Pentaglobin group 11/16 (69%) vs. Placebo 6/17 (35%) p=0.055, however the potential survival benefit disappeared after 28 days 4/16 (25%) vs. 5/17 (29%) p=0.776; Pentaglobin vs. Placebo, respectively. CRP levels were significantly lower in the Pentaglobin group on day 4, 5 and 6, respectively.
Serum PCT levels showed no significant difference between the two groups.

CONCLUSION. In this study the use of IgM-enriched immunoglobulin preparation failed to produce any improvement in the organ dysfunction as compared to standard sepsis therapy in patients with septic shock. However, we observed a trend for short term mortality benefit and a significant reduction in CRP levels obtained with Pentaglobin® administration.

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0873

EFFECTS OF LEVOSIMENDAN IN SEVEN SEPTIC SHOCK PATIENTS

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INTRODUCTION. Levosimendan is a novel inodilator that improves cardiac contractility by sensitizing troponin C to calcium. This drug has proved to be effective in treating advanced congestive heart failure or cardiogenic shock. Calcium desensitization plays an important role in the pathophysiology of septic myocardial depression. For these reasons, we thought that levosimendan might be beneficial in sepsis-induced cardiac dysfunction.

METHODS. We administrated 24 hours levosimendan infusion to the seven patients having the diagnosis of septic shock (intraabdominal sepsis 6, mediastinitis 1) after 24 h of conventional treatment including dopamine or adrenaline and observed mean urine output, mean arterial pressure (MAP), changes of conventional inotropic agents dose, central venous pressure (CVP) and outcome.

RESULTS. In five of the seven patients, infusion of conventional inotrops have been decreased or ceased. Two patients were died, but others were recovered from shock. MAP and urine output of all patients have been adequate. In only one patient, no urine output has been observed.

TABLE 1.
MAP (mmHg), CVP (cm H2O) and Urine output (cc kg-1 h-1) results

	CVP before levo	CVP after levo	MAP before levo	MAP after levo	Urine output before levo	Urine output after levo
Case-1	13	10	42	67	< 0.5	0.5 - 1
Case-2	30	30	63	82	0	0
Case-3	11	10	73	74	< 0.5	0.5 - 1
Case-4	13	12	55	80	< 0.5	> 1
Case-5	13	11	44	66	> 1	> 1
Case-6	9	17	64	64	< 0.5	> 1
Case-7	10	12	62	62	< 0.5	> 1

CONCLUSION. As our impression, levosimendan can be an alternative to the strategy of increasing the dose of conventional inotrops and unsuccesfully treated decompansated myocardial failure under septic shock status.

0875

RANDOMISED CONTROLLED TRIAL COMPARING GELIPERM AND LACRILUBE EYE CARE IN THE CRITICALLY ILL

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INTRODUCTION. Corneal exposure and microbial keratitis are potentially devastating ocular disorders. Infection may progress rapidly and result in severe impairment of visual acuity. Microbial keratitis has been widely reported amongst Intensive care unit (ICU) patients. The two main forms of eye care measures employed on ICUs in the UK are Geliperm dressing and Lacrilube ointment and the effectiveness of these methods have never been fully assessed.

METHODS. A randomised controlled trial was conducted with regional ethics committee approval. Patients were recruited over a 5 month period. Patients with primary orbital trauma were excluded. Nursing staff were given a training session on the appropriate use of both treatments. The eyes of each patient were randomised to either Geliperm or Lacrilube treatment. Daily ophthalmology ward rounds recorded the degree of corneal exposure, chemosis, palpebral aperture and sedation scores. Study endpoints included spontaneous blinking and the development of clinically significant corneal exposure. Only patients who remained in the trial for two days or more were included.

RESULTS. 80 eyes of 40 patients were recruited to the study. The mean length of stay in the trial was 7 days (range 2-15 days). Two patients were removed from the trial after developing significant corneal exposure. 28 were removed when they started blinking, 9 were removed upon death or transfer to another hospital, and 1 patient was removed when he was nursed prone and could not receive geliperm. No significant difference between corneal exposure scores was found between the two groups. Nor was any significant difference found between Palpebral aperture measurements and chemosis measurements in the two groups.

CONCLUSION. We conclude that geliperm is as effective as lacrilube in preventing exposure keratopathy provided the geliperm is used correctly.

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0874

WHO IS MISSING? FALSE NEGATIVES IN ICU-ACQUIRED INFECTION SURVEILLANCE

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INTRODUCTION. The Belgian validation study (2001 – 2004) revealed a 56% sensitivity of the national surveillance for pneumonia (PN) acquired in ICUs. The present study is designed to identify the characteristics of PN patients reported as negatives to the national surveillance.

METHODS. On the validation study all PN cases and 20% of negative charts reported to the surveillance were reviewed. Charts identified as false negatives were compared to true positives and true negatives in terms of SAPSII score, mortality, ventilation days, missing data, length of stay (LOS) after infection onset and microbiological confirmation.

RESULTS. From 1094 validated records, 861 charts were reported as PN negatives, of which 23 classified as false negatives. False negatives were similar to true positives and very different from true negatives on severity of illness and mortality, except for PN risk score and in particular the percentage of PN without microbiological confirmation. False negatives tend to have more missing data for other variables. Their characteristics are presented on table 1.

TABLE 1.
FALSE NEGATIVES COMPARISON

	FN (32)	TP (181)	TN (829)	FN vs TP
Mean SAPS II	38.9	42.8	31.7	NS
Mortality %	29.0	26.5	8.7	RR=1.1 (0.6-2.0)
Mean Vent. days	10.7	15.1	2.2	NS
Mean PN risk score	34.0	44.9	19.9	p<0.0001
Missing data %	28.1	14.9	18.5	RR=1.9 (0.9-3.6)
Mean post inf. LOS	10.1	14.6	-	NS
PN Microb. neg %	84.4	15.2	-	RR=5.4 (3.8-7.9)

FN= false negatives; TP= true positives; TN= true negatives

CONCLUSION. Patients reported inaccurately as PN negatives are similar to true PN cases. The very high proportion of microbiologically negative PN suggests that Belgian intensivists rely on microbiology identification to report PN to the surveillance. It also implies that epidemiological and clinical decision making criteria are discrepant for clinical PN.

0876

DISINFECTABLE NEEDLELESS CONNECTOR FOR PREVENTION OF CATHETER–RELATED BLOODSTREAM INFECTIONS

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INTRODUCTION. Recent studies report that mechanical valve (MV) intravenous ports reduce colonization of the catheter tip (1), passage of microorganism into the catheter lumen (2), and rates of catheter-related bloodstream infections (CR-BSIs) (3). The aim of this study was to assess the efficacy of a disinfectable, needleless MV connector in the prevention of catheter tip colonization and catheter-related bloodstream infection.

METHODS. We prospectively randomised 259 mechanically ventilated patients who needed multilumen central venous catheter. Patients in the study group had disinfectable, needleless MV connectors attached to the three-way taps, whereas the control group had standard entry port caps, 0.5% (w/v) chlorhexidine in gluconate 70% (v/v) isopropyl alcohol swab was used before accessing port. Semi-quantitative culture of catheter tip was performed on removal of all catheters. Positive catheter tip culture, positive blood culture, proven CR-BSIs (defined as positive culture of the same pathogen on catheter tip and in peripheral blood culture), age, sex, APACHE II score and SOFA score on admission, cause of admission, length of stay and outcome in the intensive care were recorded. Statistical analysis was performed using t - test and z – test, $p < 0.05$ was considered significant.

RESULTS. Both groups did not differ regarding age, sex, APACHE II score and SOFA score on admission, cause of admission, length of stay and outcome. Rate of positive catheter tip cultures was higher in the study group (n = 129 patients, rate 19.4%) than in the control group (n= 130 patients, rate 7.7%), $p = 0.01$. There was a trend to higher incidence of positive blood cultures (12.4% vs 7.4% in the study and control group, $p = 0.197$) and proven CR-BSi in the study group (5.38 vs 1.05 per 1000 catheter-days in study and control group, $p = 0.104$), although the difference was not significant.

CONCLUSION. The use of a disinfectable needleless connector for intravenous access is not associated with a decreased risk of CR-BSi.

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0877

A SIMPLE PREGRAM FOR REDUCTION OF VENTILATOR-ASSOCIATED PNEUMONIA (VAP) IN ICU

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INTRODUCTION. VAP is the most common infection in patients under mechanical ventilation (MV - 9.3-21.6 / 1000 patient-day in NNISS. There are many actions (around 23, according to Rello) which can decrease the incidence of VAP, but many are or difficult to implement or expensive.
We intended to evaluate the efficacy of two simple measures, semi-recumbent position and validation of the diagnosis of VAP by an interdisciplinary group, in the incidence of the problem.

METHODS. Our ICU has 12 adult-beds. The period of study was from 2003 to 2005, until December. We standardized semi-recumbent position in 45° in all patients studied. In daily basis, a doctor of the staff and a fellow checks all cases with suspicion of VAP and each week we had another check, at this time with presence of a infection specialist, closing or not the diagnosis of VAP. Nothing changes. We compare the incidence of VAP from 2003 to 2005 with data from 2001 and 2002.

RESULTS. Patients are similar by age, sex and Apache II. Incidence of VAP was 28 and 22 / 1000 patient-day of MV in 2001 and 2002. Incidence of 2003 was 10.7, almost 50% less than 2001/2002, 7.4 in 2004 and 8.5 in 2005. A study we done in 2002 in our ICU, we identified that patients under MV were with the trunk bellow 45° in 80% of opportunities.

CONCLUSION. VAP increases time of MV, time of hospitalization in ICU, the cost and the morbi-mortality.
Our study showed that it is possible a great reduction in incidence of VAP (from 28 in 2001to 10.7 for 1,000 days of MV in 2003) and to keep it under control (7.4 in 2004 and 8.5 in 2005) with simple and inexpensive measures.
More than 50% of the cost of the medical prescription is related to antibiotics for VAP.
To keep a patient under MV in a 45° position it is not difficult and it is cheap. To check, in daily and weekly basis, diagnosis of VAP it is easy too. Unhappily our doctors, nurses and pulmonary therapists are not awareness of these practices, although everybody knows the rational and the advantages. With some simple and cheaper attitudes we obtained an important reduction in VAP. We will continue the study.

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0878

IMPACT OF A SELECTIVE DIGESTIVE DECONTAMINATION PROTOCOL ON VENTILATOR ASSOCIATED PNEUMONIA

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INTRODUCTION. To evaluate the impact on the frequency and the characteristics of the ventilator associated pneumonia (VAP) with the setting in march, starting from the year 2004, of a selective digestive decontamination (SDD) protocol.

METHODS. Cohorts observational study in a 12 bed neurotrauma intensive care unit of from the year 2002 at the 2005.
The cases are picked up in two periods (in spring and autumn) of two months per year. They have been distributed in two groups differed among if for the presence of a SDD in the second group.
Data were collected on age, gender, reasons for ICU admission, APACHE-II admission score, ICU stay, mortality and VAP incidence.
The quantitative variables are expressed as mean ± standard deviation and the qualitative ones as percentage. For the comparison of two stockings the test of Student and for the case of proportions the chi-square. Non parametric analysis with OR of Mann-Whitney. Analysis multivariable with binary logistical regression with OR and confidence intervals of 95%. With $p < 0.05$ is significated.

RESULTS. Out of 469 patients were collected (men 68.2%, women 31.8%), with mean age 47.61±18.81 years. Mean APACHE II score on admission of 16.2±7.67 points. Reasons for admission were neuro-vascular pathology 71.8%, multiple traumas 27.5% and other pathologies 0.7%. Mean ICU stay was 9.77±9.3 days. Mortality was 19%. MV has received 65.5% and SDD 51.6%.
The incidence of VAP passes from 27.52% to 14.69% after the setting in march of SDD (X2 6.37, $p < 0.02$).
The multivariable analysis, being VAP the dependent variable, it finds that the PDDS is a protection factor with an OR 0.41 (CI 0.24 - 0.71, $p < 0.05$) and the APACHE II score is a risk factor with OR 1.04 (CI 1.001-1.08, $p < 0.05$).

CONCLUSION. The incidence of VAP has decreased after the setting in march of a SDD, being this protocol an independent protective factor in the appearance of VAP.

0879

SURVEY OF ORAL CARE PRACTICES IN EUROPEAN INTENSIVE CARE UNITS

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INTRODUCTION. Effective oral care, that includes tooth brushing and antimicrobial oral solutions, has been shown to improve patients' oral health and may significantly reduce respiratory infections in mechanically ventilated (MV) patients (pts). This survey was undertaken to determine the type and frequency of oral care (OC) in European ICUs and the attitudes, beliefs, and knowledge of ICU nurses.

METHODS. An anonymous questionnaire was used to gather information among nurses across 59 European ICUs, from 5 countries (1 questionnaire/ICU).

RESULTS. Respondents' mean age was 40.73 y, with 13.68 y of ICU experience. The 91.5% were registered nurses and 79.7% have completed a 3-y educational program. The 76.3% were from university/academic, 16.9% from public, and 5.1% from private ICUs; 74% of the ICUs were polyvalent. OC was perceived as very high priority for MV pts by the 88% and the 100% stated that they have adequate time to provide OC at least once a day. Only 32% found cleaning oral cavity an unpleasant task and only 20% that it is difficult to clean. The 37% suggested that no matter what they did, the mouths of MV pts seemed to get worse the longer they were on the MV. More than 89% responded that a nurse should be responsible for OC of ICU pts. OC practices varied within institutions. The most common practice for providing OC care was the use of mouthwashes (88.1%), once a day or less (20.3%), twice a day (30.5%) or three times a day (37.3%). Chlorexidine was the most frequently used mouthwash (61.0%). It should be highlighted that 59.3% of the respondents never used manual toothbrush, 74.6% never used toothpaste, 78% never used foam swabs, and 57.6% never used moisture agents for performing oral care. No respondent used electric toothbrush. Regarding the supplies for performing OC, although 81.3% estimated that the provided supplies were adequate, 62.9% responded that they need better supplies and equipments to perform OC in ICU. It is interesting that only 32.2% found the provided toothbrushes adequate and that in 37.3% of the ICUs toothbrushes were not available.

CONCLUSION. Oral care currently provided in ICU's may be ineffective in removing dental plaque and respiratory pathogens from the oropharynx of patients on MV. Evidence-based guidelines, continuing education and multidisciplinary interventions are warranted to change oral care practices in ICUs.

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0880

AN EDUCATIONAL PROGRAM TO PREVENT VENTILATOR-ACQUIRED PNEUMONIA: HOW DOES IT WORK?

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INTRODUCTION. The comprehension of operating mode of educational programs (EP) to prevent nosocomial infection, especially ventilator-acquired pneumonia (VAP) must be better understood to increase their efficacy. The aim of this study was to assess effects on knowledge and on cognitive factors of an EP to prevent VAP.

METHODS. An EP directed toward all ICU health-care workers (HWs) was developed to prevent VAP. We performed a cross-sectional study of HWs knowledge and cognitive factors on VAP prevention. Data were collected just before and 1 month after the EP. Knowledge was assessed by 30 questions. Cognitive factors were evaluated by a questionnaire worked out from social cognitive theories. By using single item for measures and a 7-point bipolar scale for answers (the 2 points closest to the positive perceptive evaluation were considered positive) we assessed 9 factors: 1) perceived susceptibility: "Is the intubated patient at risk of VAP?" 2) perceived seriousness: "Do VAP affect patient health?" 3) perceived knowledge: "Do you know the guidelines for VAP prevention?" 4) perceived benefits: "Do you perceive measures to prevent VAP as useless/useful? " 5) perceived barriers: "Is it difficult/easy to comply with VAP prevention measures?" 6) perceived behavioral norm: "Do your colleagues perform VAP prevention according to the guidelines?" 7) perceived subjective norm: "Do you think your behavior toward VAP prevention is taken as an example?" 8) self-efficacy: "Do you feel able to apply VAP prevention measures?" 9) intention to perform action: "Do you perform VAP prevention as recommended?"

RESULTS. Overall 100 HWs completed EP. Knowledge was significantly higher after EP (38% ± 11 vs. 58% ± 16 correct answers, $p < 0.0001$). Positive perceptive evaluation was significantly more frequent for all cognitive factors after EP. Positive perceptive evaluation was significantly related to knowledge for 5 cognitive factors before but also after EP: perceived susceptibility, perceived seriousness, perceived knowledge, perceived benefits and self-efficacy.

CONCLUSION. Our study shows that an EP directed toward all ICU HWs is associated with modifications in both knowledge and cognitive factors. Cognitive factors were in part related to knowledge. These data, especially the interactions between knowledge and cognitive factors must be taken into account in the design of future EP.

0881

MEASURES TO PREVENT VENTILATOR-ACQUIRED PNEUMONIA: PERCEPTION OF IMPORTANCE AND FEASIBILITY

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INTRODUCTION. The implementation of an educational program (EP) has been shown to improve clinical practices. Recently, data suggested that compliance with ventilator acquired pneumonia prevention (VAP) measures in daily care is low. The aim of this study was to evaluate health-care workers (HWs) perception about relative importance and feasibility of main VAP prevention measures after the implementation of an EP to prevent VAP.

METHODS. One month after implementation of the EP, HWs (n = 100) and experts (n=10) perception of relative importance and feasibility of VAP prevention measures, were assessed through 2 questionnaires. The 12 main measures were: 1) provide a correct handwashing 2) provide a correct gowns and gloves use 3) ensure a correct endotracheal cuff pressure 4) ensure a correct backrest elevation 5) avoid ventilator circuits disconnection 6) avoid non justified tracheal tube aspiration 7) provide a correct oral hygiene 8) use orogastric tube 9) take adequate precautions before intubation 10) avoid gastric overdistension 11) avoid accidental extubation 12) take adequate precautions during transport. The method chosen to quantify relative importance and feasibility of these measures was the analytical hierarchy process (AHP) witch assesses and prioritizes various criteria. The process works by providing a sequence of pairs of criteria, each criteria is compared with all the others on a scale from –9 to + 9, then the model gives a relative weight for each criteria and the summation is normalized to 100%.

RESULTS. The HWs perception of relative importance of VAP prevention measures in comparison to the experts perception was significantly lower for two: ensure a correct endotracheal cuff pressure and ensure a correct backrest elevation ($p < 0.01$), however the relative importance allocated for these 2 measures by HWs was high. Perception of relative feasibility of the 12 measures was not significantly different between HWs and experts. A poor feasibility and a poor compliance highlighted by a clinical practices survey was found for one of the most important measures which is ensure a correct endotracheal cuff pressure.

CONCLUSION. After an EP to prevent VAP, the comprehension of the relative importance of each measure by HWs seemed to be good. However, the feasibility of certain measures appeared to be low. In the future, to improve compliance with these measures to prevent VAP, it will be necessary to find solutions to increase their applicability.

0882

HAND WASH IMPACT IN VENTILATOR ASSOCIATED PNEUMONIA

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INTRODUCTION. Hand washing is generally considered to be the most important measure in preventing the spread of infection. It's well know that implementation of a control infection program have a greater compliance in initial phase but the health works compliance decreased during time. The objectivewas to study the impact of a hand hygiene compliance program during the years and the efficacy of reinforcement measures.

METHODS. Prospective study of all patients admitted in the ICU for more than 48 hours, between 2002 and 2005. The VAP diagnosis was made by new radiographic infiltrate for at least 48 h and at least two of the following criteria: fever > 38.5°C or < 35.0°C; leukocytes > 10,000/μL or < 3,500/μL, purulent sputum, or isolation of pathogenic bacteria from lower respiratory tract. The microbiological samples were collected by proximal or distal bronchial aspirated. The ICU hand hygiene compliance program was implemented in 2003 and included health workers education, routine observation with feedback, engineering controls and alcohol-based hand rubs available near all beds. An independent observer made observation compliance adherence.

RESULTS. Results are summarised in table 1

TABLE 1.

	2002	2003	2004	2005
Study population	202	234	263	256
SAPS II (mean)	49.1	50.4	51.0	54.9
Mortality (%)	26.9	31.7	30.0	27.6
VAP/1000 ventilator days	31.5	29.1	22.6	20.6
Hand wash compliance adherence (%)	35	82	79	81

CONCLUSION. The hand wash compliance program was responsible by a significant decrease in VAP. The hand wash compliance increased and there was not significant difference between different professional workers. It is possible to maintain high hand wash compliance by reinforcement policies. The infection control commission work is not completed and the 100% adherence should be the target.

0883

ALCOHOL USE DISORDERS ARE ASSOCIATED WITH INCREASED USE OF ANTIINFECTIVA IN SEPSIS

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INTRODUCTION. Alcohol use disorders (AUD) have been identified as an independent risk factor for patients especially in critical care units. Recent data have shown evidence for immune suppression and increased postoperative infections. However, no information is given to the best of our knowledge to the use of antiinfective agents in sepsis, yet. This investigation aimed to examine antiinfectiva use in patients with AUD.

METHODS. In total 1169 patients were included who experienced treatment on 5 ICUs (1 cardiosurgical, 1 neurosurgical, 2 interdisciplinary, 1 intermediate care) in an university hospital. AUDs were defined as patients with a known dependence or harmful use according to ICD10 and at least 60g ethanol a day, diagnosed in 71 patients (6.1%). Sepsis was defined according to the surviving sepsis campaign guidelines. Data were collected dayly for TISS, SAPS, SOFA Scores, infections, microbiological diagnostics and for antiinfective agents used for each patient. Statistics: Mann-Whitney-U Test, X^2 Test, univariate analysis for the confounders gender, immune suppression and sepsis days.

RESULTS. Basic characteristics significantly differed between groups. AUDs were younger (median 58 vs. 64 years p=0.022), more males (58.6%vs.48.2%, p<0.001) and had less surgery (71% vs. 83.9%, p=0.005). AUDs had significantly more sepsis days than non AUDs (43.2%vs.31.8%, p<0.001) and AUDs had less antibiotic free days (28.8% vs. 34.8%, p=0.009). Microbiological diagnostics demonstrated a trend to different spectrums of micro organisms being isolated during the ICU stay e.g. Acinetobacter baumannii (0.3% vs. 1.1%, p=0.015). Univariate analysis showed that antiinfectiva use was independent from the confounders age, gender, surgery and sepsis days. TISS, SAPS and SOFA scores showed a higher severity (median 32 vs. 35, 37 vs. 42, 4 vs. 6; p<0.001). ICU stay was significantly prolonged in the AUDs (median 1 vs. 3 days, p=0.006). Mortality tended to be higher in the AUD group (4.1%vs.8.7%, p=0.068).

CONCLUSION. AUD was associated with more sepsis days, a different microbiological spectrum, more antiinfectiva use and prolonged ICU stay. Due to the fact, that sepsis days did not confound the antiinfectiva use, antiinfective strategies should be adapted to the increased risk of the AUD patients.

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0884

COMPARISON OF ESTIMATED VS. MEASURED HOB ELEVATION IN CRITICALLY ILL PATIENTS

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INTRODUCTION. Studies have demonstrated that having the head of bed (HOB) elevated to 30-45° decreases the incidence of ventilator associated pneumonia (VAP)[1]. We hypothesized that practitioners overestimate HOB elevation and used a modified method of continuous measurement for HOB to study it [2].

METHODS. We studied 29 intubated patients. Data obtained from pressure transducers were transferred to computerized data collection system and stored q2-3 hrs. Measured data were compared to 30° at each hour. Estimated HOB data were collected on the same group patients q2-3 hrs. The measured data were then compared to estimated using unpaired Student's t-test. Data are presented as mean±SE. P value of <0.05 was considered as significant.

RESULTS. We collected 21 data points per patients on average. The majority of HOB measurements in a 24-hr day were in the range of 15.7 to 26.8°, which were significantly lower than 30° (p<0.05). As we hypothesized, the majority of the HOB estimations by nurses were significantly higher (p<0.05) than the measured data throughout the day (Fig.1).

CONCLUSION. Our results support the hypothesis that intubated ICU patients are often positioned at an angle less than 30° predisposing them to increased VAP risk. We believe that continuous measurements of HOB elevation provides more accurate information and would improve clinical practice.

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0885

A NOVEL OXIDES OF NITROGEN GENERATING SOLUTION TO PREVENT VENTILATOR ASSOCIATED PNEUMONIA (VAP)

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INTRODUCTION. VAP accounts for almost half of all infections acquired in the ICU. VAP incidence varies from around 10% to > 30%. It prolongs intensive care and hospital stays, increasing costs. With the increasing resistance of bacterial pathogens new interventions are required to prevent VAP. There is persuasive evidence that oxides of nitrogen (NOx) play a key role in the maintenance of host defence against various pathogens. In health NOx is present in high concentrations in the stomach maintaining intragastric sterility and preventing gastrointestinal infections (1). A pilot study performed by our group has confirmed our hypothesis that in mechanically ventilated patients' intragastric nitric oxide production is reduced markedly (2). We speculate that this phenomenon could lead to bacterial colonisation of the stomach contents, thereby predisposing to VAP.

METHODS. A novel non-enzymatic system has been developed by our research group, in which NO and related higher oxides of nitrogen (NOx) are exogenously generated. 2mL of the oxides of nitrogen generating solution was added to 20mL of Osmolite® enteral feed. The effect of this mixture was tested on micro-organisms previously isolated from the stomach of mechanically ventilated patients, including Pseudomonas Aeruginosa (PS), Coagulase negative Staphylococcus, Esherichia coli, Candida Albicans and Methicillin Resistant Staphylococcus Aureus (MRSA).

RESULTS. The oxides of nitrogen generating solution continued to produce large quantities of NO for up to 6h. Exposure to the NOx generating solution for 1h in Osmolite; produced on average 97% killing of the 5 micro-organisms tested.

CONCLUSION. In this study, the NOx generating solution, when mixed with enteral feed, exhibited a powerful microbicidal effect on a variety of pathogens including MRSA and fungi. The solution can be used for oropharyngeal decontamination, as it is active against antibiotic resistant organisms, does not encourage the emergence of resistant strains and is effective over a wide pH range.

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0886

CLOSED SYSTEM TRACHEAL SUCTIONING REDUCES HEALTH CARE WORKERS HAND AND EQUIPMENT CONTAMINATION

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INTRODUCTION. Impact of closed tracheal suctioning systems (CSS) on ventilator-associated pneumonia prevention is debated. These systems, however, may reduce risk of cross-contamination of multidrug resistant bacteria in the ICU by limiting suctioning equipment and health care workers contamination during tracheal suctioning (TS) of mechanically ventilated ICU patients. The aim of the study was to study hand and suctioning equipment contamination during TS.

METHODS. Mechanically ventilated patients whose tracheal aspirates were positive for meticillin resistant Staphylococcus aureus (MRSA), Acinetobacter baumannii, or broad spectrum betalactamase Gram negative enteric bacteria were included in the study. Patients with other pathogens (such as P. aeruginosa) with greater than 106 cfu bacteria in their tracheal aspirates were also included. They were initially suctioned with an open system (OSS) until results from the tracheal aspirates were available. Before being switched to a CSS (Ty-Care Exel, Tyco), a TS was performed and studied. The immediate following TS with the CSS was also studied. Swivel of the flex tube, suction valve, rinsing port and rotating valve were swabbed for microbiological culture before and after TS. Health care workers applied their gloved hands on agar plates after TS.

RESULTS. 19 TS were performed. Mean hand contamination was 70.4±79.4 colonies with OSS and 2.3±5.0 colonies with CSS (p=0.0002). Mean suctioning equipment contamination was 21.6±52.8 colonies with OSS and 0.95±5.7 colonies with CSS (p<0.0001). TS led to hand contamination in all cases (100%) with OSS and in 25% with CSS (p<0.001). Maximum level of contamination was 300 colonies with OSS and 50 colonies with CSS. When tracheal aspirates were positive for Acinetobacter baumannii, this pathogen was never encountered on health care workers' hands with CSS.

CONCLUSION. Ty-care Exel CSS considerably reduces hand and suctioning equipment contamination during TS of patients carrying multi-drug resistant pathogens in their respiratory tract in comparison with OSS. This equipment should be systematically used in patients with contaminated tracheal secretions in order to reduce risk of cross contamination and infection in the ICU.

Grant acknowledgement. Tyco provided the closed suctioning system.

0887

AUTOMATIC CONTROL OF TRACHEAL TUBE CUFF PRESSURE IN MECHANICALLY-VENTILATED PATIENTS

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INTRODUCTION. The aspiration of subglottic secretions colonized by bacteria pooled above the tracheal tube cuff due to inadvertent deflation of the cuff plays a relevant role in the pathogenesis of ventilator-associated pneumonia (VAP). We assessed the efficacy of a previously validated automatic device for the continuous control of the tracheal tube cuff pressure in averting VAP.

METHODS. A prospective randomized controlled trial was conducted in 142 mechanically-ventilated patients (age 64±16 yr, APACHE-II 18±6) without pneumonia or aspiration at admission into the intensive care unit (ICU). Patients were randomly allocated within 24 hours of intubation to undergo continuous regulation of the cuff pressure with the automatic device (n=73) or routine care of the cuff pressure (control group, n=69). Patients remained in the semirecumbent position at bed as routine prevention of VAP, unless contraindicated. The primary end-point was the decrease of the incidence of VAP.

RESULTS. Both groups were similar at baseline. The main causes for intubation were decreased consciousness (43, 30%) and exacerbation of chronic respiratory diseases (38, 27%). Cuff pressure <20 cmH2O was more frequently observed in the control group than the automatic group (45.3 vs 0.7% of determinations, p<0.001). The incidence of VAP, either with clinical diagnosis (16, 22% vs 20, 29%, p=0.44) and microbiological confirmation (11, 15% vs 10, 15%, p=0.78), the distribution of early and late-onset VAP, the causative microorganisms, as well as the ICU (20, 27% vs 16, 23%, p=0.70) and hospital mortality (30, 41% vs 23, 33%, p=0.43), were similar for the automatic and the control groups, respectively.

CONCLUSION. The automatic and continuous regulation of the tracheal tube cuff pressure did not result in additional benefits to the semirecumbent position at bed in the prevention of VAP.

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0888

THE ROLE OF BNP AND MICROALBUMINURIA IN PATIENTS WITH SUBARACHNOID HAEMORRHAGE

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INTRODUCTION. Brain derived natriuretic peptide (BNP) is an independent risk factor of sodium depletion and has a predictive role regarding the outcome after subarachnoid haemorrhage (SAH). Hypertension is also an independent risk factor of SAH. To date no studies addressed the question whether N-terminal of prohormone BNP (NT-proBNP) and microalbuminuria (mAlb) are different between normo- and hypertensive patients with aneurysmal SAH.

METHODS. A prospective, observational study was performed on patients with acute SAH confirmed by neuroimaging (Group A). Group A was treated by endovascular coiling. Control patients were scheduled for intervertebral discectomy without central nervous dysfunction (Group C). Using anamnestic data both groups were divided into normotensive (An, Cn) and hypertensive (Ah, Ch) subgroups. Venous blood samples were taken for measurement of NT-proBNP, electrolytes, creatinine levels and osmolarity 1 hour before (T-1) and after surgery (T1), at 24 and 48 hours postoperatively (T24, T48, respectively). Osmolarity, mAlb and electrolytes were analysed in urine sample collected at T24, T48 and T72. For statistical analysis Mann-Whitney U test was used.

RESULTS. Thirteen patients in Group A (5 An, 8 Ah) and 10 in Group C (5 Cn, 5 Ch) were recruited. Median NT-proBNP level was significantly higher in Group A than in C at T-1 (244, interquartile range (IQR): 95, 573 and 26, IQR: 13, 58, respectively, $p < 0.05$) and T1 (456, IQR: 62, 730; and 10 IQR: 8, 34, respectively, $p < 0.05$). Comparing NT-proBNP levels in normotensive and hypertensive patients in both groups, significant difference was revealed only in the Group A at T-1 ($p<0.01$) and at T24 ($p<0.05$). Median mAlb was significantly higher in Ah than in An patients at T24 (38, IQR: 24, 64; and 7, IQR: 6, 8, respectively, $p<0.05$). There were no significant differences regarding other parameters in either subgroups within the first 3 days after SAH.

CONCLUSION. The increasing serum level of NT-proBNP in patients suffering from SAH is related to the primary CNS damage. Regarding the kinetic, the higher NT-proBNP level at T-1 and T24 in Ah patients is a marker of the previous target organ damage. Microalbuminuria reflecting the severity of hypertension and endothelial dysfunction, showed significant differences only in the first urine sample (T24) comparing the hypertensive and normotensive individuals. However in the later subgroup the trend of this marker mimics the hypertensives beyond 24 hours.

0889

AUDIT OF INSERTION OF CVP LINES BY CRITICAL CARE TECHNICIANS

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INTRODUCTION. Changes to postgraduate education in the UK have resulted in fewer, less-experienced doctors being available on the ICU. To ensure that service provision is maintained, we have trained critical care technicians (CCTs) to insert central venous (CVP) lines. CCTs also supervise insertion of CVP lines by junior medical staff. This aims to release senior medical staff to perform other tasks.

METHODS. CCTs underwent nationally-recognised training in the insertion of CVP lines. CCTs then undertook local, supervised training and assessment. Time from request for CVP line insertion to completion, site and number of attempts taken were recorded. Notes were reviewed for 7 days post insertion for any complications. Supervision of junior doctors was performed using a standardised training programme and competency-based assessment tool.

RESULTS. 150 consecutive CVP line insertions were audited over a 5 month period. Ultrasound was used by the CCT and by the CCT when supervising the SHO, for all subclavian and internal jugular approaches. Middle grade medical staff used ultrasound for 25/48 of attempts, consultants for 34/37. There were no differences in complication rates between groups.

TABLE 1.
Time taken for insertion of CVP line

	No. inserted	< 1 hr	1-2 hr	2-3 hr	> 3 hr	unknown
Consultant	37	4	9	6	13	5
Specialist registrar	48	2	15	6	14	11
SHO	45	2	16	3	14	10
CCT	20	5	8	1	2	4

CONCLUSION. CVP line insertion by CCTs or by junior medical staff under supervision by CCTs may allow senior staff to be utilised for other tasks and may shorten patient journey times. NICE (National Institute of Clinical Excellence) guidelines were followed by CCTs but not by middle grade medical staff.

Grant acknowledgement. Supported by a grant from the NHS Changing Workforce Programme.

0890

ROLE OF NEAR INFRARED SPECTROSCOPY IN THE POSTOPERATIVE MONITORING OF NEUROSURGICAL PATIENTS

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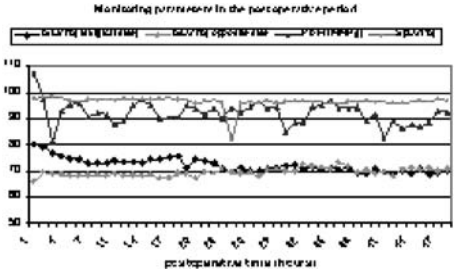
INTRODUCTION. The maintenance of an adequate tissue oxygenation is recognized as a primary objective in neurocritical care. Near infrared spectroscopy (NIRS) is a noninvasive technique providing continuous regional oxygen saturation (rSO2). The aim of this study is to evaluate the role of NIRS in the postoperative period of neurosurgery.

METHODS. Ten patients undergoing craniectomy have been enrolled in this pilot study. Patients were monitored with NIRS in the first 48 postoperative hours. Hemodynamic and respiratory parameters were simultaneously registered.

RESULTS. The results of NIRS, MAP and SpO2 monitoring in the postoperative period are illustrated in the Figure. Mean rSO2 values in the side of the surgery were 81-70% in the first 24 hours, and 70-68% in the next 24 hours. Mean rSO2 values in the side opposite to the surgical procedure were maintained between 73 and 68%.



CONCLUSION. No critical events were recorded in any patients. The main result is that rSO2 was maintained at higher values in the surgical side in the early postoperative period, and this could represent the effect of an increased cerebral blood flow in the surgical area. rSO2 values were then maintained at similar levels in both sides after the first 24 postoperative hours. The recorded cerebral oximetry appeared relatively independent from hemodynamic monitoring, suggesting a maintained autoregulation, in spite of the recent craniectomy

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0891

AIRWAY SEALING BY THE TRACHEOSTOMY TUBES WITH "LANZ" CUFFS IN THE NEUROSURGICAL ICU

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INTRODUCTION. Aspiration is one of the main risk factors of nosocomial pneumonia in the neurosurgical patients requiring artificial ventilation. That's why the problem of airway sealing by the endotracheal tube cuff is very actual in the neurosurgical ICUs.

METHODS. 30 patients with intracranial hemorrhages enrolled in the study. All of them received artificial ventilation during investigation. 14 patients had tracheostomy tubes with controlled pressure cuffs ("Lanz", Tyco Healthcare) ("Lanz" group) and 16 had tracheostomy tubes with high-volume low-pressure cuffs ("Control" group). Intracuff pressure of 25 cm H2O was set up and corrected every 3 hours.

RESULTS. The average time of the investigation was ($M\pm\delta$) 8±5 days in the "Lanz" group and 12±9 days in the "Control" group. Intracuff pressure was measured 677 times in the "Lanz" group and 1136 times in the "Control" group. We found that during the period of 3 hours intracuff pressure decreased from 25 cm H2O to 16±5 cm H2O (on the 9±5 cm H2O) in the "Control" group and to the 19±4 cm H2O (on the 6±4 cm H2O) in the "Lanz" group ($p<0.01$). It was noticed that 44% of "Control" group patients needed intracuff pressure increasing above 25 cm H2O in order to provide proper airway sealing during lung recruitment maneuvers. Patients of the "Lanz" group didn't need such manipulations. In 11 cases in the "Lanz" group we prolonged the intracuff monitoring interval to the 24 hours. Intracuff pressure decreased from 25 cm H2O only to 21±3 cm H2O during this period. No tracheostomy complications were observed in the both groups.

CONCLUSION. Tracheostomy tubes with the controlled pressure cuffs "Lanz" provide an excellent airway sealing during artificial ventilation in patients with intracarnial hemorrhages. Implication of such tubes in the daily ICU practice decreases the necessity of intracuff pressure manometers and reduces the work of the nurses.

Grant acknowledgement. Tyco Healthcare

0892

ACUTE CERVICAL CORD INJURY ASSOCIATED WITH OSSIFICATION OF THE POSTERIOR LONGITUDINAL LIGAMENT WITHOUT BONE DAMAGES

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INTRODUCTION. Ossification of the Posterior Longitudinal Ligament (OPLL) causes a chronic progressive stenosis of cervical vertebral canal and serious myelopathy due to a minor traumatic injury. In Europe, the incidence rate of OPLL is very low, but in Japan it has been reported as about 2%. In the present study, we reviewed our experience of acute cervical cord injury associated with OPLL to understand the pathomechanism and to provide clinical information for management of this disorder.

METHODS. A total of 44 patients with cervical OPLL, presenting with acute cervical cord injury without vertebral damages such as fracture were reviewed. They were treated at our critical care and emergency center from 1980 to 2005. There were 39 men and 5 women and aged from 23 to 82 years (mean ±SD: 61±13), and 2 of them died. Neurological state, type of OPLL, cord injury levels, and size of the cervical spinal canal were analyzed. The neurological state at admission was assessed by Frankel grade. The spinal canal was measured in all patients from bone window computed tomography scans. The presence of spinal cord injury was assessed from T2-weighted MRI scans. Conservative therapy involved Burton traction followed by wearing of collar. Surgical treatment was performed in 7 patients, and the cervical spinal canal was decompressed by laminoplasty.

RESULTS. The most frequent cause of the cervical cord injury was a fall to the ground (15 patients), followed traffic accident (10 patients) and downfall (10 patients), and sports (8 patients). The percentages of patients who had segmental-type OPLL were 50%, continuous- or mixed-type OPLL were 25% with radiological measurements. The anteroposterior diameter and the stenosis rate of the spinal canal at the narrowest level was 7.1±1.8mm and 56.3±16.5%, respectively. OPLL ranged from one to seven vertebral bodies. Most patients had OPLL range of five vertebral bodies and experienced incomplete spinal cord injury. The Frankel grade of paralysis at the initial assessment was A in 7 patients, B in 1, C in 24 and D in 12. Functional improvements over one grade were noted in 17 patients. The severity of paralysis was decreased by one grade in 15 patients and by two grades in 2.

CONCLUSION. Patients treated surgically tended to have better neurological improvement than those treated conservatively. The initial Frankel grade was related to OPLL range.

0893

ADMISSION LEVEL OF ACTIN-FREE GC-GLOBULIN PREDICTS SURVIVAL AFTER TRAUMA

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INTRODUCTION. Mortality after severe trauma continues to be a significant problem. The concentration of relevant plasma markers provides important prognostic information. Gc-globulin is a multifunctional plasma protein that is involved in the clearance of extracellular actin released from necrotic cells. The plasma concentration of Gc-globulin, some of which is bound to actin, seems to correlate with survival after severe injury (1). The purpose of the present study was to evaluate the ability of admission actin-free Gc-globulin levels to predict survival after injury.

METHODS. Plasma samples were prospectively obtained on arrival from 200 consecutive trauma patients admitted directly from the scene of accident to a level 1 trauma centre. Measurement of actin-free Gc-globulin was performed with the commercially available Gc-globulin (Actin-free) ELISA kit (AntibodyShop A/S, Gentofte, Denmark). All patients were classified according to the Injury Severity Score (ISS). The primary endpoint was defined as death within 30 days. The local Ethics Committee approved the study and written informed consent was obtained from the patients or next of kin.

RESULTS. The median time from injury to blood sample was 40 min (interquartile range, 33-50). Twenty-eight patients died, yielding a mortality of 14.0%. Actin-free Gc-globulin was significantly lower in non-survivors than in survivors (162 (110-222) mg/L vs. 245 (179-312), respectively; p<0.0001, Student t-test). Patients who did not survive were significantly older (61 (43-72) years vs. 36 (25-52)) and had higher ISS (38 (25-75) vs. 9 (4-16) than patients who survived the trauma (p<0.0001 in both cases; Mann-Whitney's U-test).

CONCLUSION. Plasma levels of actin-free Gc-globulin are reduced within the 1st hour after trauma. Low plasma concentrations of Gc-globulin are associated with mortality in trauma patients when actin-free levels are determined. This finding is consistent the hypothesis that reduction in circulating levels of actin-free Gc-globulin after injury is a result of depletion caused by actin scavenging related to severe injury. This prognostic marker may be useful early in trauma assessment

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Grant acknowledgement. Coloplast A/S, Denmark, supported J Stensballe. AntibodyShop A/S, Gentofte, Denmark, additionally supported the study.

0894

ASSESSMENT OF ACUTE PHYSIOLOGY AND CHRONIC HEALTH EVALUATION (APACHE) III PROGNOSTIC SYSTEM IN AMONG 541 CASES

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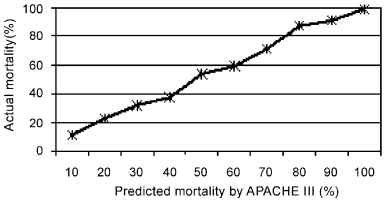
INTRODUCTION. APACHE III prognostic system consists of two options: a score, which can provide initial risk stratification for severely ill hospitalized patients within independently defined patient groups; and a predictive equation, which uses APACHE III score and reference data on major disease categories and treatment location immediately prior to ICU admission to provide risk estimates for hospital mortality for individual ICU patients (1). APACHE III prognostic system has been evaluated among 210 obstetric patients in a retrospective study (2).

METHODS. The study aim was to evaluate the predictive ability of this scoring system in a prospective study involving 541critically ill obstetricpatients admitted in our ICU. Patients were randomly divided into developmental (n=350) and validation (n=191) samples.

RESULTS. The actual mortality was 10.50%. The mean APACHE III was 29.23±21.7 for all patients, it was significantly higher for nonsurvivors than for survivor (81.96±39.26 vs 23.02±17.89, p<0.001). Mortality predicted was 9.97.area under the ROC curve was 0.917±0.045 and standardized mortality ratio was 0.95.



CONCLUSION. Goodness-of-fit tests indicated that the model performed well in the developmental sample and validated well in an independent sample of patients but with an overestimation for the lowest score as shown in the table.

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0895

UNCONSCIOUSNESS DUE TO HYPERAMMONEMIA IN PATIENTS WITH NORMAL LIVER FUNCTION ON VALPROIC ACID

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INTRODUCTION. Hyperammonemia as a cause of acute mental status changes is mostly related to abnormal liver function. However, elevated plasma ammonia level without hepatic dysfunction can be observed. We report on three patients on valproic acid therapy presented with acute unconsciousness where hyperammonemia without signs of liver dysfunction was discovered.

METHODS. none

RESULTS. CASE REPORTS: Three patients treated with valproic acid for seizure disorder were admitted to the emergency department due to acute unconsciousness. Plasma ammonia level was elevated in all three cases, but hepatocellular enzyme levels were normal. Other possible metabolic and organic causes of unconsciousness were excluded by laboratory and imaging tests. In two patients serum valproic acid level was above the therapeutic range, but in one patient serum valproic acid level was within the therapeutic range. Following discontinuation of valproic acid we observed improvement of the patients' mental status and normalization of plasma ammonia levels. Reinitiating of the valproic acid therapy in one patient was directly associated with increased plasma ammonia levels and deterioration of the patient's symptoms.

CONCLUSION. For patients presenting in the emergency department with unexplained mental status changes plasma ammonia measurement is an important screening test. Beside the liver disease as the most common cause of elevated ammonia level, other possibilities should be considered. Hyperammonemia is a possible side effect of chronic therapy and acute poisoning with valproic acid, which interferes with the enzymes responsible for incorporating ammonia into the urea cycle. It may be asymptomatic or associated with central nervous system depression. Treatment of valproic acid-induced hyperammonemic encephalopathy is supportive. In patients with coma or high serum valproic acid levels L-carnitine supplementation is recommended due to its role in β-oxidation of valproic acid.

0896

POINT PREVALENCE STUDIES TO DEMONSTRATE LEVELS OF CARE AND MODIFIED EARLY WARNING SCORES

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INTRODUCTION. Comprehensive Critical Care (DoH, 2000) changed the emphasis on critical care from defining specific critical care areas to identifying patient need. The concept is underpinned by the belief that all at risk and critically ill patients are entitled to timely and appropriate care irrespective of location. The level of unmet need for critical care has not been formally quantified in our hospital, although anecdotal evidence would suggest that it is high.
In an attempt to improve early recognition of the criticall y and documentation of clinical observations, there was a trust-wide introduction of the Modified Early Warning Scoring System (MEWS) with a colour-coded observation chart, response protocol and comprehensive teaching package.
The point prevalence studies identified the level of care and MEWS of every adult inpatient with emphasis on frequency and quality of observations documented.

METHODS. On two separate occasions during 2005 a team from Critical Care assessed individually all adult, non-obstetric inpatients in an 1100 bed teaching hospital. MEWS and level of care (based on ICS guidelines) were documented on each individual patient.

RESULTS. In the first study respiratory rate was omitted in 41% patients. This reduced to 22.5% in the second. Despite an improvement in the quality and documentation of observations, there was a continued failure to respond to a MEWS $\geq$3. In both studies, the response rate was 15%. Level 1 patients constituted 10-16% of the study population suggesting a large number of patients at-risk of deterioration.

CONCLUSION. Failure to respond to a MEWS $\geq$3 remains a major problem. Documentation of physiological decline without appropriate intervention is unacceptable. Continued education and support on the wards is essential. Increased emphasis has been placed on prompt recognition and management of patients with MEWS $\geq$3 with early consideration given to escalation of care.

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0897

ACTIVATED PROTEIN C-PROTEIN C INHIBITOR COMPLEX IN NON-SEPTIC PATIENTS ADMITTED TO INTENSIVE CARE

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INTRODUCTION. Activated protein C-protein C inhibitor complex (APC-PCI) levels are increased in several thrombotic conditions and may be related to clinical outcome. The purpose of the present study was to determine PC activation in non-septic patients admitted to intensive care by measuring APC-PCI and relating this to the clinical outcome.

METHODS. PC activation over a brief time period prior to blood sampling was determined by using a newly developed ELISA to measure the APC-PCI concentration in plasma stabilized with acid citrate. Normal values ranged from 0.07 to 0.3 ng/mL with a median of 0.13 ng/mL. APC-PCI was monitored (daily to alternate days) in 76 patients without sepsis admitted to intensive care. Nine of these died during admission (mortality 11.8%). PC activation was classified as basal (APC-PCI <0.3 ng/mL) or increased (APC-PCI >0.3 ng/mL) based on the maximal APC-PCI values observed.

RESULTS. Eighteen patients showed basal PC activation and 58 patients increased PC activation (median APC-PCI 0.83 ng/mL, range 0.30-39.8). All the non-survivors (median APC-PCI 0.66 ng/mL, range 0.31-2.90) belonged to the group showing increased PC activation during the course of illness. However, the maximal APC-PCI levels in non-survivors were not significantly different from those in all survivors (mean APC-PCI 0.55 ng/mL, range 0.0-39.8). Taking the values of the last sample obtained from each patient during admission to the intensive care unit, 7 of the 9 non-survivors (78%) showed increased PC activation (median APC-PCI for all non-survivors: 0.38 ng/mL, range 0.13-1.45), whereas only 11 of 57 survivors (19%) showed increased PC activation (median APC-PCI for all survivors: 0.16 ng/mL, range 0.0-0.87). This difference was statistically significant ($p = 0.0012$) by the Mann-Whitney U-test.

CONCLUSION. This preliminary study suggests that increased and persistent PC activation is a risk factor in this group of patients. PC activation is likely to be associated with complications that contribute to higher mortality. Further studies are needed to confirm and elucidate these findings.

0898

COMBINED MONITORING OF INTRACRANIAL PRESSURE AND CEREBRAL BLOOD FLOW IN NEUROINTENSIVE CARE

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INTRODUCTION. The benefits of monitoring cerebral blood flow (CBF) in patients with subarachnoid hemorrhage, severe hemispheric stroke and head injury are apparent. To date a suitable method for bedside CBF measurement, able to detect smaller areas of ischemia and easy to perform at the bedside is still lacking. New techniques combining near infrared spectroscopy (NIRS) and indocyanine green (ICG) dye dilutions to estimate cerebral hemodynamics are available.
The objective is was to develop a new probe for combined monitoring of intracranial pressure (ICP), cerebral blood flow (CBF) and cerebral blood volume (CBV) with near infrared spectroscopy (NIRS) and indocyanine green (ICG) dye dilution.

METHODS. For NIRS conventional probes for ICP monitoring (subdural, intraparenchymatous, ventricular drainage) are supplied with two fiber bundles and 90-degree prisms. Central venous injections of 0.5mg/bw ICG are performed. Regional values for the mean transit time of ICG (mttICG), CBF and CBV are calculated according to published algorithms [1].

RESULTS. With prototypes of the probe in two patients with intracerebral haemorrhage 9 measurements were performed. Mean values obtained by the subdural probe were in mean for mttICG 9.2 sec, CBF 16.2 ml/100g/min and CBV 2.4 ml/100g.

CONCLUSION. The new NIRS ICP probe will enable to measure oxygenation, rCBF and rCBV in the brain directly, without the influence of extracerebral tissue. Combined monitoring of ICP and NIRS will be of special clinical value in patients with subarachnoid hemorrhage and head trauma, already provided with ICP probe or ventricular drainage and being especially at risk for secondary ischemic brain damage.

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Grant acknowledgement. Swiss National Science Foundation (3200B0-102090/1), Olga Mayenfisch Foundation.

0899

AUDIT OF COMPLIANCE WITH CARE BUNDLE FOR MANAGEMENT OF SEVERE HEAD INJURIES; A RETROSPECTIVE STUDY

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INTRODUCTION. A reduction in mortality of patients with severe head injury is associated with the development of evidence based protocols [1,2]. Adherence to such protocols has not been presented. This audit assesses adherence to the Neurosciences Intensive Care Unit (NICU) care bundle for the management of severe head injury in the first 24 hours after admission.

METHODS. We undertook a case note review of 50 consecutive patients admitted to the NICU with severe head injury. Data in the first 24 hours after admission were compared with protocol targets, and where targets were not achieved, compliance with protocols reviewed. Data were retrospectively analysed to avoid alteration of clinical practice during data collection.

RESULTS. All 50 notes were traced for review. Results are summarised in tables 1 and 2.

TABLE 1.

Sex (male, female)	42.8
Age in years (median, range)	35, 17-80
Level of care (level 3, level 2)	44.6
Presenting GCS (median, range)	8, 3-15

Table 1: Demographic data, level of care and presenting GCS.

TABLE 2.

	Target	**Intervention Episodes**	**Protocol Deviations**
Oxygenation	PaO2 > 11kPa	7	3
ICP Management	ICP < 25mmHg	13/39 monitored	6
CPP Management	CPP > 70mmHg	33/34 sedated	3
Temperature	T 35-37°C	18	0
Seizure Prophylaxis	With compound fracture	24	11
Glycaemic Control	BM 5-7mmol/l	28	11

Table 2: Protocol targets, required interventions and protocol deviations.

CONCLUSION. For the fifty patients, in the first 24 hours there were a total of 123 episodes requiring intervention as defined by our NICU protocols. There were 34 (28%) protocol deviations in the management of these episodes. The suggestion that protocols can reduce mortality is exciting but without knowledge of adherence, could be misleading. With the results of this audit we are able to target specific areas of each protocol for education and therefore to improve compliance.

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0900

PROGNOSTIC VALUE OF CEREBRAL MRI IN COMA THE FIRST 6 TO 36 HOURS AFTER CARDIAC ARREST: A PILOT STUDY

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INTRODUCTION. Outcome in comatose patients with hypoxic-ischemic encephalopathy and preserved brainstem functions following cardiopulmonary resuscitation is difficult to predict. The objective of this study is to explore the prognostic value of early cerebral diffusion-weighted magnetic resonance imaging (DWI MR) in patients after cardiac arrest and successful resuscitation.

METHODS. Pilot study to observe the outcome of patients with hypoxic ischemic encephalopathy after successful cardiopulmonary resuscitation in a single centre. In each patient a cerebral MR including DWI and perfusion-weighted imaging was performed according to a standardized protocol within 6 to 36 hours after cardiac arrest. Patient management, including blood glucose and cardiopulmonary control, was performed according to standard routine, and patients were assessed by a neurologist daily. Body core temperature was kept between 34.0°C and 37.0°C during the first 24 hours after CPR.

RESULTS. From January 2005 to January 2006, 38 patients admitted to the ICU were eligible for the study. Of these, 14 (13 men, 1 woman; mean age 64.8 y) were included. 24 patients were not included because of contraindications to MR examination (8), rapid clinical improvement (8), missing consent of families (4) or death before the MR examination (4). Twelve patients died within 5 days, and two were discharged from the hospital alive. The two survivors had normal MR findings. Nevertheless, they showed a severe amnestic syndrome 6 months later. Eight patients who died showed bilateral hyperintense signals on DWI MR in the basal ganglia and parieto-occipital and mesio-temporal cortex. Four patients who died had a normal MR. MR angiography was normal in all patients.

CONCLUSION. All 8 comatose patients with signal abnormalities on DWI MR after cardiac arrest and successful resuscitation died. Normal DWI MR was seen in 2 survivors and in 4 patients who died. Therefore, abnormal signal on DWI MR may have prognostic value and indicate adverse outcome. These findings have to be corroborated in a larger number of patients. Based on our results, we are developing a protocol for a multicentre study in order to collect an adequate number of patients to answer this question.

0901

UTILITY OF A BEDSIDE 4 CHANNEL CONTINUOUS EEG MODULE TO DETECT SEIZURES FOLLOWING ACUTE BRAIN INJURY

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INTRODUCTION. Continuous EEG monitoring (cEEG) has demonstrated an increased incidence of seizures after brain injury 1,2, many of which were undetected. However, cEEG is often not available or delayed in application. With a new bedside, EEG module that is easily applied by the ICU nurse, prompt cEEG is now feasbile. However, this technology needs validation by determining its ability to detect seizures in high risk patients.

METHODS. With consent, 38 ICU patients admitted with seizures or acute brain injury were simultaneously and continuously monitored with a standard 16 channel EEG monitor (XLTEK EEG, Canada) and a 4 channel EEG monitor (Datex-Ohmeda M-EEG;#898683-00) using scalp electrodes and surface EEG electrodes (subhairline montage), respectively. Up to 48hrs of recordings were intrepreted for seizures independently and blindly. Calculation of sensitivity= a/(a+c) and specificity = d/(b+d) for documented seizure activity from both recordings were performed.

RESULTS. The sensitivity and specificity of the Datex-Ohmeda M-EEG module for detection of all seizueres was 0.9 and 0.996, respectively, compared to standard EEG monitoring. The sensitivity/specificity for detection of generalized spike waves, focal spikes, and burst suppression was .75/.94, .43/.67/and .41/.91 respectively.

CONCLUSION. Using the Datex-Ohmeda 4 channel bedside EEG module with a subhairline montage, provides a continuous, safe, user-friendly, convenient and sensitive monitor for detection of seizures in high risk patients with acute brain injury. The impact on outcome following treatment of these seizures, many of which were previously undetected clinically, needs to be studied.

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Poster Sessions
Glucose control 0902-0915

0902

IMPLEMENTATION OF INTENSIVE INSULIN THERAPY: EFFECTS ON INSULIN USE, GLYCAEMIC CONTROL AND OUTCOME

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INTRODUCTION. Intensive insulin therapy reduces morbidity and mortality in surgical [1] and medical [2] intensive care patients and has been introduced safely in clinical practice [3]. We report the results of an observational study of the implementation of an intensive insulin protocol in a mixed medical and surgical ICU in a district general hospital.

METHODS. Approval for the study was granted by the local ethics committee. The protocol [3] was introduced in February 2005. Data were collected prospectively on demographics (age, sex, APACHE II score, discipline), insulin use, blood glucose and ICU mortality on patients for 9 months before introduction of the protocol and 9 months after. Inclusion criteria were all patients admitted to ICU with a stay >72 hours. Exclusion criteria were age <16 years, primary diabetic diagnosis and patients on oral diet.

RESULTS. 747 patients were admitted over the study period. There were 76 patients in the pre-protocol group and 61 in the post-protocol group. Both groups were well-matched for age, sex, APACHE II score and discipline (p=ns for all parameters). Insulin use per 24 hours significantly increased post-protocol (33.1 pre- vs. 47.4iu post-protocol; p=0.005). There was a reduction in mean blood glucose post-protocol (6.69 vs. 6.35mmol/l; p=0.026). ICU mortality pre-protocol was 29.3% and post-protocol was 20.8%. Hospital mortality was 43.9% and 34.7% respectiviely. There were 15 episodes of hypoglycaemia (BM<2.2mmol/l) in 9 patients in the pre-protocol group and 12 episodes in 6 patients in the post-protocol group (p=ns).

CONCLUSION. We have demonstrated the safe implementation of an intensive insulin protocol in a general mixed ICU. Adoption of the protocol has resulted in a significant increase in insulin administration and a small but significant reduction in mean blood glucose. Hypoglycaemic episodes have not increased. Accepting the limitations of an observational study, intensive insulin therapy may confer a survival benefit in clinical practice.

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0903

ADHERENCE, EFFECTIVENESS AND SAFETY OF AN INTENSIVE INSULIN PROTOCOL IN CRITICALLY ILL PATIENTS

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INTRODUCTION. Tight blood glucose control has been shown to decrease morbidity and mortality in critically ill patients. We investigated adherence, effectiveness, and safety of two insulin protocols targeting increasingly tighter blood glucose control.

METHODS. Retrospective cohort study of all patients admitted to the ICU at Harborview Medical Center during March 1, 2001 to February 28, 2005. Data were compared among three subsequent time periods of implementation of the insulin protocols: 03/01/2001 to 02/28/2002 (target blood glucose goals 121-180 mg/dL, Cohort I), 03/01/2002 to 06/30/2003 (80-130 mg/dL, Cohort II), 07/01/2003 to 02/28/2005 (80-110 mg/dL, Cohort III).

RESULTS. There were no differences in baseline characteristics with respect to age, gender, ethnicity, SAPS II score, BMI, creatinine or requirement for mechanical ventilation.

TABLE 1.
Blood glucose, insulin, hospital and ICU outcome data

	Cohort I (n=2390)	Cohort II (n=3582)	Cohort III (n=4990)
Patients receiving insulin infusion, n (%)	99 (4.14)	384 (10.72) **	1106 (22.16)**
Daily insulin dose	68.5 +/- 82.9	53.9 +/- 58.5 **	45.5 +/- 43.9**
Average daily blood glucose (pts on insulin)	207.8 +/-85.9	166.4 +/- 51.9**	142.0 +/- 36.7**
Glycemia <40 mg/dL (pts on insulin) n, (%)	2 (2.02)	5 (1.30)	19 (1.72)**
ICU mortality	1.00	0.67 (0.45, 1.03)	0.63 (0.42, 0.95)*
Hospital mortality	1.00	1.11 (0.87, 1.17)	1.01 (0.87, 1.17)
ICU length of stay	1.00	1.12 (1.02, 1.24)*	1.08 (0.98, 1.19)
Hospital length of stay	1.00	1.18 (1.07, 1.31)**	1.15 (1.04, 1.28)**

**p<0.05 **p <0.01, OR adjusted for age, SCr*

CONCLUSION. An insulin protocol for tight blood glucose control substantially increased the use of insulin and was effective in reducing average glycemic levels in ICU patients. There was a marginal although significant increase in episodes of hypoglcemia. Implementation of an intensive insulin protocol was associated with improved ICU, but not hospital mortality.

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0904

DOES PRIOR DIAGNOSIS OF DIABETES MELLITUS PREDICT POOR GLYCEMIC CONTROL?

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INTRODUCTION. Studies demonstrated that intensive insulin therapy reduces mortality and morbidity in critically ill patients. In addition to recognizing and treating hyperglycemia, it is as important to identify other frequently overlooked factors that contribute to hyperglycemia, such as prior diagnosis of diabetes mellitus.

METHODS. To assess the efficacy of intensive glucose management protocol in a heterogeneous population of critically ill adult patients with or without a prior diagnosis of diabetes mellitus we conducted a prospective study carried in mixed ICU patients during 2 years. We studied patients who were considered to need intensive care for at least five days. All patients received an insulin infusion protocol with a target blood glucose of 80 to 140 mg/dL. Demographic data, prior history of diabetes, SOFA score, SAPS II, glycemic levels during the first 5 days and insulin requirement were collected.

RESULTS. 293 patients were enrolled (261 nondiabetics and 32 diabetics). Nondiabetic group: age 56.5±18.7(58) years, SAPS II 37.3±11.3 (36), SOFA score 7.2±3.3 (7), mortality rate - 31.8%. At 24h the mean blood glucose levels was under 140 mg/dl. Mean blood glucose levels in first 5 days was 143.3±5.9 (141.7) mg/dl and insulin requirement 16.8±4.8 (18.5) IU /day. Hypoglycemia incidence (glycemia < 50 mg/dl) 4.21%.
Diabetic group: age 68.0±11.7 (72) years, SAPS II 39.4±9.3 (38), SOFA score 7.3±3.1 (8), mortality rate 21.8%. At 24h the mean blood glucose level was under 160 mg/dl. Mean blood glucose levels in first 5 days was 179.1±20.8 (172.4) mg/dl and insulin requirement 42.0±11.3 (44.3) IU /day. Hypoglycemia incidence (glycemia < 50 mg/dl) 25%.

CONCLUSION. Compared with nondiabetic group, the diabetic patients had longer periods with glucose levels greater than 140 mg/dL with higher insulin requirement and higher incidence of hipoglycemias.

0905

HYPERGLYCEMIA AT ADMISSION AS A MARKER FOR POOR OUTCOME

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INTRODUCTION. Admission hyperglycemia is associated with the patient outcome; the value of its impact remains unclear.

METHODS. Observational prospective study in mixed ICU in the period of 2005-2006 (N=620). Admission hyperglycemia was defined as random blood glucose level of 200 mg/dl or more.
Collected demographic data, severity of illness scoring system and organ dysfunction (SAPS II and SOFA score), blood glucose levels, type of admission, length of hospital stay and hospital outcome. Considered prognostic variables: hyperglycemia, body mass index (BMI), SAPS II, SOFA score and sepsis. We used logistic regression equation and odds ratio to evaluate the impact of the demographic and clinical variables in the mortality rates. $P < 0.05$ was considered significant. All analysis were conducted using SPSS 11.

RESULTS. We enrolled 620 patients, 64 were diabetic (208.5±98.8(197) mg/dl), 94 hyperglycemics (249±57.14(230) mg/dl) and 462 normoglycemics (131.97±34.69(132) mg/dl). The diabetics had significant differences in relation to the other patients groups, regarding the age, BMI, SAPS II. The mortality rate in patients with new hyperglycemia was 36.2%, normoglycemics 33.9% and diabetics 28.1% (p< 0.0001). The adjusted multivariable analysis for newly hyperglycemia, severity scores and sepsis revealed that hyperglycemia (OR, 1.11; 95% CI, 0.78 to 1.58; p=0.0001), the SOFA score (OR, 1.16, 95% CI 1.09 to 1.23; p=0.0001), SAPS II (OR 1.02 95% CI 1.01 to 1.04; p=0.0001), and the sepsis (OR 1.34, 95% CI 0.93 to 1.93; p=0.0001) were associated with highest mortality rate.

CONCLUSION. The analysis of our data supports the results observed in others studies that the admission hyperglycemia is an independent marker of in-hospital mortality in patients with undiagnosed diabetes. This study also showed that the SAPS II, SOFA score and sepsis are important markers of prognostic at admission in an intensive care unit.

0906

EVALUATION OF A CONTINUOUS GLUCOSE MONITORING DEVICE IN CRITICALLY ILL PATIENTS

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INTRODUCTION. Intensive glycemic control has shown a beneficial effect on morbidity and mortality of critically ill patients. However, achieving euglycemia remains a difficult task in the ICU that is related to a significant workload and can expose patients to dangerous episodes of hypoglycemia. We have evaluated the performance of a minimally invasive continuous glucose monitoring device in a population of stable and unstable critically ill patients.

METHODS. We studied a microdialysis system that operates through a microfiber inserted in the abdominal subcutaneous space. The obtained interstitial glucose sample is analyzed by a biosensor that uses the glucose-oxidase reaction that creates a proportional electrical current. The voltage signal is calibrated with a reference capillary glucose and a value is displayed every 3 minutes. Calibration was performed every 12h. Measured values were compared to reference capillary glucose measurements obtained every hour in unstable and every three hours in stable patients during a period of 48h.

RESULTS. 19 patients, 11 hemodynamically unstable and 8 stable, admitted to a medical-surgical ICU were prospectively studied. During the first 6 hours after calibration the system performed well showing an intra-class correlation coefficient (ICC) of 0.932 from hour 1 to 3 and 0.775 from hour 3 to 6. After the 7th hour a progressive dispersion from the reference measurement was observed with a corresponding decrease in the ICC to 0.675 from hour 10 to 12. ($p<0.001$ for all values). These data showed a good agreement with the graphical Bland-Altman analysis. After the second calibration the performance improved and the ICC remained stable and > 0.77 ($p < 0.001$) for the rest of the study. The mean difference between both measurements at all points was 7.13 +/- 2.2 mg/dL for stable and 13.33 +/- 1.33 mg/dL for unstable patients ($p = 0.019$).

CONCLUSION. The proposed system can be useful for the continuous measurement of glucose both in stable and unstable critically ill patients. However to assure accurate measurements calibration should be performed at least every 6 hours.

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0907

COMPARISON OF GLUCOSE MONITORING STRATEGIES DURING INTENSIVE INSULIN THERAPY

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INTRODUCTION. Positive effects of intensive insulin therapy on morbidity and mortality have been published. During intensive insulin therapy, prevention of hypoglycaemia and possible cerebral damage is important. Intensive care units of large teaching hospitals and academic centres in the Netherlands use different glucose monitoring stratagies. There exists no consensus how glucose levels in critically ill patients are best monitored.

METHODS. A prospective, observational study in a 16 bed intensive care unit in a large teaching hospital was performed from December 2005 until March 2006. 125 Patients were treated according to our intensive insulin therapy protocol, starting within 24 hours after admission. Patients were eligible if they were above 18 years of age. We compared 4 different methods to measure the blood glucose levels: in capillary and arterial blood by a bedside glucose monitoring device, in arterial blood by a blood gas analyzer and in arterial blood (hexokinase method) in our laboratory.

RESULTS. A total of 125 paired glucose maesurements were obtained. Fifty-four (43%) of the glucose levels were obtained during the administration if noradrenalin. No glucose levels of less then 2.2 mmol/l were missed using bedside glucose measurement methods.

TABLE 1.
Average blood glucose levels by four different monitoring strategies

	capillary bedside	arterial bedside	blood gas analyzer	laboratory
average blood glucose (mmol/l)	6.7	6.3	6.6	6.5

TABLE 2.
Comparing differences between four different glucose monitoring strategies

	laboratory vs capillary bedside	laboratory vs arterial bedside	laboratory vs blood gas analyzer	blood gas analyzer vs capillary bedside	blood gas analyzer vs arterial bedside
nr. difference > 1.0 mmol/l	24 (19.2%)	17 (13.6%)	2 (1.6%)	19 (15.2%)	18 (14.4%)

CONCLUSION. In 125 critically ill patients treated by intensive insulin therapy, we measured glucose levels using 4 different methods. Comparison showed a difference of 1.0 mmol/l or more in approximately 15% of the glucose levels. Using a intensive insulin therapy protocol, this can have major consequences for insulin dosage.

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0908

TIGHT GLYCEMIC CONTROL AFTER CARDIAC SURGERY: FEASIBILITY AND RESULTS OF A NURSE DRIVEN PROTOCOL

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INTRODUCTION. Intensive insulin therapy with blood glucose level between 80 and 110 mg/dl reduces mortality in postoperative intensive care patients (1). However, glycemic control regimen are often assigned to a team of nurses and a physician. We have evaluated whether tight glycemic control is feasible in postoperative cardiac surgical patients, with our routine nursing staff using the Aalst glycemia insulin protocol (2).

METHODS. The Aalst glycemia insulin protocol is a nurse driven protocol that adjusts insulin dosage to both absolute values and changes in blood glucose levels (BGL). The protocol presets an upper and lower limit of normoglycemia. The lower and upper limits were set at 80 and 110 mg/dl, respectively. In patients after cardiac surgery with cardiopulmonary bypass, BGL were measured hourly until BGL were within the normoglycemia range for 4 hours, afterwards 2 hourly measurements were continued. If the target range was exceeded, an hourly measurement was restarted until blood glucose levels returned to target values. Data were collected during a maximum of 24 hours in ICU. In all these patients Aalst glycemia insulin protocol was already used peroperatively. The nursing staff in ICU was educated in the use of the Aalst glycemia insulin protocol and received instructions in how to correctly obtain blood samples for measurements. All patients received 5% dextrose at 1 ml/kg.h. A physician was only to be contacted by the nursing staff when glycemia was below 60 mg/dl or twice above 200 mg/dl.

RESULTS. A total of 9789 BGL were measured. In non-diabetics, mean BGL were within target at all times. In diabetics, mean BGL in ICU were only out of target during the first 8 hours. Both in non-diabetics and diabetics, the incidence of hypoglycemic measurements (<70 mg/dL) were very low, at 0.7% and 0.6% respectively. Only 1.2% protocol violations were noted, of which 86% occurred in the first 6 weeks of 6 months registration after introduction of the protocol.

CONCLUSION. The Aalst glycemia insulin protocol is efficient and safe to control blood glucose levels in postoperative cardiac surgical patients. Following proper education and follow-up, this nurse driven protocol can easily be used with minimal protocol violations. It is considered nurse friendly and can be implemented without additional staff.

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0909

THE EFFECTS OF STEROIDS ON THE TIGHT GLYCEMIC CONTROL OF THE SEPTIC ICU PATIENT

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INTRODUCTION. Hyperglycemia is common in critical illness and can lead to complications that increase the risk of death even to those who have not previously had diabetes. Normoglycemia or insulin therapy reduces morbidity and mortality of patients in ICU.
Our objective was to evaluate the effect that corticosteroids had on the glycemic control of the septic ICU patient.

METHODS. Seventy eight patients were included in a prospective observational study in a six bed University Hospital Intensive Care Unit and on a five bed medical Intensive Care Unit of a tertiary Care Hospital. APACHE II scores were calculated for all patients; they were all normoglycemic prior to their admission in the ICU and met the ACCP/SCCM consensus criteria for sepsis and septic shock. Patients with diabetes either insulin dependent or not, were excluded from the study. Subcutaneous insulin and oral hypoglycemic agents were not given. A tight glycemic control protocol was used in all patients and the aim was to maintain a blood glucose level of 90-110mg/dl. Blood glucose was measured using the glucometer PRECISION EXTRA. The intensive insulin treatment using soluble human insulin; Actrapid, started when the patient's blood glucose exceeded 120mg/dl. Strict algorithms determining the insulin infusion rate were established to be followed by the nursing staff. Enteral feeding was used to all patients based on a standard protocol. Patients that required parenteral feeding were excluded from the study.

RESULTS. From a total of seventy eight patients in the study, twenty eight received corticosteroid treatment for their septic shock (300mg solu-cortef/day for seven days). The APACHE II scores were higher in the corticosteroid group with a mean value of 24.3 vs 20.3 for the group that did not take corticosteroids. The steroid group exhibited significantly higher blood glucose levels and needed significantly higher (35%) insulin infusion rates in order to keep glucose levels between 90-110mg/dl.

CONCLUSION. Use of steroids in the ICU septic patient increases blood glucose levels and thereby significantly increases the infusion rate of insulin in order to maintain tight glycemic control (glucose levels between 90-110mg/dl). It is necessary thereby to follow these patients closely in order to establish new infusion insulin rates in order to maintain good glycemic control.

0910

BLOOD GLUCOSE MEASUREMENT AT THE POINT-OF-CARE: GLUCOSE METER VERSUS BLOOD GAS ANALYZER

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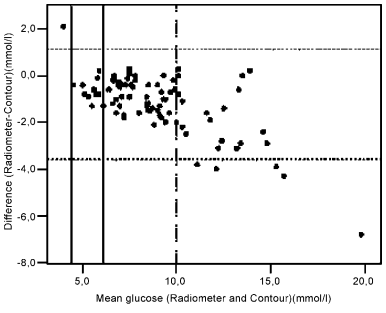
INTRODUCTION. Capillary blood glucose measurement is the method of choice as a guide for adjusting insulin infusion rates. Physiologic differences in glucose content have been found in capillary- and venous blood. The aim of this study is to investigate the glucose measurement in arterial blood by using different methods.

METHODS. Whole blood glucose was determined simultaneously in the same arterial blood sample (n= 88) by a bedside instrument (AscensiaR ContourR) and by a blood gas analyzer (Radiometer ABL 700).

RESULTS. Squared correlation coefficients (R2) between glucose meter and blood gas analyzer was 0.90.
The difference between glucose results measured with blood gas analyzer and glucose meter versus the average is shown in Figure. Mean difference is -1.2 mmol/l and standard deviation is 1.2 mmol/l. The limits of agreement are 1.2 mmol/l and - 3.6 mmol/l.



CONCLUSION. The analytical differences in glucose measurement with glucose meter and blood gas analyzer may prohibit the random use of these two methods of glucose measurement for insulin dose titration.

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0911

STRICT GLYCAEMIC CONTROL IN CRITICALLY ILL. ARE WE GOING OVERBOARD?

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INTRODUCTION. Conflicting data exists regarding potential benefits of tight glycaemic control in critically ill [1,2]. Also it may lead to complications such as hypoglycaemia [3]. Hence this study was initiated to analyze the incidence/contributory factors for hypoglycaemia in Patients admitted to an Intensive care unit (ICU) and managed by tight glycaemic control.

METHODS. The study period started in February 2006 in a 9 bed multidisciplinary ICU. Prospective analysis of charts of patients prescribed continuous insulin infusion by a sliding scale targeting capillary blood glucose level between 4.4-6 mmol/L done. Data collected with a focus on, number of hypoglycaemic events, feeding regimen/route, details of medications, Acute Physiology And Chronic Health Evaluation II score (APACHE II), Co-morbidities, details of organ failure/renal replacement therapy, positive cultures and morbidity/mortality attributable to hypoglycaemia. Logistic regression done with the observed data and hypoglycaemia.

RESULTS. Interim analysis of the data at 2 months showed 28 episodes of hypoglycaemia. Positive correlation observed between hypoglycaemia and Continuous veno venous hemofiltration with lacate free replacement fluid (Odds ratio [OR]3.8. Confidence interval [CI]1.2-18.2), Diabetes mellitus (OR 4.2, CI 2.1-38), Underlying ileus/gut failure with large volume nasogastric aspirate (OR 2.3, CI 0.8-12), Sepsis with cultures growing gram negative organisms (OR 2.6, CI 1.1-26.2), Use of Noradrenaline/Octreotide (OR 1.6, CI 2.1-7.2) and Body weight less than 52 kilograms or weight loss more than 5 kilograms since admission (OR 6.2, CI 1.4-54.2). One patient sustained neurological damage attributable to neuroglycopaenia.

CONCLUSION. Hypoglycaemia is a potential complication of intensive glycaemic control therapy in critically ill patients. Caution is required in patients with Diabetes mellitus, Gram negative sepsis, Gut failure, On renal replacement therapy with bicarbonate based solution, Use of vasopressors/octreotide and who are debilitated.

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0912

SERUM GLUCOSE LEVELS ARE ASSOCIATED WITH MORTALITY AFTER PROLONGED ICU STAY

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INTRODUCTION. Hyperglycaemia in the context of acute coronary syndromes and major neurological events has been shown to be detrimental. The aim of this study is to investigate whether there is an association between serum glucose levels and mortality in long-term ICU patients of a general ICU.

METHODS. We studied 149 consecutive patients (105 males/44 females, age 54±19 years, admission APACHE II score 15±6 and SOFA score 7±3) who stayed in the ICU for more than 10 days (mean 28 days, SD 16 days). Patients with a history of diabetes mellitus or with neurological admission diagnosis (of either traumatic or cerebrovascular nature) were excluded from the study. Mean serum glucose levels of each patient were used to compare survivors with non survivors.

RESULTS. One hundred and thirteen patients survived to be discharged from the ICU. Non survivors (36 patients) had significantly higher admission APACHE II scores than survivors (19±8 vs 14±6, P=0.001), and similarly higher SOFA scores (9±3 vs 7±3, P=0.004). Mean glucose values differed significantly between the two groups (162±44 vs 144±46, P=0.012). For grouped mean serum glucose values (<100 mg/dL with 12 patients, 101-140 mg/dL with 64 patients, 141-189 mg/dL with 48 patients, >180 mg/dL with 25 patients), mortality rates were greater in the more hyperglycaemic groups of patients (8% vs 19% vs 31% vs 32%, overall P<0.001). Patients were grouped according to admission APACHE II scores in three groups: 0-14 (76 patients, 63 survivors), 15-24 (57 patients, 42 survivors), >25 (14 patients, 6 survivors). Mean glucose values were higher in the more severely ill patients (146±52 vs 146±33 vs 173±55, Kruskal-Wallis test, overall P=0.024). Furthermore, stratified analysis within each severity of illness group showed that mean glucose values were higher in non survivors than in survivors in the APACHE II 15-25 and >25 groups: 160±35 vs 141±31, P=0.054 and 197±58 vs 142±32, P=0.028.

CONCLUSION. Serum glucose levels are markedly elevated in patients who do not survive prolonged critical illness. Further studies are required to clarify the role of glucose metabolism derangement in adverse outcomes in the ICU, and the potential effect of interventions aimed to achieve tight control of glucose levels.

0913

ENDOTHELIAL DYSFUNCTION IN CRITICAL ILLNESS: GLYCEMIA OR GLYCEMIA INDEPENDENT ACTIONS OF INSULIN?

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INTRODUCTION. The endothelium plays a pivotal role in the control of the vascular tone by releasing nitric oxide (NO) from arginine, the sole substrate for the enzyme NO synthase (NOS). Asymmetric dimethylarginine (ADMA), an endogenous derivate of arginine, inhibits NOS and is thus a determinant of the bio-availability of NO. During critical illness, high plasma levels of ADMA are associated with increased mortality. As intensive insulin therapy (IIT) affects plasma levels of arginine and ADMA, we studied the relative impact of maintaining normoglycemia and glycemia-independent actions of insulin on plasma levels of arginine and ADMA in relation to endothelial function and organ dysfunction.

METHODS. In a TPN-fed rabbit-model of prolonged critical illness we assessed the impact of maintaining normoglycemia/normoinsulinemia (NG/NI), normoglycemia/hyperinsulinemia (NG/HI), hyperglycemia/normoinsulinemia (HG/NI) and hyperglycemia/hyperinsulinemia (HG/HI) over 7 days on plasma levels of arginine and ADMA, and endothelial NOS (eNOS) expression in aortic tissue. In isolated aortic rings we quantified endothelium-dependent relaxation by relaxation to cumulative doses of a) Acetylcholine (Ach), b) Ach + L-nitro-arginine-methy-ester (L-NAME) and c) Nitroprusside of norepinephrine (NE)-induced vasoconstriction. Creatinine was measured in plasma on day 3 and 7.

RESULTS. Arginine levels remained normal in both normoglycemic groups and decreased in hyperglycaemic animals. Plasma levels of ADMA were low in both normoglycemic groups and high in hyperglycaemic groups, most pronounced in HG/HI animals ($P<0.05$). eNOS expression was not different from healthy controls in any group. Relaxation of aortic rings to Ach after NE-induced contraction was impaired in all 4 groups ($P<0.05$). The 2 normoglycemic groups revealed a better relaxation to Ach, as compared with the two hyperglycemic groups ($P<0.05$), independently of insulinemia. Nitroprusside-induced relaxation was not affected. ADMA levels positively correlated with plasma creatinine (day3: $r2=0.47$, $p<0.001$, day7: $r2=0.25$, $p=0.004$).

CONCLUSION. Maintaining normoglycemia rather than glycemia independent actions of insulin prevented endothelial dysfunction in this model of critical illness, not by influencing eNOS expression but more likely by regulating levels of ADMA, an inhibitor of local NO production. This appears to influence organ perfusion and thus organ function.

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0914

ESTABLISMENT OF GLYCEMIC CONTROL UPON THE FIRST 24 HOURS OF ADMISSION TO THE ICU IMPROVES OUTCOME

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INTRODUCTION. Insulin requirements especially the 1st 24 hrs is associated with increased mortality than simple glycemic control. Our objective was to establish glucose (glu) control from the 1st 24 hrs upon admission to the ICU and identify any relation to the outcome.

METHODS. 88 pts were included in a prospective observational study of a 6 bed University Hospital ICU and of a 5 bed med ICU of a tertiary Care Hospital. APACHE II scores were calculated for all pts. Pts with diabetes either insulin dependent or not, were excluded from the study. Blood glu levels were estimated at the time of admission and pts were randomly assigned into 2 categories, an intensive insulin treatment category (group A) and a conventional treatment category (group B). In group A intensive insulin treatment was started when the pt's blood glu exceeded 120mg/dl and the aim was to maintain a blood glu level of 90-110mg/dl. In group B insulin treatment was started when blood glu levels exceeded 180mg/dl. Enteral nutrition was given based on a standard protocol. Intravenous continuous insulin infusion was used. Blood glu was measured using the glucometer PRECISION EXTRA. Sampling was done every 2 hrs the 1st 24 hrs of admission. Strict algorithms determining the insulin infusion rate were established to be followed by the nursing staff.

RESULTS. From a total of 88 pts, 36 had strict maintenance of normoglycemia with intensive insulin therapy. All these pts required insulin to maintain their blood glu levels between 90-110mg/dl. From the 56 pts that entered group B only 42% of the pts received intensive insulin treatment in the first 24 hrs. In group A mortality was 9% vs 22% of group B. The length of stay in the unit of the intensive treatment group was significantly lower exhibiting a reduction of 18%. Group A required less time on mechanical ventilation and only 5% of the pts required ventilation for more than 30 days as opposed to group B which was 13%. Group A exhibited a reduction in acute renal failure of 7% and only 62% pts required inotropic or vasopressor support compared to 79%of group B. Lastly severe sepsis was evident in 19% of group A as compared to the 24% of group B.

CONCLUSION. Use of continuous infusion of insulin in previously normoglycemic non diabetic ICU pts so that the blood glu levels are stabilized between 90-110mg/dl within the 1st 24 hrs upon admission to the ICU reduces mortality, length of stay in the unit, time on mechanical ventilation, acute renal failure, sepsis and inotropic support. Overall it enhances the probability of a pts faster recovery with fewer complications.

0915

TIGHT GLYCEMIC CONTROL IN PATIENTS IN MIXED INTENSIVE CARE UNIT (ICU): RANDOMIZED, CLINICAL TRIAL

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INTRODUCTION. Critically ill patients develop hyperglycemia even though they are not diabetics. Intensive insulin therapy decreases morbidity and mortality in patient in surgical ICU, but not in patients in medical ICU. The effect of this therapy in patients on mixed medical- surgical ICU is unknown

METHODS. In a prospective, randomized, clinical trial, of adult patient admitted to mixed UCI, we considered eligible those with expected hospitalization longer than 48 hours. On admission, patients were randomly assigned to receive intensive insulin therapy with the use of insulin infusion to maintain the glucose levels between 80 to 110 mg/dl (4.4 to 6.1mmol per liter) or to conventional therapy to maintain glucose levels between 180-200 mg/dl (10 to 11.1 mmol per liter). The primary end point was UCI mortality.

RESULTS. A total of 504 patients were enrolled in a period of 30 months. The ICU mortality in the intensive treatment group was 84/254 (33.1%) and in the control group was 78/250 (31.2%) (relative risk [RR], 1.06; 95% confidence interval [CI], 0.82- 1.36). The in-hospital mortality for intensive and conventional therapy was 102/254 (40.2%) and 96/250 (38.4%), (RR, 1.06; 95% CI, 0.84-1.29) respectively. UCI-acquired infections were similar in both groups, 21% in the intensive treatment group vs. 26.4% in the control group, (RR, 0.82; 95% CI, 0.60-1.12). There were no differences neither in the days of mechanical ventilation (mean±SD) 8.0±9.9 vs. 8.2± 12.8, (means difference, -0.2; 95% CI, -2.2-1.9), nor in the ICU length of stay: 8.6±10.2 and 10.5± 19.1, (means difference, - 1.9; 95% CI, -4.6 – 0.7). There was a rate of hypoglycemia ≤40mg/dl. of 8.3% in the intervention group and 0.8% in the standard group, (RR, 10.3; 95% CI, 2.5-43.6).

CONCLUSION. Intensive insulin therapy used to maintain glucose levels within normal limits did not reduce the morbidity or mortality in patients admitted to a mixed ICU. Furthermore, this therapy increased the risk of hypoglycemia

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0916

LOWER HEMOGLOBIN LEVELS DO NOT INCREASE MORTALITY WHEN SIMILAR PATIENTS ARE COMPARED

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INTRODUCTION. Anemia has been associated with poor Intensive Care Unit Performance [1]; however, the appropriate threshold in which blood transfusion should be initiated is not yet determined. We investigated the association between lower hemoglobin levels on admission to ICU and hospital mortality after adjustments for severity of illness was made.

METHODS. Retrospective analysis of all patients ≥18 years-old who were admitted to the 27-bed ICU Medical intensive care unit (MICU) of a Comprehensive Cancer Center and stayed longer than 24 hours between September 1, 2001 and December 31, 2003. Patients were stratified by admission hemoglobin (Hb) level within units of 1 g/dl, except in patients with Hb levels ≤6 and ≥13 which were grouped inclusively. The primary outcome was overall hospital mortality, and the severity of illness was assessed by an internally validated modified sequential organ failure scoring system (mSOFA), that does not use hemoglobin levels as a parameter.

RESULTS. Data were available for 1263 medical ICU patients (53.9% male, mean age 57 ±15.2). The mean Hb level was 11.04 ±2.15. Hospital mortality increased as admission Hb levels declined. All groups had a significantly higher odds ratio of hospital death (OR-HD) when compared to the group with Hb 11g/dl. Overall hospital mortality was 38.4%. By contrast, as the mSOFA score increased the odds of hospital death increased as well. There was not a significant difference in mortality in any grouping when comparing admission Hb levels of the patients stratified according to their severity of illness.

CONCLUSION. Although, there appears to be an association between lower admission hemoglobin levels and increased risk of hospital death, this association disappears when patients were adjusted for mSOFA scores. This suggests that lower hemoglobin levels are more likely an indicator of severity of illness and not necessarily a cause for increased mortality.

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0917

SEVERE ACUTE PANCREATITIS IN ANDALUSIAN INTENSIVE CARE UNITS

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INTRODUCTION. The aim of the study was to know epidemiologic and clinical data of hospitalized acute pancreatitis (AP) in Andalusia (8 million inhabitants), and specially in patients admitted in 7 Intensive Care Units (ICU).

METHODS. From January 1997 until December 1999, mortality AP was studied in 32 andalusian hospitals and 317 patients with AP were admitted in seven ICUs and assessed in relation to specif and general scores, stays, etiology, necrosis level through dynamic computerized axial tomography (SCAN), clinical complications, antibiotherapy and mortality.

RESULTS. AP incidence was 56 cases by 100,000 inhabitants with an overall mortality of 6%. ICU-AP (n=317) was 1.3% of all ICU admissions (n=23449 patient) and 11.3% of overall AP admitted at the Hospital (n=2791). Gallstones etiology was 71% and pancreatic necrosis by dynamic CT in 83%. The surgery was performed in 34.7% of patients to a medium of 19±14 days from onset of symptoms. Respiratory, haemodinamic and renal complications in 30%. Other results are exposed in the following table.

TABLE 1.
ICU Acute Pancreatitis and Clinical Results

	ICU Acute pancreatitis, n=317	Overall admissions ICU, n=24349
24 h Ranson Score	2.5± 0.4	
48 h Ranson Score	4.5±0.7	
APACHE II Score	18.9±15.6	11.7±6.8
Stay ICU, days*	9.9±3.1	5±1.4
ICU Mortality* *	24%	13%

*(*) p< 0.001, T-test ; ** Chi Square*

CONCLUSION. AP in UCI has a profile of severity, with long term stay patients, a higher mortality than the rest of patients admitted in our units and important number of complications. Educative interdisciplinary interventions from the onset of symptoms could improve the outcome.

0918

ARE INTENSIVE CARE NURSES INVOLVED IN SHARING INFORMATION FOR HOSPITAL INFECTION?

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INTRODUCTION. The aim of this study was to assess how information about hospital infections is shared by nurses with relatives of patients.

METHODS. An anonymous questionnaire was sent to nurses in intensive care units (ICU) throughout France. The questionnaire was designed : 1) to discover the conditions used for information of relatives when HI occurs in patients. 2) to evaluate the level of knowedge possessed by nursing staff in this field, 3) to assess the consequences of this information on relations between nursing staff and relatives. The questions demanded a binary (YES/NO) answer.

RESULTS. 307 responses from 16 ICU were collected. The majority of respondents (241/307) are informed by the physician in the diagnosis of a HI . Two thirds of nurses ask the physician to inform the relatives of this diagnosis, only 20% of nurses inform the relatives themselves. Half of respondents (157/307) noticed that this information had a negative effect on the further relationships with the relatives.
The level of knowledge amongst nurses found that :
1) The majority of respondents (235/307) felt able to explain the diagnosis and treatment of HI to relatives, but less felt able to explain the pathophysiology (145) and consequences (117) of HI. 2) Isolation procedures are well understood by the majority of repsondents: 237 knew the indications, 263 could explain the different types of isolation and 259 respondents felt able to explain this to relatives. 3) The reporting of hospital infections however was less well understood with only one third of respondents knowing their role in this.
A comparison of responses according to level of experience (< or> 2 years) did not show any significant difference for information sharing with relatives or isolation procedures. However, the procedure for reporting of HI was better understood by more experienced nurses (p= 0.015).

CONCLUSION. This survey shows that ICU nurses possess a good standard of knowledge regarding HI and are able to share this information with relatives. However their knowledge regarding some aspects, i.e. reporting HI, could be improved.

0919

ACUTE HEART FAILURE IN THE ICU: DIFFERENCES BETWEEN CARDIO-SURGICAL AND MEDICAL PATIENTS

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INTRODUCTION. Epidemiological studies in intensive care unit (ICU) patients with acute heart failure (AHF) are scarce, especially in patients after cardiac surgery. The aim of this observation study was to compare cardio-surgical and medical ICU-patients with AHF in terms of underlying heart diseases, co-morbidities, treatment, and outcome.

METHODS. The prospective study was performed at the medical and the cardio-surgical ICUs of the University Hospital Zurich, Switzerland. During a three-month period all 355 admissions were screened, and AHF was diagnosed in accordance to the recently published ESC guidelines. Patients were divided into cardio-surgical and medical patients whether or not they had heart and/or major vascular surgery preceding or during their ICU stay.

RESULTS. 110 (57%) cardio-surgical and 82 (43%) medical patients with AHF were identified. No differences between groups were found for age (66 (18-96) years), gender (32% women) or LV-EF (40 (10-75)%), but the simplified acute physiology score (SAPS) was higher in medical patients (31 (6-84) vs 23 (6-82), p=0.001). Coronary artery disease was the most common underlying heart disease and present in 64% of all patients. Compared to medical patients, cardio-surgical patients had more valve diseases (33% vs 8.5%, p<0.001). More common in medical patients were sepsis (24 vs 6.4%, p<0.001) and elevated (>100umol/l) creatinine levels (51% vs 28%, p=0.001) on ICU admission as well as concomitant lung diseases (26% vs 19%, p=0.027). Cardio-surgical patients were treated more commonly with invasive ventilation (78% vs 22%, p<0.001), inotropes (61% vs 21%, p<0.001) and vasopressors (68% vs 33%, p<0.001) on the day of ICU-admission. No differences between groups were found for the use of mechanical cardiac support (21%) or renal replacement therapy (19%) during the ICU stay. Mortality was higher in medical patients at ICU-discharge (22% vs 4.5%, p<0.001), 30-days (31% vs 8.2%, p<0.001) and 6 months (37% vs 9.1%, p<0.001).

CONCLUSION. Cardio-surgical and medical ICU-patients with AHF are two distinct populations with different underlying cardiac diseases, co-morbidities, and therapeutic needs. The better short- and long-term prognosis of cardio-surgical patients reflects a selection of patients with less severe co-mobidities and better treatment options.

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0920

INCIDENCE AND OUTCOMES OF PATIENTS WITH CANCER ADMITTED TO THE INTENSIVE CARE UNIT (ICU)

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INTRODUCTION. Intensive Care is increasingly being used in the management of cancer patients. It's a matter of controversial debate. Recent studies have found that the outcomes of critically ill cancer patients have been improving over the years. The aim of this study is to examine incidence and outcomes of cancer patients admitted in our unit.

METHODS. Retrospective observational study in a twenty-bed medical-surgical ICU of a tertiary university hospital. A total of 307 consecutive cancer patients were admitted to the ICU over a 33-months period. 207 patients were admitted for therapy monitoring only (postoperative care) and were excluded from analysis (mortality 2.4%). The charts were analysed and compared with a control group of 779 similar patients admitted to our ICU suffering from other diseases.

RESULTS. Of 2118 patients admitted in the ICU during the study period were admitted 100 (4.7%) non-postoperative cancer patients. Medical/Surgical 54/46. Men/Women 61/39. Mean Apache II at admission 17 +/- 7. Origin of cancer: Gastrointestinal 25, genitourinary 17, haematological 16, lung 14, head/neck 9, uncertain 9, intracranial 7 and breast 3. Cause of admission: Respiratory insufficiency 37%, sepsis 28%, acute neurologic disorders 13%, hemorraghe 8%, cardiac arrest 8%, and non-postoperative monitoring 6%. Were not intubated 7%. Were intubated less of 24 hours 19%. Non-invasive mechanical ventilation (NIMV) was used in 7 patients but only 3 were not intubated. 74% patients were treated with invasive mechanical ventilation (IMV) for more than 24 hours. 69% had more of one organ failure. A tracheostomy was performed in 29%. Mean days of IMV 8.8 +/-10. ICU mortality rates from cancer and non-cancer control patients were 46% and 42.23% respectively (no significance). Average duration of ICU stay were 11.06 +/- 12.25 days in cancer patients against 5.68 +/- 7.68 days in non-cancer patients (p < 0.05).

CONCLUSION. 1) In our sample the ICU mortality rate is similar in critically ill cancer patients to that of mixed population of non cancer patients but the length of ICU stay is significantly longer. 2) NIMV was used in a low rate of patients.

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0921

OUTCOMES OF PATIENTS WITH HEMATOLOGICAL MALIGNANCIES ADMITTED TO LEVEL 2 CARE

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INTRODUCTION. Better conditioning protocols and transplantation strategies to reduce graft vs host disease, improvements in antifungal therapy, antibacterials and supportive care have translated to better survival for patients with hematological malignancies.

METHODS. Royal Marsden, Level 4 hematology cancer centre treats leukemia's, lymphoma's, myeloma's and performs bone marrow transplants. We report 46 consecutive admissions to our Level 2 care unit over a 12 month period [Acute Myeloid leukemia (n= 10), Acute Lymphoid leukemia (n= 9), Chronic Lymphocytic leukemia (n= 1), Lymphoma (n= 16), Multiple Myeloma (n= 10)].

RESULTS. Admission to level 2 Care was due to Respiratory failure in 17 patients [AML (n= 4), ALL (n= 5), Lymphoma (n= 6), MM (n=2)], renal failure in 4 patients [Lymphoma (n= 2), MM (n=2)], Sepsis in 20 patients [Acute AML (n= 3), ALL (n= 4), CLL (n= 1), Lymphoma (n=7), MM (n=5)] and Graft vs host disease [CLLn=1].

CONCLUSION. The mean duration of stay was 2.65 days, 24 (52.17%) patients recovered from the acute episode and and the rest died. The deaths were due to Respiratory failure (n= 10), sepsis (n= 6), refractory relapsed disease (n= 4), Misc - renal failure (n= 1), GI bleed (n= 1). All the 4 patients who had underwent high dose autologous transplants [High Dose Melphalan (n=2), high dose methotrexate (n=1), BEAM (n =1) recovered. Early admission to level 2 unit is a useful strategy in treating these patients with high risk disease and our survival rates of 50% reflect that. Further analysis and scoring systems are needed to risk stratify these patients.

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0922

OUTCOME OF CRITICALLY ILL OBSTETRIC PATIENTS IN A MULTIDISCIPLINARY INDIAN ICU

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INTRODUCTION. Critical illness in the peripartum period poses major challenges to an intensivist. There are only few reports of obstetric ICU admissions from the developing world [1]. We reviewed maternal outcome in a series of critically ill obstetric patients admitted to our multidisciplinary intensive care unit, in a tertiary care Indian hospital.

METHODS. This was a retrospective chart review of consecutive obstetric ICU admissions between March 2004-March 2006. The admission APACHE II and SOFA scores, adequacy of antenatal checkup, and reasons for ICU admission were analysed. The primary outcome analysed was hospital mortality. Statistical analysis was done by Chi square and independent student t-test using SPSS 11.5 V.

RESULTS. We identified 67 patients, constituting 1.77% of all ICU admissions and 1.30%(67 of 5141) of all deliveries. The indications for ICU admission were Hemorrhagic 29.9%, Hypertensive complications 14.9%, Rheumatic heart disease 17.9% and Others 37.3%, which included patients with puerperal sepsis, Peripartum cardiomyopathy and medical disorders in obstetric patients. The mean ICU length of stay was 3.15 ± 3.25. 35.8% of patients had inadequate (<2 visits) prenatal checkups. There were nine maternal deaths (13.4%). The Standardized mortality ratio (SMR) was 1.03. The maximum maternal mortality were in those with hemorrhagic complications (6%) compared to 3% and 4.4% in those with hypertensive and other complications respectively. There was no mortality in patients admitted with Rheumatic heart disease complicating pregnancy. The APACHE II score in survivors and non survivors were 6.93± 3.71 and 15.00± 5.24 respectively (Mean ± SD)(P< 0.0001). The SOFA score in survivors and nonsurvivors were 2.47± 2.77 and 10.78± 5.72(Mean ± SD)(P< 0.0001). The mean TISS 28 score in survivors were 23.86± 9.72 and that in non survivors were 41.22± 6.61(Mean ± SD)(P< 0.0001). The maternal mortality in those with adequate prenatal checkups were 33.35% compared to 66.7% in those with inadequate prenatal checkups. (X2-4.303, df-1, P=0.038)

CONCLUSION. In critically ill peripartum patients, severity of illness at admission and the adequacy of antenatal care correlates with mortality.

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0923

OBSTETRIC ADMISSIONS TO THE INTENSIVE CARE UNIT: A 10-YEAR REVIEW IN AN OBST AND GYN HOSPITAL

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INTRODUCTION. To review all pregnant women who required admission to an Intensive Care Unit during pregnancy, childbirth or puerperium.

METHODS. Retrospective collection of data off all obstetric patients admitted to the ICU over a 10 year period from May 1996 to April 2006 in an Obstetrics and Gynecological Hospital in Athens Greece. Data collected included the characteristics of obstetric admissions, the reasons for admission, interventions in the ICU and outcomes.

RESULTS. In the ten year period 1121 women required ICU admission (0.84% of all deliveries). The most common reason for ICU admission were Preeclampsia (38.5%), Haemorrhage (29%), HELLP syndrome (6.5%), Infection (4%), DIC (2%). We observed two maternal deaths (due to amniotic fluid embolism). The most common therapeutic intervention were the insertion of an arterial line and blood transfusion. Ovarian hyperstimulation syndrome is a new entity that needs ICU admission in severe cases (1.8% of all admissions).

CONCLUSION. Preeclampsia is the leading cause of ICU admissions and it is crucial doctors to recognize it early so as the pts do not suffer of its complications which may be fatal. Moreover obstetricians, intesivists and anesthesists need improved management strategies for obstetric hemorrhage, which may significantly reduce maternal morbidity. And as in vitro fertilization becomes all and more often intesivists may be prepared to face patients with ovarian hyperstimulation syndrome.

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0924

FACTORS RELATED TO FAILURE OF SULPROSTONE TREATMENT FOR POSTPARTUM HEMORRHAGE

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INTRODUCTION. Severe postpartum hemorrhage (PPHem) remains among the two first causes of maternal deaths in the world, even in developed countries. Obstetrical management in the event of persistent or worsening PPHem despite initial measures consists of sulprostone (S) infusion, an uterotonic prostaglandin analog. We studied retrospectively factors associated with a failure of this specific treatment.

METHODS. Between January 1996 and December 2005 all consecutive cases of PPHem transferred in our centre with persistent or worsening bleeding treated with sulprostone were included and reviewed. The sulprostone therapy was considered as failed when uterine artery embolization and/or surgical arterial ligature and/or hysterectomy were needed. Statistics: univariate analysis with t-test and Chi2-test. Significant if $p < 0.05$.

RESULTS. 288 consecutive patients were included. Results are expressed as mean ± standard deviation and percentage

TABLE 1.

	Failure of S (n = 182)	Success of S (n = 106)	
SAPS-2	24.80 ± 10.08 **	19.86 ± 7.65	p < 0.0001
Age (year)	32.55 ± 5.40 ***	30.98 ± 5.46	p < 0.02
HR (bpm)	110 ± 22 ***	101 ± 21	p < 0.02
SBP (mmHg)	104 ± 29 ***	119 ± 30	p < 0.02
DBP (mmHg)	59 ± 18 ***	68 ± 18	p < 0.02
Multiparity	74.54% *	25.46%	p < 0.05

TABLE 2.

	Failure of S (n = 182)	Success of S (n = 106)	
RBP before arriving	5.23 ± 5.53 **	2.5 ± 2.65	p < 0.0001
RBP in center	4.57 ± 5.26 **	1.00 ± 1.83	p < 0.0001
Hemoglobine (g/dl)	6.37 ± 1.72 **	7.43 ± 1.75	p < 0.0001
PT (%)	43.40 ± 20.00 **	58.00 ± 22.00	p < 0.0001
Platelet (10 3/mm3)	80 ± 57 **	125 ± 110	p < 0.0001

CONCLUSION. In our study, the requirement for more than 5 red blood pack (RBP) in the primary centre, age more than 31 years, multiparity were all associated with a higher risk of treatment failure of sulprostone in PPHem.

0925

CLINICAL EPIDEMIOLOGY AND OUTCOMES OF OBSTETRIC PATIENTS ON A GENERAL ICU (GICU) IN SOUTH AMERICA

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INTRODUCTION. The annual incidence of obstetric complications in South America has been unknown. Since direct correlations have been reported between some obstetric diseases and ITU stay, respiratory morbidity, and adverse outcome such mortality (1,2). It is important that anaesthetist and intensivist be able to rapidly identify and treat these patients, and specialist should be capable to detect risk factors related to mortality, early airway complications, bleeding, ITU long stay, pulmonary complications, etc. Aim: Our objective was to analyse the epidemiological and clinical characteristics of obstetric patients in a GITU from a South America country.

METHODS. We performed a retrospective research study from June 2003 to May 2005. Of seven hundred and ninety patients admitted to the obstetric department, Fifty two critical obstetric patients admitted a general intensive therapy unit CUB, Medellín, Colombia, were included. Data were collected on demographic variables, severity score, ITU stay, septic shock, and mortality. Statistics: A descriptive analysis was performed, data are presented as mean ± SD. The statistical analysis was carried out with the SPSS 10 package.

RESULTS. The study included Fifty two obstetric patients, mean age of 28.5±7.4 yrs, with an average of 2 pregnancies, and stage of pregnancy 33.5±5.7 weeks; BMI24.6±4.4, and caesarean operation about 80.8%. APACHE II score 8, and severe sepsis 7.7%. The commonest diagnosis at admission were HELLP 17 patients (32.7%), cardiac diseases 13 (25%), hypertensive disorders 12 (23.1%), severe bleeding 5 (9.6%). The most usual chronic disease associated was cardiac disease. 13 patients (25%) required pulmonary catheter, 23 (44.2%) received transfusions, 14 (27%) required inotropes, 11 (21%) mechanical ventilation, and 4 (7.7%) hemodyalisis. From the total of patients, only died 2 patients with pulmonary hypertension due to atrial communication.

CONCLUSION. In our region, epidemiological characteristics of obstetric patients are not different from those of other countries, but the number of ITU admission from the total of obstetric patients admitted to the hospital is higher than other countries (1.4%). That elevated number of critical obstetric patients was may be due to socio-economic problems on our country and our reference obstetric centre. Developing countries required more ICU obstetric beds to reduce obstetric morbidity and mortality.

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0926

MORTALITY OF SEVERE UPPER GI-BLEEDING UNDER INTENSIFIED IMMEDIATE INTERVENTIONAL TREATMENT

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INTRODUCTION. Despite improved medical and endoscopic management, mortality of acute upper gastrointestinal (GI) bleeding in high-risk patients (> 60 years, massive blood loss) is still over 20%. In Forrest I bleeding, even 26% of the patients die (1).

METHODS. Aim of this retrospective study was to evaluate the outcome of patients with severe GI bleeding in our department for 1 year with regard to overall and bleeding mortality. Standard ICU therapy included primary hemodynamic stabilization by administration of fluids and packed red cells (hemoglobin < 8 g/dL) respectively, continuous infusion of somatostatin (240 µg/h i.v.) and pantoprazole (80 mg as bolus, followed by 8 mg/h i.v.), as well as endoscopic hemostasis during the first 3 hours after hospitalization.

RESULTS. Hematemesis was diagnosed in 154 patients at hospitalization; 66 of them fulfilled the primary inclusion criterion: GI-bleeding Forrest I to IIb (32/34 m/f; mean age 67 ± 18 y; hemoglobin 8.3 ± 2.0 g/dL). According to Forrest classification, 11% showed bleeding type Ia (arterial, spurting hemorrhage), 44% type Ib (oozing hemorrhage), 18% IIa (hemorrhage from visible vessel), and 27% IIb (adherent clot). Four main conditions were responsible for the hemorrhage: duodenal ulcer (41%), gastric ulcer (20%), esophageal ulcer (13%), and esophageal varices (11%). Primary endoscopic hemostasis was feasible in 88% of patients; in 9%, surgical treatment was necessary. Two patients died because of hemorrhagic shock. 5-day mortality rate was 8% (n=5), and overall mortality 15% (n=10). In 8% of the patients, recurrent bleeding could be stopped successfully.

CONCLUSION. Though patients with severe upper gastrointestinal bleeding were included, a comparatively low mortality rate was monitored. Mortality was below published data in patients with Forrest Ia hemorrhages and in high risk patients (> 60 years, massive blood loss), aswell. We consider the immediate endoscopic hemostasis combined with ICU treatment as cause for the low mortality rate.

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0927

OUTCOME OF PATIENTS WITH SYSTEMIC LUPUS ERYTHEMATOSUS IN INTENSIVE CARE UNIT

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INTRODUCTION. Systemic lupus erythematosus (SLE) is an autoimmune disease, involving multiple organ systems with variable outcomes. Our aim was to study the reasons for admitting SLE patients to the intensive care unit (ICU) and their outcomes during an 11-year period.

METHODS. A retrospective study held in our 10-bed ICU, between Jan.1991-Jan.2002. Medical files of 20 ICU patients with SLE according to the revised criteria of the American Rheumatism Association were reviewed. Parameters recorded were demographic details, clinical signs and symptoms, SLE disease activity index (SLEDAI), Acute Physiology and Chronic Health Evaluation II scores (APACHE II), medical treatment, events during ICU stay, and outcomes.

RESULTS. Of 20 patients (ptn) 13 (65%) had an active disease according to the SLEDAI score. Diagnoses when admitted to the hospital were infectious in 4 ptn (20%), hemorrhagic in 6 ptn (30%), SLE exacerbation in 7 ptn (35%) and elective surgery in 4 ptn (20%). Only 4 ptn (20%) were admitted immediately to the ICU. For patients not admitted directly to ICU median hospital stay prior to ICU transfer was 7 days (range 1-60). Reasons for transfer to the ICU were infectious (11 ptn 55%), hemorrhagic (6 ptn 30%) and respiratory failure (5 ptn 25%). Mean APACHE II score was 21 (range 12-38). Mean APACHE II score for patients who died was 24 and for survivors 21. 18 ptn (90%) were mechanically ventilated, 13 ptn (65%) had an infection, 6 ptn (30%) developed acute renal failure and 4 (20%) ptn underwent hemodialysis, 5 ptn had seizures, 7 ptn had gastrointestinal complications and 3 ptn had cardiovascular complications. Median length of stay (LOS) in the ICU was 4 days (range 1-34). Among ptn who died median LOS was 4 days (range 1-34). The mortality rate in the ICU was 45% (9 ptn). The most common cause of death was sepsis with multi organ failure (MOF) (88%). 30 day mortality was 60%. Two year survival was 35% (7 ptn).

CONCLUSION. To conclude, the main reasons for life threatening events and ICU admission were infection and bleeding. The main cause of death was sepsis with MOF. APACHE II score was not a reliable predictor for a bad outcome. Despite late acceptance to the ICU outcomes were not different from those reported in the literature.

0928

CRITICALLY ILL HEMATOLOGIC MALIGNANT PATIENTS IN INTENSIVE CARE UNIT (ICU)

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INTRODUCTION. The survival of patients with a hematologic malignancy has substantially improved. The aim of this study was to assess the outcome and the risk factors of the patients with hematologic malignancy admitted to ICU.

METHODS. Data were retrospectively analysed on 132 patients with hematological malignancy admitted to ICU between January 2001- May 2005.

RESULTS. During the study period 5382 patients admitted to ICU, and hematological malignant patients were 2.45% of them. Of the 132 patients with hematological malignancy who were admitted to ICU, 72 were men, and 60 were women. The mean age was 41.94 (year). The hematological diagnosis were (in %) acute myelogenous leukemia (40.2), lymhoblastic leukemia (22.7), non- Hodgkin's lymphoma (14.4, Hodgkin's lymphoma (9.1, chronic lymhoblastic leukemia (6.1), chronic myelogenous leukemia (4.5), myelodysplastic syndrome (3). The reasons for admission to ICU were acute respiratory failure (77.3%), sudden conscious loss (6.8%), CPR (6.1%), sepsis (6.8%). The most seen diagnosis were sepsis and fungal pneumonia. The most common microbiological agent in septic patients was Acinetobacter Baumanii. The overall ICU mortality was 80.3%. In multivariate analysis, APACHE II score, leucocyte and platelet counts before, and at ICU admission, and lenght of hospital stay have significant effect on mortality.

TABLE 1.

	Non survival	Survival
Age (year)	41.5±17.14	42.38±18.97
APACHE II	26.26±8.04	20.69±5.13
Leucocyte (before ICU)	34997	13256
Leucocyte (at ICU admission)	20902	13015
Platelet count (before ICU)	52367	102307
Platelet count (at ICU admission)	54635	104423
Lenght of ICU stay (day)	4.26	7.76
Lenght of hospital stay (day)	38.97	64.73

CONCLUSION. Young patient population, severe complications and high mortality rates are very important points in hematological malignant critically ill patients. Acute respiratory failure and sepsis are very important causes of ICU admission in these patients.

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0929

ICU READMISSION AFTER CORONARY ARTERY BYPASS GRAFTING

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INTRODUCTION. Increasing number of coronary artery bypass grafting (CABG) patients and limited ICU resources lead us to evaluate ICU readmission of patients undergoing CABG surgery at our institution.

METHODS. We retrospectivelly reviewed 2870 consecutive patients, who underwent CABG surgery between January 2002 and December 2005 at our institution. Reasons for readmission to the ICU and outcomes were determined.

RESULTS. Of the 2670 patients discharged from the ICU, 87 (3.25%) patients were readmitted. Five patients were readmitted for the second time. The principal reasons for readmission to ICU were cardiac insufficiency - 46 cases (52.8%) respiratory failure - 20 (22.9%), gastrointestinal complications 7 (8.0%), , neurologic disorders - 6 (6.8%), sepsis - 4 (4.5%), renal failure - 1 (1.1%) and sternal dehiscence - 1 (1.1%).
Mortality rate of readmitted patients was 19.5%, compaired with 3.8% among patients that were not readmitted to ICU.

CONCLUSION. The most common cause for readmision after CABG was cardiac insufficiency. Identification of patients who will be readmited to ICU is very difficult.

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0931

INFLUENCE OF BODY TEMPERATURE AND CVP ON STROKE VOLUME VARIATION IN CARDIAC SURGICAL PATIENTS

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INTRODUCTION. The specific interactions of mechanical ventilation on the cardiac vascular system cause cyclic left ventricular stroke volume variations (SVV). Real time measurement of SVV using arterial pulse contour analysis is useful to predict volume responsiveness and to monitor volume therapy in mechanically ventilated patients. In the early post-operative phase the difference between core temperature and peripheral (skin) temperature (ΔTemp) tends to be large as a result of a compromised cardiac output and decrease in temperature during the operation. In this study, we evaluated the relative influence of Δtemperature, and central venous pressure (Pcv), as indicator of preload, on SVV measured with the LiDCO-plus system (LiDCO Ltd. Cambridge, UK).

METHODS. At baseline the LiDCO pulse contour cardiac output, was calibrated using bolus thermodilution technique. Nine postoperative cardiac surgical patients were included. All measurements were carried out during standard clinical care without specific interventions in supine position. In stable clinical condition, changes in core and peripheral temperature, Pcv and SVV were recorded. In total of 87 data points were evaluated using multiple linear regression (backward elimination procedure).

RESULTS. The regression equation of SVV against Δtemp was $y = -1.344x + 15.684$ ($p < 0.001$). and SVV against Pcv; $y = -0.247x + 17.50$ ($p = 0.196$). The correlation coefficient for Model 1 (SVV against ΔTemp and Pcv together) was 0.28 and for Model 2 (SVV against ΔTemp, as separate variable) 0.27. The difference in correlation coefficients between both models is 0.01, expressing the larger influence of ΔTemp as opposed to Pcv on SVV. The influence of volume loading on SVV was significant in individual patients, R2=0.80 in a patient without volume loading, in contrast with R2=0.02 in a patient with volume loading. The slope of the regression line was determined by the amount of volume loading over time.

CONCLUSION. In the post-operative phase after cardiac surgery SVV reflects cardiac function and vessel compliance. In the first hours after cardiac surgery, the influence of ΔTemp is of far more importance on SVV than the central venous pressure (Pcv). Therefore knowledge of ΔTemp is important to interpret SVV.

Poster Sessions
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0930-0943

0930

CARDIOPULMONARY RESUSCITATION (CPR) IN RELATION TO CARDIAC SURGERY

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INTRODUCTION. The incidence of CPR after cardiac surgery varies, depending on the patients included and the observation period. Anthi excluded patients with left ventricular assist devices (LVAD), intra-aortic balloon pump (IABP), cardiogenic shock and bleeding and reported an incidence of 0.7% (1). A CPR incidence of 1.4% was reported by Wahba in patients followed for maximally 192 hours (2). El-Banayosy excluded patients with implantation of mechanical circulatory support systems and reported an incidence of 2.3% within seven days (3). The aim of this study was to determine the incidence and outcome of CPR in relation to cardiac surgery.

METHODS. Explorative database study of prospectively collected data. Setting: teaching hospital with 18 ICU beds.

RESULTS. Between May 15, 2003 and February 1, 2006, 2848 consecutive adult patients underwent all types of cardiac surgery, including patients with LVAD, IABP, unsuccessful PTCA and aortic dissections. CPR was necessary in 106 patients (3.7%). Prior to surgery and before admission to the ICU, 28 patients underwent CPR (1.0%), of whom 19 died (67%). After surgery, 78 patients were resuscitated (2.7%), of whom 47 died in the hospital (67%). The difference is not significant (CI -.202 to .0169). Overall mortality after cardiac surgery was 87/2848 (3%). Of all patients who died after cardiac surgery, 66/87 (76%) died after a (previous) CPR attempt.

CONCLUSION. The incidence of CPR related to cardiac surgery in unselected consecutive cases including emergency surgery in this cohort is 3.7%. No significant difference in outcome of CPR is observed between patients resuscitated prior to cardiac surgery and after surgery. Hospital survival was 33% in both groups.

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0932

EFFECTS OF PROLONGED CARDIOPULMONARY BYPASS IN PATIENTS WITH PREOPERATIVE LOW CREATININE CLEARANCE

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INTRODUCTION. Preoperative Renal Dysfunction (PRD) is a predictor of Acute Renal Failure (ARF) [1], and number of patients with PRD is increasing. Calculated creatinine clearance is a better measure of renal function than serum creatinine alone.[2] The aim of our study was to evaluate the influence of the length of Cardiopulmonary Bypass (CPB) on renal outcome in patients with preoperative low creatinine clearance

METHODS. 102 patients with preoperatory calculated creatinine clearance < 60 ml/min (Cockroft-Benedict formula) undergoing to cardiac surgery with CPB were enrolled. According to CPB length they were divided into two groups: Group A (45 patients) with CPB < 100 minutes, and Group B (57 patients) with CPB > 100 minutes. Eight perioperative and eleven postoperative variables were collected and analysed with Student's t test and chi-square test; p value < 0.05 was considered significant

RESULTS. No significant differences were found between the groups in age, weight, left ventricular function, Euroscore, preoperative serum creatinine and creatinine clearance. Four out of eleven postoperative variables analysed were significantly different, and are shown in the following table:

TABLE 1.

	GROUP A	GROUP B	p value
Packed red cells units transfused	1.38	4.05	0.0003*
Max creatinine (mg/100ml)	1.55	1.97	0.02*
Deaths (pts.)	0	7	0.04*
Creatinine clearance decrease >25% (pts.)	14	43	0.004*

** =p<0.05*

CONCLUSION. To evaluate renal function creatinine clearance is more effective than serum creatinine. In this experience we studied the effect of prolonged CPB in patients with preoperative renal dysfunction as defined calculating creatinine clearance.[3] In patients with a CPB lenght > 100 minutes we found a significant decrease in renal function and an increased mortality. Our data are in agreement with literature reporting ARF as a risk of increased mortality, and the influence of PRD on ARF after cardiac surgery. Moreover our study can suggest that in patients with PRD a prolonged CBP is a factor that leads to a further impairment of renal function

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0933

ACUTE RENAL FAILURE AFTER CARDIAC SURGERY: PREDISPONENT FACTORS AND PRONOSTIC

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INTRODUCTION. Acute renal failure (ARF) post-cardiac surgery (PCS) bears an increase of morbidity and mortality in mild-moderate cases as much as in its severe forms. We tried to determine the factors before and during the surgery asssociated with ARF development in PCS and its association with an increase of the morbidity or mortality.

METHODS. We considered renal dysfunction during PCS when serum creatinine (Cr) levels were >=1.5 mg/dl and <2 mg/dl (Group I). The other group included patients with Cr levels >2 mg/dl during PCS or an increase of 25% compared with pre-surgery Cr levels in patients with a previous renal dysfunction (Group II). Patients on dyalisis before surgery were excluded. We included every patient on cardiac surgery with extra-corporeal circulation (ECC) from January 1999 to December 2005 (n=1397). We collected pre-surgery variables: age, gender, cerebrovascular disease, periferic vascular disease, insulin-dependent diabetes, hypertension, cardiac insufficiency, previous acute myocardial infarction, pre-surgery use of intra-aortic balloon pump (IABP), surgery mode (emergency or scheduled), previous ECC procedures and functional stage of NYHA classification. Intrasurgey variables:type of surgery procedure, ECC time, aortic clamp time and use of IABP. We used t-Student for quantitative variables and Chi-square for qualitative variables to compare groups. Multivariate analysis with logistic regression was performed in every factor with statistical signification (p<0.05).

RESULTS. We observed a significative increase of the mortality in both groups (p<0.05). Overall, 245 patients developed ARF, group I =131 (9.9%) and group II =114 (8.6%). In group I, the OR and 95% CI of the significative variables after multivariate analysis were: ECC time 1.003 (1.00-1.006), age 1.047 (1.026-1.068), gender 1.717 (1.150-2.563), previous ECC procedure 1.843 (1.134-2.996) and emergent surgery 2.672 (1.555-4.590). In group II: ECC time 1.003 (1.00-1.006), hypertension 1.837 (1.184-2.849), cerebrovascular disease 2.399 (1.333-4.318), diabetes 2.524 (1.379-4.619), previous renal dysfunction 6.976 (3.940-12.353) and emergent surgery 11.372 (6.274-20.611).

CONCLUSION. Our study confirms that ARF is a serious complication after cardiac surgery, with an important increase of the mortality in the severe cases of ARF. The knowledge of the predisponent factors should allow us to establish better strategies in order to decrease the incidence of ARF and the associated mortality.

0934

EFFECTS OF LOW CVP ASSISTED HEPATIC RESECTION SURGERY ON PERIOPERATIVE RENAL FUNCTION

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INTRODUCTION. Hepatic resection under low CVP anaesthesia is associated with reduced perioperative blood loss, consequent reduced transfusion requirements and overall improved morbidity and mortality rates (1). Anaesthetic techniques to facilitate low CVP may contribute to perioperative renal injury. We have studied the effect of low CVP assissted hepatic resection on perioperative renal function.

METHODS. We studied 21 patients undergoing hepatic resection under low CVP anaesthesia for colorectal metastases. A standard anaesthetic technique was employed. Low CVP induced via preoperative dehydration, intraoperative frusemide 1 mg/kg, remifentanil and GTN infusions combined with thoracic epidural use. Serum urea, creatinine and creatinine clearances were measured preoperatively and up to 10 days postoperatively.

RESULTS. Minor increases in urea and creatinine and minor decreases in creatinine clearance occur on day 1 post resection and afterwards rapidly return to normal. No patients exhibited sustained decline in perioperative renal function.

Fig. 1- Mean serum urea & creatinine changes after hepatic resection (95% CI shown)

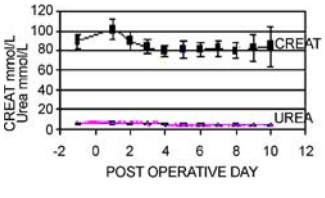
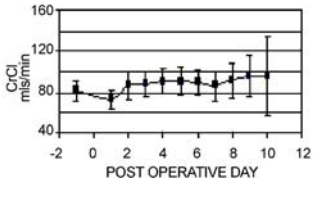


Fig. 2- Mean creatinine clearance (CrCl) changes after hepatic resection (95% CI shown)



CONCLUSION. Despite the potentially nephrotoxic effects of low CVP anaesthesia, significant alterations in renal function are not commonly associated with this technique in the context of hepatic resection.

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0935

TREATMENT OF TACROLIMUS LEUKOENCEPHALOPATHY BY SWITCH TO CYCLOSPORINE AFTER LIVER TRANSPLANTATION

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INTRODUCTION. Immunosuppresive drugs are necessary in transplant recipients. Calcineurin inhibitor (CI), as like tacrolimus and cyclosporine, are first line immunosuppressive drug for post organ transplantations. However, neurological side effects related to CIs have been described (1). Although they are reported to be minor (headache, tremor, paresthesia) in most cases, major neurotoxicity, such as leukoencephalopathy (LEP), develops in 1-6% of transplant recipients (2). The prognosis is good after cessation or dose reduction, and complete recovery usually occurs. Thus, the common strategy for CI induced LEP was dose reduction, close monitoring, and timely conversion to non-CI immunosuppressive drugs, such as rapamycin (3). However, cessation of CIs could increase risk of rejection especially in early stage after transplantation (4). To our knowledge, there is no previous report with successful exchange from tacrolimus to cyclosporine against tacrolimus induced LEP after living donor liver transplantation (LDLT).

METHODS. Between January 1997 to Feburary 2006, 140 LDLT was performed at tertiary teaching hospital. Operative procedure was performed with the standard technique and UW preservation solutions. Tacrolimus was the primary immunosuppressive agent of CIs, except for the patients with diabetes mellitus and infection of hepatic virus type C. Tacrolimus was primary administered in 95 patients (68%) and cyclosporine was in 45 patients (32%).

RESULTS. Five patients undergoing LDLT developed abnormal neurological symptoms such as tremor, confusion, drowsiness, and diminished state of responsiveness. All 5 patients received tacrolimus, but not cyclosporine, and were diagnosed as tacrolimus induced LEP based on clinical features and Magnetic resonance imaging, which showed white matter lesions predominantly in the posterior cereberal regions. The demographic and neurological characteristics of these patients are outlined in Table 1. Immediately after diagnosis, we exchanged tacrolimus to cyclosporine. Within two days, all patients have recovered recover without neurological sequelae and acute rejection associated with cessation of tacrolimus.

TABLE 1.

	Sex	Age	Primary Disease	Trough of FK (ng/ml)	Day after operation	CNS complication
1	Male	6	Fuluminant	8.2	10	tremor, coma
2	Female	42	Alchoholic LC	8	14	coma
3	Male	45	Viral LC	11.2	16	convulsion
4	Female	47	Alchoholic LC	4.3	21	coma
5	Female	48	Alchoholic LC	6	18	convulsion

CONCLUSION. We reported 5 patients with tacrolimus induced LEP after LDLT. In all 5 patients, LEP could be recovered successfully after exchange tacrolimus to cyclosporine. Whether conversion to cyclosporine would be better strategy on the tacrolimus induced LEP, should be verified in future trials.

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0936

CASE SERIES OF ADMISSIONS CAUSED BY NSAID USAGE IN ELDERLY ORTHOPAEDIC PATIENTS. CAN OUTREACH HELP?

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INTRODUCTION. The use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDS) is associated with a 5-8 fold increased risk of ulcer perforation, and associated with an eight fold increased risk of acute renal failure (ARF) in new users within the first month. Elderly debilitated patients are particularly at risk [1,2]. One retrospective analysis [3], showed 3.7% of ICU admissions related to NSAID complications and of these 75% had a contraindication to use.

METHODS. We conducted a retrospective analysis of all ICU admissions and relevant case notes for the twelve months Nov'04 to Nov'05. Our objective was to identify admissions related to complications of NSAID treatment.

RESULTS. We present 6 ICU admissions related primarily to the complications of NSAIDs. This represents approximately 1.5% of total admissions for the period. The average age was 71.5 years and the average admission APACHE II score was 23.7. The average length of stay in the ICU was 7 days. The average TISS-28 score was 35. Three patients were admitted for Renal Replacement Therapy. The three other patients were post emergency laparotomy for GI perforations. These three patients died. Only 1/6 patients was prescribed GI prophylaxis and 3/6 patients had contra-indictations.

CONCLUSION. 1. The use of GI prophylaxis in the over 60's when prescribing NSAIDS, in line with international guidelines. **2.**We suggest that perioperative physicians need to (a) identify high risk patients (b) write clear instructions about further NSAID use (c) order appropriate post operative follow up. **3.** The waste of resources treating iatrogenic diseases could be better spent prospectively identifying and monitoring of high risk patients. **4.** NSAIDs play a contributory role in many other ICU admissions. With this in mind, we suggest a prospectively study examining recent NSAID usage in all ICU admissions.

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0937

CONVENTIONAL VERSUS DYNAMIC LIVER FUNCTION TESTS FOLLOWING LIVER RESECTION

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INTRODUCTION. Postoperative liver failure might be one of the most dreaded complications of liver resection (1). Our aim was to examine which is the most reliable parameter for operability and for assessing and monitoring postoperative liver function on the ICU.

METHODS. In a prospective, descriptive study patients, who underwent liver lobe resection because of primary liver tumor, liver metastases or hemangioma were enrolled. Beside routine liver function parameters such as bilirubin (Bi), prothrombin time (PTT), albumin, aspartate aminotransferase (AST), alanin aminotransferase (ALT), we also determined the indocyanin green (ICG) clearance (PDR: Peripheral Disappearance Rate) LiMON, Pulsion Medical Systems, Germany. Measurements were done intraoperatively at the beginning (t0), in the end (t1) and on the first postoperative day (t2). For statistical analysis Mann-Whitney and Wilcoxon-tests were applied, statistical significance was considered at $p<0.05$.

RESULTS. Out of the 28 patients (13 men/15 women, 63±8 ys) 12 proved to be inoperable, but none of the parameters showed significant difference between the operable and inoperable patients. The prothrombin (t0: 85.2±10.8%; t2: 62±12.4% p=0.001), albumin (t0: 37±31 g/l; t2: 29.6±4.7g/l, p=0.003) decreased, AST (t0:37±31 IU; t2:384±308 IU, p=0.007), ALT serum level (t0: 29±19 IU; t2:443±324 IU, p=0.026) increased significant after the operation. The serum bilirubin (t0: 14±9 μmol/l; t2: 24±15.5 μmol/l, p=0.006) increased slightly, but still remained in the normal range, and the PDR showed a significant improvement (t0:20.6±8%/min); t2:25±8%/min, p=0.016). Patients showed no clinical signs of liver dysfunction and were discharged from hospital.

CONCLUSION. Prothrombin, albumin may changed due to haemodilution, the transaminase enzymes may increased because of tissue damage, the Bi and PDR showed no change or improvement of the liver function. Based on our preliminary results it seems that only the Bi and PDR can be relied on monitoring the real physiological changes in the liver function following liver resection.

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0938

OUTCOME OF TRAUMATIC CARDIO-PULMONARY ARREST DUE TO PENETRATING TRAUMA

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INTRODUCTION. The aim of this study is to clarify the outcome of patients with CPA on arrival due to penetrating trauma (PT-CPA) treated with our strategy including emergency department thoracotomy (EDT). The outcome of CPA due to penetrating injury is poor. We have few strategies for them, which are not always effective. And we have few data concerning the outcome of them.

METHODS. This study is case series observational study using the clinical courses of patients with PT-CPA were examined. We have taken 3 approaches to these patients; 1) our private aggressive treatment strategy (resuscitation for 30 minutes, aggressive infusion using 7 Fr. sized sheath introducer into the subclavian vein, and EDT), 2) in-hospital system supporting these aggressive resuscitation (logistic issue such as the close location between ED and the room for catheter intervention and CT, and direct entrance to the OR by exclusive lift, and common instruments interchangeable between ED and OR including bed, 3) pre-hospital EMS in our city (CPA patients are transferred in about 7 minutes to the nearest of selected 11 hospitals which can receive and treat CPA patients). According to Japanese custom, we usually have to resuscitate CPA patients without sign of death, independent of their vital signs or signs of life.

RESULTS. For past 7 years, 18 PT-CPA were treated. 12 were witnessed, and 6 were CPA after scene. 15 underwent EDT. Although 11 achieved ROSC after administration of 2.1mg of epinephrine, most of them died within 24 hours. Only 9 (50%) went to ICU, TAE room, and OR (admitted), and only 3 (17%) were discharged (survivor), all of whom were free from ventilator. Restricted in 12 witnessed, 8 of them (67%) achieved ROSC, all of whom were admitted, and 3 survived (25%). Restricted in 6 CPA- after-scene patients, all of 6 achieved ROSC (100%), all of whom admitted (100%), and 2 survived (33%). There was no difference in the time interval from arrival on the hospital to ROSC between survivors (9 minutes, 3-12) and non survivors with or without admission (13 minutes, 3-44). The time interval from collapse to the arrival on the hospital of survivors (4 minutes, 0-13) and nonsurvivors with admission (16 minutes, 0-40) was longer than that of nonsurvivors died in ED with and without ROSC.

CONCLUSION. Expected outcome of PT-CPA patients is not hopeless. Our aggressive strategy for treating PT-CPA is valuable to improve the outcome of PT-CPA.

0939

POSTOPERATIVE MANAGEMENT OF ORTHOTOPIC LIVER TRANSPLANT RECIPIENTS IN INTENSIVE CARE

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INTRODUCTION. Orthotopic liver transplantation (OLT) began at our hospital n 1992, with annual increases, having reached a total of 555 in January 2006. All liver transplant patients have at least a 24 to 48 hours ICU stay. The outcomes have modified during the past few years mainly due to greater personnel experience (surgical, medical and nursing care) and advances in immunosupression drugs. The progressive improvement in the OLT recipient medical and nurse care is associated with lower short-term morbidity and more favourable outcome.

METHODS. The authors reviewed retrospectively clinical records of 222 OLT patients (242 procedures) during the last 3 years (2003-2005). Sample characteristics were collected (demographic data, indications, ICU stay, ventilation time) as well as revision of early complications and ICU outcomes after OLT. A brief review of the changes in medical care of these patients during the first 8 years at our centre is also presented.

RESULTS. The most frequent indications for primary OLT and for retransplantation were familial amyloidotic polyneuropathy (30%) and hepatic artery thrombosis (60%). The most challenging complications still seen are postoperative bleeding, acute renal failure, vascular complications and infections, with no significant changes over the past 3 years. However ventilation times and ICU stay during these past 3 years are lower comparatively to the earlier period of liver transplantation ($p< 0.05$ and $p< 0.001$). Demographic data, global as well as comparative results are presented.

CONCLUSION. The prompt recognition and management, and anticipation of OLT complications is only possible by a strong team approach of the ICU staff. Complications occurring in the immediate postoperative period require that OLT recipients are closely followed in an ICU setting with experienced personnel. Appropriate care can overcome adverse influences of many negative predictive factors suggested to influence OLT patients outcome.

0940

EARLY POINT-OF-CARE LACTATE LEVELS PREDICT LIVER FUNCTION AFTER HEMIHEPATECTOMY

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INTRODUCTION. Under circumstances that liver metabolism is known to be compromised, lactate levels may be used as a marker of liver function. Lactate has been shown to predict outcome after paracetamol intoxication and after fulminant hepatic failure due to other causes. Although it has been shown in very small patient groups that lactate metabolism is changed after hepatectomy (1), the value of lactate itself has not been established. We studied lactate as an indicator of liver function after partial hepatectomy. For this purpose we determined the relation of lactate with prothrombin time (PT), which is an established early marker of changes in liver function.

METHODS. In a retrospective observational study we included all patients admitted to the surgical ICU after a right, left or segmental hepatectomy between April 2005 and March 2006. During the first 2 days of the ICU stay, lactate levels (reference range 0.6-1.2 mmol/L) were frequently measured in arterial blood with an ABL-700 (Radiometer Copenhagen) point of care device. Prothrombin time (PT; reference range 11-16 s) was regularly measured in arterial blood at the central laboratory with a STA-R analyzer (Diagnostica Stago), with a clotting assay.

RESULTS. During the study period 39 patients (23 males, 16 females) with a mean age of 59 years (range 27-76) underwent a hemihepatectomy. In 20 patients a left-sided or segmental hemihepatectomy and in 19 patients a right-sided or extended hemihepatectomy was performed. 340 lactate and 126 PT measurements were performed during the first two ICU days. The mean ICU length of stay was 4 days (range 1-35) and the mean hospital length of stay was 19 days (range 8-57). Hospital mortality was 8% (3 patients). Blood lactate levels were significantly correlated to PT (Pearson's $R=0.69$; $p<0.001$). Maximum lactate levels with a mean of 2.6 mmol/L were reached 4 hours after ICU admission, whereas maximum PT-levels with a mean of 19.3s were reached 13 hours after ICU admission.

CONCLUSION. This is the first study showing lactate levels are elevated after hemihepatectomy. Peak lactate levels were reached very early post-operatively and clearly correlated with liver function as later measured with PT.

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0941

HELLP SYNDROME IN THE INTENSIVE CARE UNIT: CLINICAL PROFILE AND OUTCOME

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INTRODUCTION. HELLP syndrome (haemolysis, elevated liver enzymes and low platelets) is a severe expression of preeclampsia with a significant increase of maternal and fetal morbidity and mortality. The clinical profile, outcome and length of stay of a cohort of women admitted to our Intensive Care Unit (ICU) are reported here.

METHODS. The cohort of all HELLP patients admitted to the ICU of our institution between 2001 and 2006 were studied prospectively. Demographics, clinical data, maternal and fetal morbidity and mortality, and length of stay in ICU were registered. Parametric and non-parametric methods were used as applicable to compare means, proportions and medians.

RESULTS. Of the 197 patients with preeclampsia admitted to our ICU during this period of time, 34 (17.25%) presented with HELLP syndrome. Data are presented in Table 1. All patients were treated with vasodilators, beta-blockers and magnesium. Delivery was caesarea section in 100%. Length of stay in ICU was 5.5 days (median). Maternal deaths were due to acute liver failure and multi-organ failure. Fetal deaths were associated with low fetal weight (p<0.04). (Table 1: PRE HBP:Previos high blood pressure; Gest. Age: Gestational age in weeks; SBP/DBP:Systolic/Diastolic blood pressure; m:Mean; SEM:Standard error of mean).

TABLE 1.

RISK FACTOR	AGE (m±SEM)	OBESITY (%)	SMOKER (%)	PRE HBP (%)	PRIMIPARA (%)	GEST. AGE (m±SEM)	
	28.7±1	2.9	3	8.8	73.5	30.6±0.6	
CLINICAL DATA	HEMOGLOBIN (m±SEM)	PROTEINURIA (%)	PLATELETS (m±SEM)	URIC ACID (m±SEM)	ALT/AST (m±SEM)	EDEMAS (%)	SBP/DBP (m±SEM)
	10.8±0.3	91.2	93.212±6.601	6.1±0.2	297.8±76.8/ 217.7±42	73.5	165.5±2.5/ 101.3±1.6
COMPLICATIONS (%)	SEIZURES	RENAL FAILURE	LIVER FAILURE	HEART FAILURE	CID	FETAL WEIGHT <1k	MORTALITY MATERN/ FETAL
	8.8	3	3	3	3	30	6.1/18.8

CONCLUSION. The cohort studied consisted mostly of primipara women with a mean age of 28.8, in their 30th week of gestation and who underwent caesarean section. All our patients presented with severe hypertension and nearly all with edema and proteinuria. The length of stay in ICU was around 5 days. Eclampsia was the most common maternal complication. Mortality was due to acute liver failure. Fetal mortality was associated with low fetal weight.

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0942

DOES CENTRAL VENOUS PRESSURE CORRELATE WITH BLOOD LOSS IN ADULT LIVE DONOR HEPATECTOMY?

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INTRODUCTION. In an attempt to increase the donor pool, adult live donor liver transplantation is being performed in a number of American transplant centers. Adult live donor hepatectomy (ALDH) poses a significant perioperative risk to the donor. It is often recommended to maintain a low central venous pressure (CVP) throughout the hepatectomy in an effort to reduce blood loss. We present our experience of first 100 cases of ALDH.

METHODS. Following IRB approval, the first 100 cases of ALDH between 2000 and 2002 at our hospital were reviewed. Following a thorough screening process, all patients received standard anesthetic. Monitored parameters included intraarterial pressure, CVP, urine output, arterial blood gas, lactate, hemoglobin, electrolytes and liver panel. Blood loss (EBL) was estimated from cell salvage reservoir and sponges. 0.9%NaCl was used for resuscitation. In order to reduce EBL, besides lower PEEP, limited amount of fluid was given to keep CVP low. All patients were extubated at the end of surgery and transferred to ICU.

RESULTS. All data are presented as mean ± SD (Table1). There were 38 males and 61 females. There was no correlation between CVP and EBL. Both CVP groups were matched. The surgery lasted 615 ± 99.6 minutes. Mortality was 0%.

TABLE 1.
CVP and EBL in Adult Live Donor Hepatectomy

	CVP < 5 mmHg	CVP > 5mmHg	p Value
Number (n)	39	61	n/a
Mean CVP (mmHg)	3.9 ±1.0	6.8 ±1.1	< 0.05
EBL (ml)	545.9 ±319.8	550 ± 434	0.959

CVP; Central venous pressure, EBL; Estimated blood loss

CONCLUSION. In contrast to the usual notion, CVP does not correlate with EBL in ALDH. Strict attention to adequate tissue perfusion with normothermia, metabolic homeostasis, and pain control is crucial to best perioperative outcome in ALDH.

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0943

SHORT-TERM PROGNOSTIC FACTORS IN LIVER TRANSPLANTATION

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INTRODUCTION. This works analizes the evolution, complications and survival of orthotopic liver transplantation.

METHODS. Prospective study of the first 74 consecutive liver transplants from april 2002 to juny 2004. We studied variables of donor, recipient, operation, ICU evolution, outcome at 3 and 6 months. Primary endpoint: patient survival at 6 months. Secondary endpoint: indentify risk factors who have influence in survival. Statistical analysis: screening univariate analysis, logistic regression and ROC curves.

RESULTS. Age: 55 ± 10 years; M/F: 54/20; days in ICU: 7 ± 8, 9; hospital stay 28, 3 ± 25 date. Indications were: 37 alcoholic; 27 viral; 10 other causes. Child Pugh: A 15 patients, B 35, C 21; MELD: 13 ± 6 (6-28). Waiting time: 39 +/- 39 days (0-219). In 5 cases transplantation was on liver and kidney. Preservation time: 363 ± 124 min; warm ischemic time: 61 ± 15 min; surgical time: 500 ± 127 min. Intraoperative transfusions: blood 10, 3 ± 9, 5 u; platelets 2, 3 ± 8, 8 u; plasma 15, 7 ± 8, 7 u. APACHE II: 9, 5 ± 2, 9 (4-16). Early complications: 3 hepatic artery thromboses, 2 acute rejections, 6 biliary leakage/obstruction. Late complications: 38 rejections, 23 infections, 40 atelectasis, 37 pleural effusions, 30 arterial hypertension, 25 acute renal failure, 13 diabetes. 17 Reoperations in 15 patients: 3 retransplants by primary non-function, 3 extensive bleeding, 3 artery thrombosis, 6 biliary leakage/obstruction, 1 peritonitis, 1 lymphatic leakage. Survival at 6 months was 86% (10 deaths: 4 intraoperative, 6 multiorganic faliure). There were more complications in virus C cirrhosis, arterial hypertension in ICU and hypotension in donor retrieval. The survival was significantly poor by the following ICU events: need of vasoactive drugs, hypotension, infections, long stay, prolonged ventilatory support, and need of transfusions. Logistic regression depicted: number of blood transfusion in operating room (a), number of fresh plasma administration in ICU (b), urea concentration in ICU (c) and graft complications (d) (No=0; yes=1) as negative factor, and the formula is: Z= 18.8 - 0.42a - 0.1b - 0.04c - 7.1d. ROC curve show a high sensibility.

CONCLUSION. Many variables influence in the early outcome of liver transplantation, but we founded independent role in blood and plasma transfusions, urea level and graft complications in ICU.

Poster Sessions
Moderating the effects of intensive care
0944-0957

0944

EXPERIENCE USING A BOWEL MANAGEMENT SYSTEM AT A UNIVERSITY MEDICAL INTENSIVE CARE UNIT

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INTRODUCTION. Problems of defecation including diarrhea are common in critically ill patients. Sedation, tube feeding, antibiotics and other interventions contribute to this disturbed state. Consequently, medical staff has to perform frequent positioning and bed changes which can lead to other problems like hemodynamic instability or displacement of catheters. Moreover, fecal soilage can lead to skin breakdown with an increased risk of developing pressure ulcers. In February 2004 we began using the Zassi BMS Kit® (Zassi) in our MICU. This catheter system was specifically designed for the anorectal anatomy to safely and reliably divert, collect, and contain gastrointestinal waste.

METHODS. Between February 2004 and August 2005 five randomly sampled critically ill patients with diverse underlying diseases who had a Zassi were prospectively observed. The majority of them required artificial ventilation and therefore sedation. The frequent positioning of these patients was awkward and often led to hemodynamic instability, especially while on pressor support. Furthermore, protection and improvement in skin integrity was desired.

RESULTS. After an initial introduction phase, the handling of Zassi was easily achievable by every member of our staff. The acceptability on our intensive care unit was very high. We observed several benefits by using Zassi. Patient positioning could be accomplished more easily in daily handling, especially for patients with need of pressor support and therefore hemodynamic problems from positioning. As a closed system, this allowed for a true observation of daily fecal output, which was varied, unpredictable and often high volume (0–5.3 L/day). We observed a decrease in skin breakdown by using Zassi as compared to other commercially available containment modalities. We observed a dramatic decrease in dressing and bed changes, and better healing of pre-existing decubitus ulcers. The price of the system was easily balanced by the duration of use and the above named advantages. We did not identify any severe injuries caused by Zassi.

CONCLUSION. In our MICU we have used the Zassi for more than one year. We observed an obvious reduction in patient positioning, bed and dressing changes. A clear benefit was seen for the healing of skin lesions and preventing the development of new ones. Despite the initial costs for the system we believe that our patients and staff members profit and therefore will continue using this system.

0945

EARPLUGS AND EYE MASKS: DO THEY IMPROVE CRITICAL CARE PATIENTS' SLEEP?

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INTRODUCTION. Disturbed sleep and sleep deprivation is common in patients in Critical Care settings (Redeker 2000). Noise is a major factor disrupting sleep as well as inappropriate use of light/dark cycles. Interventions to encourage sleep in Critical Care units, usually involves pharmaceutical resolutions, but don't always improve the quality of patients sleep (Bourne and Mills 2004). Approaches to help control the environment such as eye masks and earplugs may be more effective ways to minimise the patients' exposure to noise and light.

METHODS. This study evaluated 64 patients' reported experiences of their sleep to assess the impact of eye masks and earplugs in a cardiothoracic critical care unit. Sleep assessment tools were chosen using rating scales along with open-ended questions. Inclusion criteria was set to inform the selection of appropriate high dependency patients. Patients included in the study tried the interventions and then self-selected into either an intervention or non-intervention group.

RESULTS. The main findings included the identification of factors that prevented and helped sleep. Many patients using earplugs and eye masks found they improved sleep. However, noise was still a factor preventing sleep for both groups of patients. 34 patients tried the interventions and mixed reports were found from very comfortable to very uncomfortable.

CONCLUSION. Some patients' sleep was improved using the interventions so should be considered as a matter of routine practice with critical care patients. In offering earplugs and eye masks to help patients sleep, nurses should take the time to show patients how to use them and encouraged to try them out for comfort.

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Grant acknowledgement. The Newcastle upon Tyne Hospitals Charitable Fund to purchase earplugs and eye masks.

0946

ARE LEVEL 1 AND 2 PATIENTS AFFECTED BY BEING CARED FOR NEXT TO LEVEL 3 PATIENTS?

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INTRODUCTION. An acute services review led to the closure and subsequent relocation of the 8 bedded Surgical High Dependency Unit (HDU) to 2 beds within the Intensive Care Unit (ICU). Staff raised concerns about the appropriateness of mixing Level 1 and 2 with Level 3 patients (1). Purpose of this study was to investigate the HDU patients' experience and satisfaction with being nursed in an Intensive Care environment.

METHODS. Shortly following discharge from ICU, 46 HDU patients received a questionnaire by post or by hand. Each questionnaire contained an explanatory letter and a stamped reply-paid envelope.

RESULTS. 34 patients replied, a response rate of 69%, of which 25 were female and 9 male. 27(79%) were informed of their expected admission to ICU with 18(67%) being informed by medical staff and 9(33%) by nursing. Pre-visits were not offered to 30(88%). Patients received different information regarding the name of the area, ICU 6 (22%), Intensive Therapy Unit (ITU) 6 (22%), HDU 9 (33%), HDU within ITU 6 (22%). In 29 (85%) of patients, noise of staff, equipment, other patients and procedures contributed to lack of sleep and an awareness of being less ill than others. Patients preferred the personalised attention of nursing staff, close monitoring and felt safe with 31(91%) enjoying a good/excellent level of care. Dignity and modesty were maintained for 32 (94%) patients. The lack of toilet/washing facilities and the mixed sex area caused concern for 8 (24%) patients.

TABLE 1.

Patients' satisfaction of noise level in ICU

	Excellent	Good	Satisfactory	Unsatisfactory	Poor
Noise level - day	9 (26%)	15 (44%)	9 (26%)	1 (3%)	0 (0%)
Noise level - night	8 (24%)	12 (35%)	7 (21%)	5 (15%)	2 (6%)

CONCLUSION. HDU patients receive good quality care and attention within the ITU area. The ITU area requires an appropriate name to reflect the level of care delivered to facilitate effective communication for families and patient. Reducing the noise level at night and introducing toilet/washing facilities should improve the environment. A dedicated area for the HDU patients may alleviate the stress and anxiety of being next to critically ill patients. These findings raised further questions regarding the appropriateness of mixing level 1 with level 3 patients in an open clinical area.

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0947

TRANSLATING CAM-ICU AND VALIDATION BY SEMI-STRUCTURED INTERVIEWS

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INTRODUCTION. For more than 50 years delirium in critically ill patients has been known and it is still a common problem in the ICUs. In order to develop treatments and care for these patients we need an instrument capable of detecting delirium although the patients are mechanically ventilated. The Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) is a valid instrument (Ely 2001; McNicoll 2005) validated by experts – not patients' statements. CAM-ICU has been translated into 10 languages which give an excellent opportunity to further internationalise the evolution.

METHODS. The translation into Danish and back (Hall, Wilson, & Frankenfield 2003) was doubled and consensus made. 3 ICUs scored adult patients admitted from 15th of September 2005 to 15th of March 2006. Patients were scored the first time after 48 hours and then twice a day until discharge from ICU or death. Excluded were patients with CNS injuries, psychoses at admission and non Danish-speaking patients. A semi-structured interview guide (Kvale 1997) was made from indicators of delirium (American Psychiatric Association 2006; Axèll 2001). 10 patients were interviewed by the author, who was blinded for the scores. After transcriptions the interviews were content analyzed.

RESULTS. The Danish CAM-ICU is very similar to the original version. Of the 10 interviewed patients 4 were scored to have delirium. They had all suffered from delirium. 6 patients were scored to be negative to delirium and 4 of them had not suffered from delirium, but 2 had. These 2 were sparsely scored.

CONCLUSION. The CAM-ICU identifies delirium, but false negative results are possible. The CAM-ICU is valid and ready for use in intervention studies.

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0948

RANDOMIZED DOUBLE BLIND CLINICAL TRIAL ON PATENCY OF ARTERIAL CATHETERS WITH HEPARIN VS SALINE SERUM

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INTRODUCTION. At our Intensive Care Units (ICU), the insertion of arterial catheters (AC) allows us a constant measurement of intra-arterial blood pressure and extraction of samples for analytical purposes. Although the AC manufacturer does not suggest the use of heparin (Hep) for its maintenance nor it is indicated in the brochure of this drug, it is an habitual practice to use it at low doses to this goal.
Objective: To analyze the action of Hep versus saline serum (SS) in the maintenance of the AC regarding duration, functionality and analytical coagulation results.

METHODS. : Randomized clinical trial, controlled with placebo and double blind to measure patency, quality of arterial pressure waveform (Flush Test) and capacity to measure intra-arterial blood pressure, number of required manipulations of AC in Hep as well as in SS and coagulation tests (to analyze the blood samples 7 cc were always rejected). The solution of Hep used was 1U/ml. The pharmacy service prepared the blind and the randomization. Criteria of inclusion and exclusion: > of 18 years old, informed consent of the patient or his relatives, only one AC per patient, not receiving high doses of anticoagulants and/or thrombolytics nor Platelets < 1000000 mm3. Descriptive statistic, Student t Test, chi- square and Kaplan-Meier technique.

RESULTS. 133 patients have been recruited, 65 in the Hep group and 68 in the SS group. There are no differences regarding age, gender, reason for catheter insertion nor previous platelets. The duration of AC was 6.6 days for both groups. The number of manipulations required for the correct operation of AC was 14% and 15% respectively for Hep and SS. In the Hep group AC was removed for occlusion or poor quality of waveform in 8% of cases and in SS group in 19% ($p = 0.08$). No differences in the final platelet count were found. In the Hep group the activated partial thromboplastin time (aPTT) and thrombin time (TT) were significantly extended.

CONCLUSION. Use of Hep for the maintenance of AC patency does not seem justified since it does not extend its duration nor decrease the number of manipulations, although in SS group there is a non-significant increase of AC withdrawal by occlusion or poor quality of pressure wave. However, Hep alters aPTT and TT significantly.

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0949

THE PERSON IN ITS FINAL PHASE OF LIFE: NURSING CARE

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INTRODUCTION. Providing nursing care to terminal ill person constitutes one of the most demanding and stressful activities for nurses, both as physical and psychic levels, requiring professional maturity and emotional stability to face illness and death processes. It was intended with this study, to know the frequency of set of interventions proposals these professionals implement with the person in its final phase of life.

METHODS. It was used a questionnaire as an instrument of collecting data based on a likert scale (5 points). The sample was constituted by 415 nurses, who congregated the requirements previously established and worked in medicine and intensive care units in one of the four general hospitals of Porto area, in Portugal. The collected data have been processed in SPSS version 13.0 for Windows®. Analysis of content was used for categorize data from the answers to the open questions.

RESULTS. From the analysis of the data, it is observed in the relation nurse ill person that there is a concerning for continuing to care the ill person, although being in the final phase of life. The following behaviours are more frequent: 1. *stay the maximum of possible time with the person* in female nurses, older nurses and in nurses who haven't a second job; 2. *shorten the interventions* in male nurses; 3. *try to know how the person would like to die* in female nurses and in nurses with a higher formation; 4. *take care of the last desires of the person* in female nurses, older nurses, nurses with a higher formation, nurses with a specific formation on death process and in nurses who work in medicine units; 5. *place the person in a isolated room* in older nurses, nurses with a specific formation on death process and in nurses who work in medicine units; 6. *keep effective communication with the person* in nurses who haven't a second job and in nurses who work in medicine units; 7. *deny the reality when the person says "I'm going to die"* in nurses without a specific formation on death process; 8. *keep the same cares* in nurses who work in intensive care units; 9. *clarify the clinical situation to the ill person with the physician (multidiscipline team)* in nurses who work in intensive care units.

CONCLUSION. When analysing the nursing interventions for the ill person, we found statistical significant differences related with some nurses attributes. However, it is observed globally the concern for the human needs in this final phase of life.

0950

THE PERSON IN ITS FINAL PHASE OF LIFE: NURSING CARE FOR THEIR FAMILIES

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INTRODUCTION. Providing nursing care to the families of the terminal ill person constitutes one of the most demanding and stressful activities for nurses, both as physical and psychic levels, requiring professional maturity and emotional stability to face illness and death processes. It was intended with this study, to know the frequency of set of interventions proposals these professionals implement with the person's families.

METHODS. It was used a questionnaire as an instrument of collecting data based on a likert scale (5 points). The sample was constituted by 415 nurses, who congregated the requirements previously established and worked in medicine and intensive care units in one of the four general hospitals of Porto area, in Portugal. The collected data have been processed in SPSS version 13.0 for Windows®. Analysis of content was used for categorize data from the answers to the open questions.

RESULTS. From the analysis of the data it is observed that nurses look for having time and availability for their sheltering, and it was also verified, in some cases, the implication of the person's families on cares. *The following behaviours are more frequent*: 1. *try to know what the family knows* in female nurses; 2. *when the family has emotions leave her with the ill person* in female nurses; 3. *imply the family on cares* in female nurses, older nurses and in nurses who work in medicine units; 4. *allow the presence of the families while providing nursing cares to the person* in female nurses, nurses with a higher formation, nurses with a specific formation on death process and in nurses who work in medicine units; 5. *allow more visits than the established* in nurses with a higher formation, nurses who have a second job and in nurses who work in intensive care units; 6. *arrange other things to do* in nurses who have a second job; 7. *is available to go to the meeting of the family* in nurses who work in intensive care units; 8. *clarify the doubts about the clinical situation of the ill person with the physician (multidiscipline team)* in nurses who work in intensive care units.

CONCLUSION. When analysing the nursing interventions, we found statistical significant differences related with some nurses attributes. However, it is observed globally the concern for the human needs to person's families in its final phase of life.

0951

MONITORING USING SUBCUTANEOUS MICRODIALYSIS IN THE ICU - INTIAL EXPERIENCE

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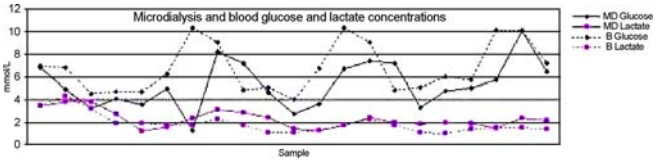
INTRODUCTION. Microdialysis (MD) is established in neurosurgery as a monitor of tissue metabolism (1), however it is considered experimental in the ICU. It is suggested that subcutaneous MD can detect metabolic events (2) and be used as an adjunct to monitoring tissue perfusion. We describe the implementation and initial experience using MD in our ICU.

METHODS. 2 key persons underwent teaching sessions from the manufacturer. They were then responsible for the management of the MD. A physician inserted the MD catheter in the subcutaneous tissue of the right arm. Samples were collected 4 hourly and frozen until analysis. Nursing was straightforward, consisting of checking for infection, bleeding or irritation. The two keypersons were also responsible for analysis, and synchronization of the MD and clinical data.

RESULTS. MD catheter insertion was simple and there was one minor adverse event (self limited bleeding at insertion site). Sampling vials were changed without problems. An example from MD monitoring is given here (MD reflects blood glucose&lactate measurements):



CONCLUSION. We found that the care of the patients was not affected by MD, on the contrary, it provoked discussion regarding tissue perfusion in critical illness. There were no major adverse events. Implementation of continuous MD in the ICU is feasible. Continous MD monitoring was not a significant burden on existing resources.

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0952

IMPLEMENTATION OF TIGHT GLYCAEMIC CONTROL IN A GENERAL INTENSIVE CARE UNIT: A NURSING PERSPECTIVE

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INTRODUCTION. Tight glycaemic control (TGC) has become common UK intensive care practice (1), using various protocols, all of which seem likely to increase the workload of nursing staff. We wished to assess the perceived impact of the recent introduction of a computer-based algorithm for TGC on the workload of our nursing staff. Understanding of the potential hazards of TGC was also explored.

METHODS. All nurses that worked on the adult intensive care unit at the John Radcliffe Hospital, Oxford were mailed a questionnaire asking specifically about TGC. (TGC was defined as maintaining glycaemic levels in a narrow normal limit range of between 4.1 and 7.0 mmol/L). Questions explored the effect of implanting TGC on their workload, and asked what their understanding was of hyper- and hypoglycaemia thresholds, the danger of these events, how insulin ranked in comparison to other commonly used drugs on the ICU in terms of hazard potential, and specifically how dangerous they thought insulin was.

RESULTS. Implementation of a TGC protocol was said to increase nursing workload in at least 84% of replies, however in looking after a patient receiving TGC only 33% said it definitely increased the stress of their working day. The average blood sugar stated for hyperglycaemia came out at 8.9mmol/L, and for hypoglycaemia at 3.6mmol/L. Nursing staff considered that a hypoglycaemic event was marginally more dangerous than a hyperglycaemic event, although both were considered at the high end of the danger spectrum. When asked to rank the drugs insulin, potassium chloride (IV), metoprolol (IV) and cefuroxime (IV) in order of danger (least first), the order resulting was cefuroxime (IV), metoprolol (IV), insulin and potassium chloride (IV), and alone insulin was given a danger factor between 7 and 8 on a scale of 1-10.

CONCLUSION. TGC appears to increase the perceived nursing workload, however only 33% of respondents felt that it increased the stress of their job. The thresholds for hyper and hypoglycaemia were conservative and therefore the potential for harm from extreme hyper/hypo-glycaemia in the ICU is small. In general, nursing staff clearly appreciated the dangers of TGC, however the presence of outliers suggests the need for continuing education to provide this treatment safely.

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0953

DEATH OF THE ILL PERSON: IMPLICATIONS FOR NURSES

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INTRODUCTION. Providing nursing care to terminal ill person constitutes one of the most demanding and stressful activities for nurses, both as physical and psychic levels, requiring professional maturity and emotional stability to face illness and death processes. It was intended with this study, to know the frequency of set of emotions or feelings proposals these professionals feel in presence of a ill person in its final phase of life.

METHODS. It was used a questionnaire as an instrument of collecting data based on a likert scale (5 points). The sample was constituted by 415 nurses, who congregated the requirements previously established and worked in medicine and intensive care units in one of the four general hospitals of Porto area, in Portugal. The collected data have been processed in SPSS version 13.0 for Windows®. Analysis of content was used for categorize data from the answers to the open questions.

RESULTS. From the analysis of the data, it is observed on the category: death of the person, 46.1% never consider "it's just one more death", the majority is to think on the situation and allotment the experience, as well it gives another sense to his life. The younger sick people cause usually more disturbances on the nurses. As result of death of the person, nurses relate in *some times* frustration (51.1%), relief (47.2%) and suffering (47.8%); *never* indifference (64.2%). The following **behaviours** are more frequent: 1. *it's just one more death* in male nurses and in nurses who have a second job; 2. *gives another sense to his life* in female nurses and in nurses with a higher formation; 3. *it's to think on the situation* in female nurses, nurses with a higher formation and in nurses with a specific formation on death process. The following **feelings** are more observed: 4. *frustration* in nurses who work in intensive care units, female nurses, older nurses and in nurses with a higher formation; 5. *indifference* in male nurses and in nurses who have a second job; 6. *suffering* in female nurses, nurses with a higher formation and in nurses who haven't a second job.

CONCLUSION. When analysing the emotions or feelings that nurses feel, we found statistical significant differences related with some nurses attributes. However, they are not indifferent to death of the ill person.

0954

FROM CARE BUNDLE TO CARE PATHWAY. A SEAMLESS PROVISION OF PATIENT CARE

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INTRODUCTION. The percutaneous tracheostomy is now the most common tracheostomy performed within Critical Care and it is performed much earlier in the patient's treatment to facilitate faster weaning from the ventilator. This results in patients being discharged earlier to the general wards with a tracheostomy tube in place which brings particular problems for ward-based staff, who may not get enough exposure to maintain their skills and competence. A Tracheostomy Care Bundle was implemented to assist staff in caring for these patients and this has since evolved into an Integrated Care Pathway (ICP) for Percutaneous Tracheostomy. The care pathway aimed to embed the elements of the care bundle into practice as compliancy can be difficult to maintain without the Hawthorne effect. The ICP is a tool that can address clinical risk issues, becomes an educational resource and can be evaluated through a planned audit cycle.

METHODS. The aims of the ICP are to have; the right people, doing the right things, in the right order, at the right time, in the right place, with the right outcome, all with attention to the patient experience and to compare planned care with care actually given. The ICP was piloted over 4 months and audited in January 2006. Audit data has since been collected on Version 1 of the ICP and will be ready for presentation within the poster.

RESULTS. There was limited use of the interprofessional communication pages however this is not unusual with the pilot of a pathway as it take time for people to internalise a change in to their practice. However elements of the care bundle were embedded into practice; humidification assessed 2 hourly, need for suction assessed 2 hourly with guidance upon pre oxygenation and safe technique, recording of cuff pressure, tube patency checked 2 hourly, availability and checking of safety equipment.

CONCLUSION. This has demonstrated that the development of an ICP helped to measure and ultimately improve the care given to patients with a percutaneous tracheostomy in a more seamless and timely manner. Full audit data will be available in August for full presentation. The evolvement from Care Bundle to Care Pathway would seem appropriate in a large NHS Trust.

0955

RESULTS OF DEVISED FAMILY SATISFACTION QUESTIONNAIRE OF INTENSIVE CARE PATIENTS

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INTRODUCTION. Family members of ICU patients are often confronted with life threatening situations. Families experience uncertainty and anxiety and are dependent on the ICU staff. They are in need of information, support and accessibility. (1) Goal of the devised questionnaire was to measure the quality of care in the information and support needs of family members.

METHODS. 86 questionnaires were distributed from Sept 2004 until Feb 2005. Next-of-kin of ICU patients were given a questionnaire within the first 3 weeks of admission. The questionnaire contained 15 questions concerning information and support given by ICU staff members. Respondents could answer by a four point scale or by yes or no. With the last question the family members were asked to give an overall score of the family support. Our Goal was to score an eight or higher.

RESULTS. The family members returned 59 questionnaires (69%). The average score given to the ICU for satisfaction was 8.6 (range 6-10). The respondents understanding of information given by ICU staff members was rated sufficient to good (92%-100%). The possibilities for respondents to get information from a physician was rated 86% on admission of the patient. Conversations with physicians during the admission took place 1 to 4 times weekly (86%). During visiting hours enough possibilities were given to get information from nurses (98%). The respondents most common complaint was unfamiliarity with practical aspects of the ICU. For example: lack of information about the possibility to stay overnight, availability of a family room and the possibility of obtaining meals in the hospital restaurant (respectively 61%, 24% and 58%). The respondents experienced support by being welcomed personally (92%) as well as in seeing the critical ill family member for the first time (82%). Being treated respectfully by staff members was experienced by all positively.

CONCLUSION. 1. The quality of care in family guidance is at a high level in our ICU. 2. The information given by staff members is frequent and adequate, scoring sufficient to good. 3. The information given on pratical aspects needed our attention. We devised an information leaflet. 4. Limitation of this study was the use of a devised questionnaire.

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0956

COMPARISON OF HYDROPOLYMER DRESSING AND HYDROCOLLOID DRESSING IN MANAGEMENT OF PRESSURE ULCERS

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INTRODUCTION. Pressure sores are a current problem in intensive care unit, leading to protracted hospital stays and high care burden. Many preventive and therapeutic approaches have been tried and new trials are evolving. One relatively recent method is application of a hydrocolloid dressing. In this study, we compared the therapeutic effects of hydrocolloid dressing on pressure ulcer healing with other topical application, hydropolymer dressing.

METHODS. In this prospective study, 60 patients with a grade II or III pressure ulcer according to Braden scale were randomised to received hydrocolloid dressing (Suprasorb H) or hydropolymer dressing (Allevyn adhesive). Condition of the wound and surrounding skin, comfort, ease of use and leakage from dressing were monitored at each assessment. Treatment continued for four weeks or until the wound was lightly exuding.

RESULTS. The results showed that the two dressing were similiar in performance in that they could remain 3. and 5. days. After 5 days, surrounding skin condition, reduction in wound size and complete healing of pressure ulcers were better in the hydrocolloid dressing group.

CONCLUSION. The hydrocolloid and hydropolymer dressing are effective and well tolerated in management of pressure ulcers and hydrocolloid dressing is more effective method for treating grade II and III ulcers in intensive care unit patients.

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0957

MEDICATION DELIVERY VIA INDWELLING BOWEL ACCESS DEVICE PLAYS CRITICAL ROLE IN CRITICAL CARE

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INTRODUCTION. Bowel access and fecal control are often essential adjuncts to patient care. Access is important diagnostically, for contrast radiographic studies, and therapeutically, for the administration of medications and bowel irrigation to prepare patients for surgery, remove fecal impactions and stimulate defecation. Control of fecal evacuation may assist in perineal and sacral wound healing and has safety implications for medical personnel. In our academic critical care setting, we have also noted an increasing need for the administration & retention of multiple classes of medications rectally for treatment of patients with illnesses such as liver failure, renal failure, C. difficile colitis, and GI bleeding. The aim of this study is to delineate therapeutic uses of the Zassi Bowel Management System (ZBMS) as well as the nature of complications caused by its use.

METHODS. ZBMS was employed during the care of 288 patients between September 2004 and November 2005; we retrospectively reviewed the charts of 76 consecutive patients in whom this system was utilized.

RESULTS. The mean dwell time was 10.1 days with a range of 1 - 49 days. The most common use of the system was to channel fecal drainage in patients with diarrhea as prophylaxis against tissue breakdown and otherwise facilitate nursing care (42%, n=32). Causative factors of diarrhea predominantly were C. difficile colitis, GI bleeding, and enteral tube feeding. Wound protection was the reason for insertion in 24% (n=18) of patients. Administration of medications, including lactulose (n=10), Kayexalate (n=5), neomycin (n=2), and vancomycin (n=1) occurred in 24% (n=18) of patients. Only one adverse event was noted, an ulceration of the rectal vault with resultant hemorrhage which was later determined to be the result of overinflation of the retention cuff.

CONCLUSION. The use of this bowel management system provided a safe and effective means of medication delivery, control of fecal drainage and the protection of wound and skin in a wide variety of complex patients. Although there are other systems available to passively drain and contain fecal content, the Zassi Bowel Management System provides the unique additional benefit of medication administration and retention to assist with improving patient outcomes.

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0959

ACUTE RESPIRATORY FAILURE IN COPD: EVALUATION OF AN ICU POLICY

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INTRODUCTION. Purpose: Evaluation of an intensive care unit (ICU) treatment policy of patients with respiratory failure due to an exacerbation of chronic obstructive pulmonary disease (COPD).

METHODS. Patients: All patients admitted between January 1 1998 and March 1 2004 with respiratory failure due to an acute exacerbation of COPD as primary diagnosis admitted to our 12-bed closed format medical ICU were retrospectively analyzed.
Materials and Methods: Treatment according to a local ICU protocol, including the aim for maximally 72 hours mechanical ventilation.

RESULTS. 87 patients with 101 admissions were evaluated. Fourteen patients were admitted twice. According to blood gases and lung function testing 83% had at least stage III COPD (FEV1 < 50% predicted) according to the GOLD classification. In 62 first admissions patients were mechanically ventilated for a total of 299 days. The others received either conservative therapy or non-invasive positive pressure ventilation. The ICU survival was 77%. The median ICU stay and median ventilator days were 3.0 both (mean 4.7 and 4.8 respectively, range 0-40). Hospital survival was 70%. There were no important differences between first and second admission except for the 6-months and 1 year survival. This declined from 65% and 57% to 28% and 21% respectively.

CONCLUSION. Our policy results in a short duration of ventilation and ICU stay with ICU and hospital mortality in the expected range.

Poster Sessions
COPD and weaning 0958-0968

0958

EFFECTS OF REMIFENTANIL ADMINISTRATION ON EXACERBATED COPD PATIENTS

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INTRODUCTION. There are no data regarding the administration of remifentanil on bronchomotor tone in sedated and intubted COPD patients. Our aim is to describe the modifications induced by remifentanil on respiratory system of exacerbated COPD patients.

METHODS. We enrolled 10 exacerbated COPD patients (mean age 69.5±7.65 yrs) admitted in the ICU, intubated, mechanical ventilated and paralysed with cis-atracurium 0.2 mg/kg. Remifentanil was started at 0.02 mcg/kg/min and increased until a Ramsay Score of 6. Respiratory variables (total and minimal resistances, Rrsmax and Rrsmin; DELTARrs and compliance) were acquired using the end inspiratory occlusion method, and recorded at the baseline (T0), after 10, 15, 20 min. (T1, T2, T3) of drug infusion, and at 30 min after 0.15 mcg/kg salbutamol iv (TBeta). We applied one way Anova and Tukey test for post-hoc comparison for statistical analysis.

RESULTS. The results are shown in Table 1. Remifentanil determined a significant increase of Rrsmax Rrsmin and DELTARrs at time T3 (p<0.001).

TABLE 1.
Respiratory variables registered in the study protocol

	Rrs min	Rrs max	DELTARrs	Compliance
T0	14.48±7.24	17.24±7.73	3.43±1.76	54.51±13.8
T1	15.18±6.78	19.06±6.65	4.11±1.57	55.37±15.67
T2	16.14±6.09	20.18±6.61	4.57±2.35	54.95±14.72
T3	18.13±6.04*	23.05±6.43*	5.02±2.71*	61.87±6.65
TBeta	13.67±5.94**	16.82±6.67**	3.88±1.98	55.98±13.16

** T0 vs T3 p<0.01 ; ** T3 vs TBeta p<0.01*

CONCLUSION. Remifentanil lowers catecholamine levels increasing cholinergic and bronchial tone, that promptly returned to baseline after salbutamol infusion. In COPD patients, chronic inflammation reduces adrenergic receptor density and bronchial tone may be dependant on catecholamines levels.

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0960

HELIOX AND CPAP WITHOUT A VENTILATOR

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INTRODUCTION. Failure to achieve or restore a sufficient airway in patients with an acute upper airway obstruction (AUAO) can lead in a matter of minutes, to hypoxic neurological injury or even to death. Both heliox and continuous positive airway pressure (CPAP) applied by a face-mask are known to alleviate AUAO [1]. Combining heliox and CPAP may be attractive but is technically very difficult with mechanical ventilators. The Boussignac CPAP system (BCPAP) avoids many technical problems since it has no moving parts and generates CPAP in situ. After bench-testing we evaluated the combination of heliox and BCPAP in patients with AUAO.

METHODS. Heliox and BCPAP were only used as a bridging measure until a safe airway was acquired by an experienced and well-prepared team. The heliox cylinders and the BCPAP system were put on a trolley that could rapidly be brought to the patient anywhere in the hospital or operating room. For safety reasons a helium and oxygen mixture of 50%/50% (heliox 50/50) was chosen in order to avoid inadvertent hypoxia as can occur with the helium/oxygen 80/20 mixture. BCPAP was generated with heliox 50/50 at a flow rate of 15-30 L/min. Previous laboratory testing had shown that heliox 50/50 could generate CPAP of 5 cm H2O. The disposable plastic BCPAP device directly was connected to a standard facemask. Patient acceptation, complications and outcome were recorded.

RESULTS. 8 patients with various degrees of inspiratory stridor due to upper airway obstruction, were treated with heliox and BCPAP for a mean duration of 83 ± 42 (range 180 – 60) minutes. The mean (SD) age of the patients was 52 ± 26 (range 0 - 83) years. A clear response within a few minutes was note in 6 (75%) patients. 2 patients showed no response. In all cases stridor typically disappeared within a few minutes. The overall hospital mortality was 13%.

CONCLUSION. The combination of heliox with CPAP was simple and technically feasible with the Boussignac CPAP system. The combination was effective as a bridge to a final airway in the majority of patients with acute upper airway obstruction.

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0961

MECHANICAL VENTILATION IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS. HOW ARE WE DOING IT?

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INTRODUCTION. In Mexico 7% of smokers have Chronic Obstructive Pulmonary Disease (COPD). COPD in Mexico represents a bigger problem when compared with others developed countries as it has a higher prevalence and 17-50% of Mexican families are exposed to biomass for cooking and warming, the latter is responsible of up to 30% of COPD cases. Severe COPD exacerbations usually require non invasive or invasive ventilatory assistance. The consequences of these exacerbations can lead to death. Our objective was to describe the impact of COPD in the clinical course of patients under Mechanical Ventilation (MV).

METHODS. From March 2003 to February 2006 we prospectively recorded clinical data of all mechanically ventilated patients in the Intensive Care Unit (ICU) of the ABC Medical Center. We performed an analysis of patients with COPD diagnosis, considering the presence or not of an exacerbation as the primary MV indication as well as the survival. Statistical Analysis: Data was summarized using mean and standard deviation or median and interquartile interval; for comparisons between groups: Student *t* test, Mann-Whitney U test, X^2 test or Fisher exact test, statistical significance with P <0.05.

RESULTS. On the 3 year study period, 2456 patients were admitted to ICU, 870 (35.4%) required MV, 169 (19.4%) had COPD, and 60 patients (35.5%) were submitted to MV due to COPD exacerbation. Patients with exacerbated COPD were mainly women, were more hypoxemic at admission, had a longer MV duration, required more antibiotics and nutritional support. They also remained more hypoxemic and with more hypercapnia. Employed tidal volumes adjusted to ideal body weight, were lower in a range reduction of 0.8-1.4 ml in the exacerbated COPD group when compared with non exacerbated. Mortality was 23.3% vs 27.5% in exacerbated vs non exacerbated, respectively. Non survivor patients had a longer MV, higher frequency of Acute Respiratory Distress Syndrome (ARDS) and Ventilation Associated Pneumonia (VAP); tracheostomy was more frequently performed, and more recruitment maneuvers and sedation were needed. These patients had more tachycardia, acidosis, hypoxemia, and oxygen and positive end expiratory pressure requirements were higher, with elevated peak inspiratory pressures.

CONCLUSION. COPD patients have particular behavior under MV due to an exacerbation of this disease. However, mortality does not change due to exacerbation. Factors associated to mortality are ARDS, VAP and hypoxemia.

0962

OUTCOME OF COPD PATIENTS IN ICU: A RETROSPECTIVE ANALYSIS

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INTRODUCTION. The decision to admit a COPD patient on a ICU environment depends on several factors. The definition of prognostic factors is essential to guide the management of those patients.
The aim of this study was to search for variables that could influence ICU discharge, hospital discharge and 6 months survival in a population of COPD patients admitted due to exacerbation of their disease in a Medical ICU in the last 2 years.

METHODS. A retrospective analysis of 52 admissions of 46 patients with COPD diagnosis, stratified according to GOLD guidelines (2005), was done. SAPS2 was used as severity index. Fischer's exact test was used to compare non-numerical variables and ANOVA test was used to compare means of numerical variables.
Sixty two percent of the patients were male, mean age of 71 years, and 77% had previous autonomy for daily activities (ADA). Fifty five percent were in Stage III of COPD and 52% had previous hospital admissions for exacerbation of their disease. Of those, 11% had been submitted to invasive ventilation (IV).

RESULTS. Exacerbation of COPD due to respiratory infection was the acute syndrome at admission in 67% of the patients. Mean SAPS2 was 46%. The mean length of stay (LOS) in ICU was 6.4 days and 37% were treated with NIV before orotracheal intubation (OTI). The mean IV time was 4.9 days. ICU mortality was 13.5%. For those who survived, 17.1% died in other hospital wards. Six months survival of the entire population was 61.9%.
The variables found to be significantly associated with ICU mortality were absence of ADA (p=0.012), high number of previous hospital admissions (p=0.05), low pH (p=0.043) and high HCO3- (p=0.002) at admission and high SAPS2 (p<0.001).
The only variable found to be significantly associated with successful hospital discharge was absence of ADA (p=0.003).
The variables found to be significantly associated with survival at 6 months were ADA (p=0.003), absence of previous home oxygen therapy (p=0.037), low number of previous hospital admissions (p=0.044), and low SAPS2 (p=0.001).
A trial of NIV before OTI was associated with short length of IV and LOS in ICU but did not reduce ICU mortality.

CONCLUSION. Stage of the disease and the acute syndrome at admission (except cardiac arrest) did not influence the ICU survival. ADA was the unique factor related with prognosis in the three analysed moments. COPD patients who are autonomous for their daily activities, that do not use oxygen therapy at home and without previous hospital admissions are more likely to be alive 6 months after their admission in the ICU.

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THE CHANGES OF EXPIRATORY TRIGGER IN COPD PATIENTS DURING PRESSURE SUPPORT VENTILATION

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INTRODUCTION. During pressure support ventilation (PSV) the ventilator delivers for each breath a certain amount of pressure, fixed by the physician. The ventilator usually stops to deliver pressure when the inspiratory flow reaches a certain percentage of the peak inspiratory flow (expiratory trigger criteria). Nowadays it is possible to modify the percentage of the expiratory trigger (ET). It was previously showed that in patients with acute lung injury the modification of ET significantly modified the respiratory rate and tidal volume without changing the inspiratory muscle effort (1).

METHODS. We evaluated in a group of COPD patients with respiratory failure during PSV the changes of ET (high 40% and low 5% of the peak inspiratory flow respectively) regarding the pattern of breathing and inspiratory work (WOBI). PSV was set at 5 cmH2O without external PEEP and oxygen fraction remained constant during the study.
Airway, esophageal, gastric pressure and airflow were measured.

RESULTS. In table the results are expressed as mean ± standard deviation

TABLE 1.
Breathing pattern and inspiratory effort

	Respiratory rate bpm	Tidal Volume ml	Cycling flow l/sec	PEEPI cmH2O	WOBI J/min
40% ET	25.7±8.0	364±105	0.17±0.03*	4.2±2.1*	10.8±4.8*
5% ET	25.8±7.6	398±131	0.04±0.014	5.0±1.4	13.3±6.6

** p<0.05 vs 5% ET*

CONCLUSION. The variation in the percentage of ET although did not modify the minute ventilation, significantly reduced the intrinsic PEEP and work of breathing.

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0964

SLEEP QUALITY IN CRITICALLY ILL PATIENTS DURING PAV WITH LOAD-ADJUSTABLE GAIN FACTORS AND PS

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INTRODUCTION. It has been shown in critically ill patients that respiratory load compensation is more efficient during proportional assist ventilation with adjustable gain factors (PAV+) than that during pressure support (PS). PAV+ automatically adjusts the flow and volume gain factors such as to represent always constant fractions of resistance and elastance of the respiratory system, measured by applying at random intervals of 4 to 10 breaths, a 300 msec pause maneuver at the end of selected inspirations. The large number of end-inspiratory occlusions may affect either the sleep quality or the sedation level.

METHODS. During two consecutive nights polysomnography was performed in 17 critically ill patients ventilated with PAV+ and PS. In each mode two levels of assist were studied (baseline and 40% higher). Seven patients were studied without sedation, while in 10 patients propofol (1.0-1.5 mg/kg/h) was used such as to achieve a score of 3 on Ramsay's scale.

RESULTS. With and without sedation the sleep efficiency, sleep staging, sleep fragmentation index (number of arousals+awakenings/per hour of sleep) and sleep respiratory disturbance index (apneas+ hypopneas/per hour of sleep) did not differ between modes as well as between assist levels.

CONCLUSION. Compared to PS with PAV+ the large number of airway occlusions did not affect either the sleep quality or the level of sedation.

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0965

BREATHING PATTERN VARIABILITY: HEALTHY SUBJECTS AND WEANING PATIENTS. THE CHAOS THEORY PERSPECTIVE

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INTRODUCTION. There is growing interest in describing patterns and rhythms of biological systems and their variability in physiological and pathological states. The goal of the present study is measuring breathing pattern variability (BPV) by calculating Sample Entropy (SampEn) of several parameters so to settle its pronostic usefulness during weaning. Similarities or differences with healthy subjects BPV were also sought

METHODS. Intubated critical patients on MV > 48 h and a group of non-intubated healthy volunteers were included. A variable orifice pneumotachograph connected to a breathing monitoring system (Bicore CP-100) were used. Values captured this way were recorded and saved using a computer software program. Patients underwent a 30 min O2T trial. The following variables were gathered breath-to-breath (both from patients and volunteers): inspired and expired tidal volume (Vti), (Vte); respiratory rate (RR); inspiratory fraction (Ti/Ttot); peak inspiratory and expiratory flow rate (PIFR) (PEFR). The following study groups were obtained: CG (control group): tests conducted on healthy volunteers; SG (succeed group): tests on patients who underwent disconnection and successful extubation; FG (failure group): tests on patients who underwent tests not followed by extubation or who needed reintubation < 48 h; and IG: tests on all intubated patients. Statistical analysis: Mann-Whitney or Student's t-tests. p<.05 indicated significance

RESULTS. 15 healthy volunteers (CG=15) and 40 patients were included. 51 disconnection tests were conducted (IG=51): SG=26; FG=25. SG versus FG: No significant differences were found in BPV. SampEn Vti and SampEn Vte revealed higher values in FG than in SG almost reaching statistical significance (Table 1). IG versus CG: higher SampEn values were obtained in all parameters in CG; differences in SampEn Ti/Ttot, PIFR, and PEFR reached statistical significance (Table 2)

TABLE 1.

	IG	CG	p
SampEn Vti	1.65	2.02	0.080
SampEn Vte	1.68	1.97	0.088
SampEn RR	0.58	0.75	0.064
SampEn Ti/Ttot	1.79	2.01	0.007
SampEn PIFR	1.70	1.91	0.026
SampEn PEFR	1.64	1.94	0.001

TABLE 2.

	SG	FG	p
SampEn Vti	1.62	2.01	0.055
SampEn Vte	1.66	1.82	0.090
SampEn RR	0.58	0.58	0.930
SampEn Ti/Ttot	1.79	1.80	0.980
SampEn PIFR	1.73	1.66	0.500
SampEn PEFR	1.67	1.61	0.510

CONCLUSION. SampEn PIFR, PEFR and Ti/Ttot revealed higher values in healthy volunteers than in intubated patients. BPV showed differences, but has not been useful in distinguishing successful from failed weaning.

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SLEEP QUALITY IN MECHANICALLY VENTILATED PATIENTS: COMPARISON OF THREE VENTILATORY MODES

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INTRODUCTION. The ventilatory mode could have an impact on sleep quality in patients requiring assisted mechanical ventilation. Objective: To evaluate the influence of three ventilatory modes on sleep.

METHODS. Fifteen patients awake were evaluated during three periods of six hours in a medical Intensive Care Unit. Measurements: All patients were successively ventilated in three ventilatory modes: assist control ventilation (ACV) and two modalities of pressure support ventilation (PSV), clinically adjusted (cPSV) and with automated adjustement (aPSV). Sleep recordings were evaluated with polysomnography.

RESULTS. The median percentage of sleep during the recordings was 43 [32-70]%. The main alterations were a diminished percentage of Rapid Eye Movement (REM) sleep accounting for 10 [2-13]%, and a high index of fragmentation with 29 [19-41] arousals and awakenings per hour. Restorative sleep time was longer during the first part of the night, 62 [17-86] minutes and REM percentage was higher during the last night period, 13 [2-26]%. The duration of restorative sleep and the percentage of REM were similar through the three ventilatory modes, 37 [4-62] minutes and 7 [0-13]% in ACV, 26 [0-68] minutes and 4 [0-10]% in cPSV and 24 [0-51] minutes and 1 [0-7]% in aPSV (p=0.79 and p=0.54 respectively).

CONCLUSION. Sleep architecture is markedly altered in assisted mechanical ventilated patients due to a diminished REM stage (N=15-25%) and a high index of fragmentation (N<10). The ventilatory mode, in the way it was adjusted through this study, does not seem to influence sleep quality.

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EFFECT OF INSPIRATORY PRESSURE SUPPORT ON BREATHING VARIABILITY IN POSTOPERATIVE VENTILATION

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INTRODUCTION. Respiration is inherently variable, and respiratory failure may be associated with reduced variability. In supported mechanical ventilation, there is limited information about the role of ventilator settings on respiratory variability. To test the hypothesis that decreased ventilatory support may reduce variability, we assessed the effect of reducing Inspiratory Pressure Support (IPS) on respiratory pattern and indices of variability.

METHODS. Fifteen postoperative patients were successively ventilated in IPS at 10 and 5 mbar with a Galileo (Hamilton), and than successfully extubated. The length of the inspiratory (Ti) and expiratory (Te) phases of the respiratory cycle, tidal volume (Vt), and the pressure @100ms (P01) were recorded for each breath with the ventilator interface. For each variable, the mean and the coefficient of variation (CoVar = SD/mean) were computed. The autocorrelation coefficient of the first lag (CoCor) was used to determine which proportion of variability was correlated breath-to-breath (short term memory of the neural controller). Comparisons between 10 and 5 mbar of IPS were done by one way analysis of variance.

RESULTS. During weaning, breathing pattern changed: respiratory rate increased (rapid shallow breathing). This corresponds to a stimulation of the respiratory drive, as shown by an increased P01. Both variability and autocorrelation were not affected by the reduction in IPS.

TABLE 1.

	Mean IPS 10	- IPS 5	CoVar IPS 10	($x10^{-2}$) IPS 5	CoCor IPS 10	($x10^{-2}$) IPS 5
Ti (s)	1.03 ± 0.18	0.97 ± 0.20	12 ± 7	13 ± 6	26 ± 19	29 ± 22
Te (s)	3.20 ± 1.08	2.51 ± 0.99*	25 ± 14	22 ± 9	27 ± 19	34 ± 17
Vt (ml/kg/min)	8.26 ± 1.76	7.22 ± 1.41	17 ± 10	17 ± 9	35 ± 19	32 ± 21
P0.1 (mbar)	3.1 ± 1.4	4.5 ± 1.8**	36 ± 11	33 ± 16	23 ± 20	21 ± 15

CONCLUSION. A reduction of IPS induced the expected changes in breathing pattern. By contrast, and contrary to our hypothesis, breathing variability was not influenced in this group of postoperative patients rapidly weaned from mechanical ventilation.

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DIAZEPAM OR MIDAZOLAM FOR TRACHEAL INTUBATION IN THE ICU?

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INTRODUCTION. In several countries midazolam or diazepam are the main drugs of choice for urgent procedures. There are no randomized trials comparing midazolam and diazepam for urgent orotracheal intubation. A clinical equivalence would allow physicians to choose between the agents on a cost basis. The aim of the study is to compare the clinical efficacy and tolerability of the two drugs.

METHODS. Thirty-three patients over 18 yr old undergoing urgent intubation were randomized to either diazepam or midazolam for intravenous sedation. Sedation was administered using titration protocols and observed during 60 min.

RESULTS. 17 patients received midazolam (mean 15±9 mg) and 16 patients received diazepam (mean 11±5 mg). All patients were adequately sedated (Ramsay scale 5-6). There were no differences for SaO2, diastolic pressure or Ramsay scale between drugs. Systolic pressure was lower (p=NS) for midazolam group after 15 min (93±23 mmHg vs. 107±38 mmHg) and 30 min (93±27 mmHg vs. 100±33 mmHg). Time for sedation was 168±130 sec for midazolam and 100±68 sec for diazepam (p=NS).

CONCLUSION. Sedation with diazepam was quicker, effective and well tolerated, and surprisingly obtained with a lower dose.

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Poster Sessions
Macro and microcirculation in septic shock
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INITIAL HEMODYNAMIC ASSESSMENT AND HEMODYNAMIC SUPPORT IN COMMUNITY ACQUIRED SEPSIS

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INTRODUCTION. Community-acquired sepsis remains a common and serious illness and a leading cause of death in spite of an aggressive therapeutic approach. The aim of our study was to evaluate the initial hemodynamic assessment as well as the haemodynamic support in community-acquired sepsis.

METHODS. During a 12 months period all community acquired sepsis admitted to 17 Portuguese ICU were consecutively included in the study. Patients were followed up during the first 5 ICU days, the day of ICU discharge or death as well as hospital outcome.

RESULTS. Eight hundred ninety seven consecutive patients (median age 63 years, 577 men, and hospital mortality 38%) were studied. At the time of ICU admission 51% of the patients were in septic shock, 40% in severe sepsis and 9% with sepsis. However among the patients that were admitted with septic shock in the ICU, at hospital admission 35% had no cardiovascular dysfunction and only 12% presented with severe cardiovascular failure. The time delay between hospital and ICU admission was 2±2days. During the period of observation patients with septic shock presented more cardiovascular dysfunction assessed with the SOFA score. In all severity sepsis groups (sepsis, severe sepsis and septic shock) survivors showed a tendency to improvement whereas nonsurvivors showed a slight variation. Concerning the particular aspect of hemodynamic support of the SSC recommendations for severe sepsis and septic shock, only the use of vasopressor showed a good penetration rate (80%); fluids were administered to get a mean arterial pressure of 65mmHg in 65% of the patients, inotropes and steroids were used in 50%.

CONCLUSION. The great majority of patients with community acquired sepsis admitted to ICU were in severe sepsis or in septic shock (91%). The percentage of patients in shock at ICU admission was higher than at hospital admission. Time from hospital to ICU admission was long enough to suggest the need to review the process of care.

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VOLUMETRIC MONITORING IN PATIENTS WITH SEPTIC SHOCK

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INTRODUCTION. Early goal-directed therapy (1) improves survival in severe sepsis and septic shock and is the standard treatment recommended by the surviving sepsis campaign (2). Volume overload is a potential concern with this approach. The PiCCO™ device (Pulsion Medical Systems) allows monitoring of the intravascular volume status and could be used to guide volume therapy in severe sepsis and septic shock. We measured volumetric PiCCO™ parameters in patients with septic shock to examine whether using the treatment algorithm provided by the manufacturer (3) would result in treatment decisions different from those when using the current standard.

METHODS. We investigated 9 patients with septic shock treated with early-goal directed therapy. They had surgical interventions prior to ICU admission if required. In addition to standard monitoring a femoral PiCCO™ catheter was inserted. Cardiac index (CI), central venous oxygen saturation (SvO2), intrathoracic blood volume index (ITBI), and extravascular lung water index (ELWI) were measured on admission to the ICU, 6, 12, and 24 hours later by transpulmonary thermodilution after injection of a 15 mL bolus of cold (< 8˚C) normal saline into the central venous line.

RESULTS. Data are shown as median (range). Patients were aged 80 (43-90). Therapeutic goals were met by all patients within the first 24 hours. Doses of noradrenaline (NOR), dobutamine (DOB), and haemodynamic data are shown in Table 1, volumetric data in Table 2. In many patients ITBI and ELWI exceeded the thresholds (850, 10 respectively) above which according to the manufacturers' algorithm no further fluid resuscitation is necessary (3). Column n shows the number of patients with CI > 3.0, ITBI > 850 and ELWI > 10 who would have been treated with volume reduction according to the manufacturers' algorithm.

TABLE 1.

	NOR ug/min	DOB ug/min	MAP mmHg	CVP mmHg	SvO2 %	CI L/m2/min
0 h	24 (4-96)	400 (0-600)	70 (53-80)	19 (9-22)	80 (66-91)	3.6 (2.8-7.2)
6 h	24 (10-84)	400 (0-600)	64 (60-80)	18 (11-23)	80 (58-89)	3.6 (2.4-5.8)
12 h	27 (4-86)	400 (0-600)	70 (56-75)	16 (13-23)	83 (71-92)	3.2 (2.6-8.1)
24 h	26 (0-80)	400 (0-600)	73 (58-105)	19 (10-22)	75 (68-86)	3.7 (2.5-4.7)

TABLE 2.

	ITBI mL/m2	ELWI mL/kg	n
0 h	984 (735-1566)	10 (5-17)	3
6 h	994 (876-1419)	10 (6-36)	5
12 h	1076 (830-1746)	13 (6-40)	6
24 h	891 (771-1320)	9 (4-15)	2

CONCLUSION. Using data obtained by the PiCCO™ monitor and the treatment algorithm proposed by the manufacturer, many patients with septic shock would be treated with restricted fluid resuscitation or even diuretic therapy. Further studies are needed to adapt the manufacturers' treatment thresholds for patients with septic shock.

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0971

THE VOLUMETRIC MONITORING OF HEMODYNAMICS DURING SEPTIC SHOCK AND ACUTE LUNG INJURY

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INTRODUCTION. Septic shock and acute lung injury (ALI) are frequent causes of death in the ICU. The therapy of these conditions is guided by invasive hemodynamic moni-toring. The aim of our study was to evaluate the volumetric hemodynamic parameters (1) by using single transpulmonary thermodilution (STD) in patients with sep-tic shock combined with ALI.

METHODS. We studied 18 patients (mean age 49±12 yrs) with septic shock and ALI diagnosed within 24 h. In all patients, a 5F thermodilution catheter (Pulsiocath PV2015L20) and a 7F Swan-Ganz catheter (Pulsiocath PV2057) were inserted into the femoral and pulmonary artery, respectively. Cardiac index (CI), cardiac function index (CFI), global end-diastolic volume index (GEDVI), intrathoracic blood volume index (ITBVI), left ventricular contractility index (dPmax), pulmonary artery pressure (PAP), left and right heart end-diastolic volume (LHEDV, RHEDV), right ventricular end-diastolic volume (RVEDV) and other hemodynamic parameters were assessed every 2 h by STD and continuous pulse contour analysis (PiCCOplus and VoLEF, Pulsion Medical Systems, Germany). The duration of study was 72 h. The data were compared with baseline using the test of contrasts.

RESULTS. The baseline mean values of SAPS II, SOFA and Murray scores were 59.8±13.3, 11.4±2.1 and 1.6±0.6 points, respectively. The mortality rate at Day 28 was 67%. After the correction of vasoactive therapy during the first 4 h, GEDVI, ITBVI, PAP, and LHEDV decreased by 5-15% ($p<0.05$). RHEDV and RVEDV did not change significantly. The peak decrease in CFI, dPmax and CI was observed at 48 h (by 19%, 42% and 17%, respectively; $p<0.05$). These changes can be explained by the myocardial depression and progression of septic shock to the hypodynamic phase that requested the increase of doses of inotrope therapy.

CONCLUSION. The sepsis-induced myocardial failure is caused mainly by left heart dysfunction. In patients with septic shock and ALI, volumetric parameters provide valuable data for the management of hemodynamics.

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CARDIORESPIRATORY RESPONSE TO INCREASING LEVEL OF PEEP IN SEPTIC PATIENTS: A VOLUMETRIC STUDY

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INTRODUCTION. Mechanical ventilation with PEEP application is necessary in septic patients, but septic myocardial dysfunction may worsen if hypovolemia is not corrected. Aim of this study is to evaluate in septic patients under increasing level of PEEP 1- the haemodynamic and volumetric response 2- To assess whether ITBVI (Intrathoracic Blood Volume) correlate with cardiac function 3- To assess whether EVLWI (Extra Vascular Lung Water) may be used as index of alveolar recruitment.

METHODS. 18 septic patients admitted to a general intensive care were enrolled in the study (Group A). 10 non septic with cardiorespiratory failure were used as control group (Group B). All patients were mechanically ventilated (TV 6-8 ml /Kg Pl press < 30 cmH20) and connected to an integrated monitoring system - PICCO system / Agilent - by a fiberoptic arterial catheter (pv 2014L16) and a central venous catheter. After haemodynamic stabilization all patients were submitted to 5 -10-15 cmH20 of PEEP (T0-T1 -T2). At every step the main haemodynamic, volumetric and oxymetric variables were evaluated in either groups. All data are expressed as mean±sd. ANOVA test was used to compare changes in the groups. Linear correlation was used to study the relationship between ITBVI and CI and SVI. $P < 0.05$ was considered statistically significant.

RESULTS. At Table 1 are reported the main results. SVI and CI correlated with ITBVI in group A but not in group B at every time. In Group A basal ITBVI correlated with depression of cardiac function during PEEP application. (ITBV / δ SVI r= 0.66, $p < 0.05$.)

TABLE 1.

	Group A			Group B		
	T0	**T1**	**T2**	**T0**	**T1**	**T2**
ITBVI ml/m2	732±163**	696±156**	722±228	957±250	918±230	888±126
SVV %	12±6	16±6*	16±3**	9±4	10±9	10±8
EVLWI ml/Kg	8.9±4	10.5±5	8.3±3	11.5±4	10.2±2	11.6±4
PaO2/FIO2	216±72	217±67	225±77*	177±72	254±75	303±74#

** p < 0.05 ** p < 0.01 between Groups.# p< 0.05 in the group vs T0.*

CONCLUSION. 1-In septic patients PEEP application may worsen hypovolemia, as detected by volumetric monitoring and doesn't improve oxygenation. 2- ITBVI correlates with cardiac function during PEEP application. 3- EVLWI is not reduced during PEEP application.

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APPLICATION OF FLOW-MEDIATED DILATION AND HEART RATE VARIABILITY IN THE OUTCOME PREDICTION OF SEPTIC PATIENTS

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INTRODUCTION. Endothelial dysfunction is a major pathological mechanism in sepsis. The flow mediated dilation (FMD) has been documented as a non-invasive index to evaluate the endothelial function in atherosclerosis. Decreased heart rate variability (HRV) was found as poor prognosis in septic patients. The aim of this study is to compare these two indices in predicting the outcome of septic patients.

METHODS. Twenty-three patients with sepsis in surgical intensive care unit were included. The APACHE II score and routine biomarkers as well as 30-minute heart rate signals by Holter were recorded at the first admission day. Heart rate signals were analyzed by linear and nonlinear methods. All patients underwent continuous ultrasound detection of brachial artery reactivity by degree of FMD. Three-month mortality was followed.

RESULTS. There were 13 patients survived and 10 expired. There were no significant differences of APACHE II score and routine biomarkers. Decreased HRV (Table 1) showed in expired group. The DeltaD (peak-baseline)(survival/expired=0.180±0.152/-0.004±0.129, p=0.009) and FMD (%) (survival/expired=4.7±4.0/0.5±2.9, p=0.014) were significantly lower in expired group. The slope of diameter change during occlusion (SLOPE)(survival/expired=0.03±0.18/0.06±0.04, p=0.029) was higher in expired group.

TABLE 1.

The characteristics of HRV in survival and expired groups

	Survival (n=13)	Expired (n=10)	*p*
VLF (ms^2)	558.8 ± 692.3	107.4 ± 96.4	0.038*
DFA	0.81 ± 0.18	0.55 ± 0.19	0.008*
DFAalpha1	0.90 ± 0.24	0.55 ± 0.19	0.029*

VLF: the power of the very low frequency; DFA: Detrended fluctuation analysis

CONCLUSION. 1) Both impaired FMD and decreased HRV were highly associated with the outcome of septic patients. 2) The SLOPE can be a novel marker of endothelial function to predict the prognosis of septic patients.

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0974

IMPACT OF OXYGEN DISSOCIATION CURVE ON MIXED VENOUS OXYGEN TENSION IN CRITICALLY ILL PATIENTS

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INTRODUCTION. In Sepsi early goal therapy includes treatment oriented for mean arterial pressure, central venous pressure, and central venous oxygen saturation. However, the amount of oxygen delivered to the mitochondria is critically dependent on the oxygen tension gradient between capillary lumen and the tissue. Several factors influence the magnitude of this gradient including cardiac output (CO), haemoglobin concentration (CtHb), rate of tissue metabolism, and the position of oxygen dissociation curve (ODC). Abrupt leftward shifts of ODC can contribute to the increase of the values of SvO2. This study was designed to state the effect of leftward shift of ODC on PvO2.

METHODS. We reviewed haemogasanalytic and haemodynamic data of 70 consecutive critically patients. Only thirty subjects whose a shift to the left of p50 > 10% occurred, were included.

RESULTS. Data are expressed as mean (±SD). As expected, due to selection of samples, during the recovery in ICU p50iv significantly decreased from 31.5 (SD 5.3) to 25.9 (SD 2.8) mmHg, p<10-8. The leftward shift of ODC was partially caused by recovery from acid base disturbance. Mixed venous pH increased from 7.275 (SD 0.149) to 7.416 (SD 0.008) p<10-6 and mixed venous pCO2 decreased from 53 (SD 24) to 41 (SD 9) mmHg p<10-3. There were no significant differences between haemodynamic and oxygen transport related variables measured pre and post changes in p50. The increase in haemoglobin oxygen affinity without any significant change in DO2 and VO2 induced a significant drop in PvO2 from 40 (SD 8) to 34 (SD 6) mmHg p<10-5 but not in SvO2 0.640 (SD 0.12) vs 0.645 (SD 0.97) p=NS.

CONCLUSION. Early goal oriented therapy should be implemented in the initial resuscitation of critical ill patients. Measurement of central venous oxygen saturation can easily be applied in intensive care patients and offers a useful indirect indicator for the adequacy of tissue oxygenation. However the value of SvO2 could be misleading when changes in ODC, due to therapeutic interventions on pCO2 and pH, occur. In patients with severe acidosis, in addition to maintaining of a SvO2 above 70%, we suppose the maintenance of a PvO2 above 35 mmHg.

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MIXED VENOUS OXYGEN SATURATION IS NOT ESTIMATED BY CENTRAL VENOUS OXYGEN SATURATION IN SEPTIC SHOCK

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INTRODUCTION. Central venous oxygen saturation ($ScvO_2$) in initial resuscitation is included in the Surviving Sepsis Campaign guidelines and the $ScvO_2$ monitoring has been suggested to be comparable to SvO_2 for clinical purpose. However, while $ScvO_2$ is an excellent tool in resuscitation period of shock, it is still controversial if that is suitable for follow-up afterwards during ICU treatment. The aim of the study was to assess the correlation and agreement of $ScvO_2$ and $SvO_2$and compare the $ScvO_2$-SvO_2 difference to lactate, oxygen-derived and hemodynamic parameters during early septic shock in ICU.

METHODS. 16 patients with septic shock were studied prospectively. All were mechanically ventilated and the dose of norepinephrine over 0.1μg/kg/min for maintaining mean arterial blood pressure over 65mmHg, was required for inclusion. SvO_2 samples were drawn slowly from the distal port of the unwedged PA catheter, $ScvO_2$ samples from the sideport of the introducer and arterial samples via the arterial catheter simultaneously. Blood gas analysis was performed and oxygen saturations were determined photospectrometrically with CO-oximeter. Hemodynamic measurements were performed with Swan-Ganz catheter. Arterial plasma lactate level was measured by a photometric method.

RESULTS. Altogether 72 paired blood samples were obtained. Five paired samples were missed due to technical reasons. The Intra Class Correlation of paired $ScvO_2$and SvO_2 was highly significant (p<0.001) but the bias of difference was 4.2% and 95% limits of agreement from -8.1 to 16.5%. Mean SvO2 of patients was below mean $ScvO_2$ at all time points. The difference between $ScvO_2$ and SvO_2 correlated inversely to CI (p=0.036) and to DO_2(p=0.007) but no correlation to other measured variables or dose of norepinephrine were found. Changes between two measurements were parallel (both measurements changed same time to same direction compared to previous measurements) in 55% (95%Cl 41%-69%) of consecutive measurements.

CONCLUSION. The difference between paired $ScvO_2$ and SvO_2 varies highly, is inestimable and unacceptable wide for clinical use. Therefore, $ScvO_2$ can not be used as a surrogate of SvO_2 in treatment of septic shock after resuscitation period in ICU.

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0976

EVALUATION OF EXTRAVASCULAR LUNG WATER IN PATIENTS WITH SEVERE SEPSIS

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INTRODUCTION. In hospitalized patients sepsis is a common syndrome, occurring at a rate of 450000 cases/year in Europe. Severe Sepsis is associated with high death rates (nearly 30–50%) and with Respiratory failure (85%) (1). The increased capillary permeability for altered alveolar–capillary barrier function with accumulation of extravascular lung water (EVLW) is determinant of acute respiratory distress syndrome (ARDS) development (40% of cases). Aim of the study: we analyzed the prognostic value of EVLW as clinical tool for the assessment of pulmonary function.

METHODS. This retrospective study was conducted in 40 patients (25F/15M; age 60 +/- 18 years, SAPS II 58 +/-21)
Transpulmonary thermodilution was used to measure EVLW and cardiovascular hemodynamics and a 5-F arterial catheter was placed in the descending aorta via the femoral artery, using the Seldinger technique. The arterial catheter and a standard central venous catheter were connected to pressure transducers and to an integrated bedside monitor (PiCCO). Continuous cardiac output (CO) calibration and EVLW measurements were obtained by central venous injections of 15–20 ml iced 0.9% saline solution.

RESULTS. All data are given as means ± SD and $P < 0.05$ is considered statistically significant. Maximum EVLW was significantly higher in nonsurvivors (n = 19) than in survivors (n =21) [mean 13mL/kg vs 9 mL/kg, respectively; $p < 0.0001$]. Tab.1

TABLE 1.

DATA OF EVLW * $p < 0.0001$

	SURVIVORS	NON SURVIVORS
MEAN	9	13 *
STD DEVIATION	2	2.082
LOWER C. I. %	8.09	11.99
UPPER C.I. %	9.91	14.003

CONCLUSION. Non survivors had significantly higher EVLW values than survivors and it is a diagnostic and prognostic marker in patients with severe sepsis. Measurements of EVLW may stratify the risk and improve patient management.

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EVALUATION OF EXTRAVASCULAR LUNG WATER IN PATIENTS WITH SEPSIS

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INTRODUCTION. There are only a few reports about the examination of extravascular lung water (EVLW) with sepsis but even fewer on the rise of EVLW with sepsis. The objectives of this study were to investigate whether or not EVLW could be a useful prognostic indicator of pts with sepsis and to evaluate the daily relationships among the EVLW index (EVLWI), pulmonary vascular permeability index (PVPI), PaO2/FiO2 ratio, and Sequential Organ Failure Assessment (SOFA) scores during the clinical course.

METHODS. We examined 28 pts with sepsis (21 alive; 7 died). All pts were mechanically ventilated. Upon admission, the Pulse Contour Cardiac Output (PiCCO) monitoring system (Pulsion, Germany) was set up to provide an estimate of EVLWI and PVPI. PVPI is the ratio of EVLW to pulmonary blood volume. These measurements were taken immediately and subsequently every 24 h for 2 days. Statistical analyses: t-test, analysis of variance (ANOVA) and liner regression analysis were used.

RESULTS. There was no statistically significant difference in EVLWI and PVPI values between survivors and non-survivors at every measured point, while those in survivors decreased significantly ($p<0.01$) and those in non-survivors increased significantly ($p<0.05$) during 48 h. EVLWI was related to the PaO2/FiO2 ratio and SOFA scores (r2=0.25, 0.26, $p<0.01$) at 48 h after admission. PVPI was related to the PaO2/FiO2 ratio at 48 h (r2=0.29, $p<0.01$), and was related to SOFA scores at 24 h (r2=0.16, $p<0.05$) and at 48 h (r2=0.43, $p<0.01$).

CONCLUSION. 1) This study showed that EVLWI and PVPI were not good prognostic indicators of pts with sepsis, especially upon admissions. 2) The increase or decrease of these values was a good predictor. 3) The analysis of the relation between EVLWI, PVPI and SOFA scores showed that a continuous, not a temporary, increase of the pulmonary vascular permeability influenced the outcome of pts with sepsis. 4) PVPI is a more accurate indicator than EVLWI and correctly reveals the degree of pulmonary vascular permeability and the condition of pts with sepsis. 5) Using PVPI will improve the strategy of how to control vascular permeability in the early stage in sepsis.

0978

THE PROGNOSTIC VALUE OF OXYGEN-DERIVED MARKERS IN CIRCULATORY SHOCK

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INTRODUCTION. To compare the prognostic value of different oxygen derived variables in patients with circulatory shock.

METHODS. Prospective, observational clinical study. In 27 patients with a first episode of cardiogenic (n=11) or septic (n=16) shock, we measured hemodynamic variables, arterial and mixed venous blood gases, arterial lactate and pyruvate concentrations within the first 4 hours of shock (T0) and 4 to 8 hours (T1) after onset of shock. Arterial blood samples were deproteinized with perchloric acid and lactate and pyruvate were determined using an enzymatic method and a spectrophotometer. A new index DPCO2/C (a-v) O2) derived from the respiratory quotient and its simplified version (DPCO2/1-SvO2) were calculated.

RESULTS. Although patients with cardiogenic shock were older than those with septic shock, the initial APACHE II and SOFA scores were similar in the two groups (23±4 vs 24±8 and 11± 2 vs 12±3). Fifteen patients died in the ICU. Blood lactate and L/P ratio were the best predictors of ICU outcome (Table).

TABLE 1.

	0 to 4h Area	0 to 4 h Std. Error	0 to 4h Sign	4 to 8h Area	4 to 8h Std. Error	4 to 8h Sign
Delta PCO2/C (a-v) O2	0.51	0.11	0.92	0.49	0.12	0.92
Delta PCO2/1-SvO2	0.58	0.12	0.85	0.47	0.13	0.78
LACTATE	0.76	0.09	0.02*	0.82	0.09	0.01$
RatioL/P	0.74	0.10	0.04*	0.81	0.09	0.01$

** p<0.05, $p<0.01*

CONCLUSION. The lactate concentration remains a better outcome predictor than L/P ratio in shock. The oxygen related variables DPCO2/C (a-v) O2 and DPCO2/1-SvO2 are not related to outcome of shock.

0979

DETERMINANTS OF POST ARTERIAL OCCLUSION REOXYGENATION MEASURED BY NIRS

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INTRODUCTION. We study the increase in tissue O2 saturation (StO2) following arterial occlusion in subjects and patients.

METHODS. Tissue oxygenation and perfusion of thenar muscle were assessed using near infrared spectrometry technique (NIRS), Laser Doppler technique (LD) and Humeral Doppler technique (Doppler) at baseline and following forearm arterial occlusion in 9 subjects and 3 patients with and without norepinephrine. The slope of the increase in StO2 (S-Release), the peak Doppler velocity, the tele-diastolic Doppler velocity and peak LD hyperhemic response following occlusion release were compared.

RESULTS. In subjects, S-Release is correlated with the post occlusion increase of peak Doppler (r2 = 0.68), tele-diastolic Doppler (r2 = 0.50) and peak LD (r2 = 0.39). The post occlusion increase in peak Doppler velocity and in LD were also correlated (r2 = 0.84). In patients, this relation was shift to the right in presence of norepinephrine with a larger decrease in S-Release than in Doppler responses. This relation was restored after recovery and withdrawal of norepinephrine. On the opposite, the relation between peak Doppler velocity and LD was not affected by the presence of norepinephrine.

CONCLUSION. StO2 measurements in combination to a transient arterial occlusion test is representative of local tissue oxygenation and perfusion. The increase in StO2 following forearm arterial occlusion specifically characterize the local change in perfusion flow drives by the functional adaptation of micro vascular pathway.

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0980

TIME COURSE OF HEMOGLOBIN CONCENTRATIONS IN CRITICALLY ILL PATIENTS

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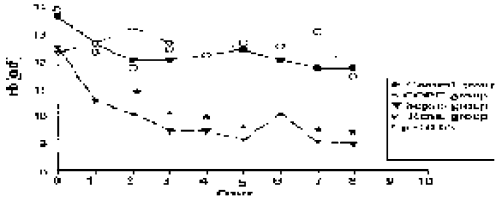
INTRODUCTION. More than 30% of Intensive Care (ICU) patients required red blood cells transfusion (1). In ICU, physiopathology of anemia is complex and includes a blunted erythropoietin (EPO) response (2). We aimed to test the hypothesis that the time course of hemoglobin (Hb) concentrations is different in relation to the baseline EPO level in four groups of ICU patients: COPD's, terminal renal failure, septics and controls (3).

METHODS. Daily Hb concentrations were collected in four groups of ICU patients: a control group (post-surgery, neurology impairments, n=16), COPD without infection (n =16), a septic group (n=13), and a terminal renal failure group requiring hemodialysis (n= 5). Patients were excluded if they were red blood cells transfused or bleeding. Intra-group and inter-group analyses were done with statistical tests of Kruskall-Wallis and the paired comparison of Dunn. A value of $p < 0.05$ was considered statistically significant.

RESULTS. Hb at ICU admission was identical between the 4 groups: 13.7±1.6 (control), 13.5±2.5 (COPD), 12.5±2.1 (septic), and 12.1±1.4 g/dL (renal). The rate of anemia, defined by the local cut-off value (<13.5g/dl), at admission is significant for the septic (61.5%) and the renal groups (100%). Hb concentrations decreased significantly already after 2 days in the septic group (figure).



CONCLUSION. These results showed that during their ICU stay, anemia is more pronounced in septic patients. A possible explanation is a more marked blunted EPO response in this population compare to others. Further studies with EPO measurements in these groups are necessary to confirm this hypothesis.

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0981

MONITORING OF TISSUE OXYGENATION IN SEPTIC PATIENTS WITH THE USE OF MICRODIALYSIS

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INTRODUCTION. The purpose of this study was to determine whether microdialysis in the femoral muscles is an adequate indice of tissue oxygenation in septic patients.

METHODS. This is a prospective observational study that was conducted in a Surgical Intensive Care Unit of a university teaching hospital. Sixteen consecutive patients in septic shock (i.e. documented sepsis plus mean arterial pressure below 90 mmHg persistent to fluid challenges) were included in the study. All patients were admitted in the SICU and a pulmonary artery catheter, a gastic tonometer and a microdialysis catheter in the right femoral muscle were placed. Baseline measurements were obtained and consecutive measurements were performed every 4 hours. Measured values included mean arterial pressure (MAP), pulmonary pressure (PP), pulmonary wedge pressure (PWP), cardiac index (CI), systemic vascular resistance (SVR), oxygen delivery (DO2), oxygen consumption (VO2), gastric mucosal pH (pHi), PCO2 gradient (PgCO2) and microdialysis derived values (lactate, pyruvate, glycerol, glucose and lactate/pyruvate ratio). All data were collected in separate sheets and recorded in an electronic data bank. After discharge of each patient, every logged event such as fever, hemodynamic instability or respiratory failure was plotted in a time scale chart and all recorded measurements were added in this chart as well. We examined the relation between lactate/ pyruvate ratio elevations and the various events that were recorded during hospitalization.

RESULTS. 16 consequtive patients, 9 male and 8 female, mean age 62.2 years, and mean APACHE II score 18.7 were included in the study. Mean SICU stay was 6.4 days and mean hospital stay was 18 days. Of the 18 patients, 12 survived to be discharged from the hospital and 6 died. Previous to all major events (fever, hamodynamic instability, shock, etc) there was a constant elevation in lacate/pyruvate ratio above 25. In all six patients that finally died, there was an elevation of lactate/pyruvate ratio above 50. Our observations support the hypothesis that microdialysis is an early indication of tissue hypoperfusion.

CONCLUSION. Our observations support the hypothesis that microdialysis is an early indication of tissue hypoperfusion. Supported by these data we have recently designed a prospective randomized trial that will evaluate the ability of microdialysis values to guide resuscitation stategy in critically ill patients.

0982

DIFFERENTIAL MICO-OXYGENATION DYSFUNCTION IN HAEMORRHAGIC AND SEPTIC SHOCK PATIENTS

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INTRODUCTION. We study the micro-oxygenation dysfunction in septic and haemorrhagic shock patients.

METHODS. 29 consecutive septic shock patients (SEPSIS) and 13 severe post-partum haemorrhagic shock women (HAEMORRHAGE) were studied at ICU admission. Tissue oxygenation and perfusion of thenar muscle were assessed using near infrared spectrometry technique (NIRS). Tissue O2 saturation was measured at baseline (StO2) and following forearm arterial occlusion. The slope of the decrease in StO2 during occlusion (S-Occ), the slope of the increase in StO2 following occlusion release (S-Release) and the deficit of post-ischemic oxygenation recruitment (Deficit) were used to characterise micro-vascular pathway function. Values obtains in a control group of 10 subjects (CONTROL) were used for comparison. The severity of post-partum haemorrhagic shock was defined by a Troponin I value above 0.08 ng/ml.

RESULTS. StO2 values were lower in both groups of patients with shock:* p< 0.05 ** p<0.01 *** p<0.0001 between CONTROL and HAEMORRHAGE ; § p<0.001 §§ p<0.0001 between CONTROL and SEPSIS; £ p < 0.01 between HAEMORRHAGE and SEPSIS.

TABLE 1.

	CONTROL mean (SD)	HAEMORRHAGE mean (SD)	SEPSIS mean (SD)	Anova p
StO2 (%)	91 (3)	77 (12) *	80 (9) §	< 0.01
S-Occ (%/s)	-0.4 (0.2)	-0.2 (0.1) **	- 0.4 (0.2) £	< 0.004
S-Release (%/s)	10 (2)	3 (2) ***	2 (1) §§	< 0.0001
Deficit (%)	2 (0)	10 (11) *	9 (10) §	< 0.08

CONCLUSION. StO2 measurements in combination to a transient arterial occlusion test demonstrate differential micro-vascular pathway adaptation accordingly to shock aetiology. In septic shock patients, the decrease in StO2 remains normal while it is impaired in haemorrhagic shock patients. This discrepancy support evidence of an oxygen delivery failure at the muscle level as it could also be inferred from the Troponin I elevation. The reperfusion is impaired in the two groups of patients with a decrease of vascular post-ischemic recruitment.

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Poster Sessions
The key is the pathogen 0983-0996

0983

THE IMPACT OF ABNORMAL BACTERIAL FLORA ON MORTALITY AND MORBIDITY IN PAEDIATRIC CARDIAC SURGERY

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INTRODUCTION. Experience in critically ill adult patients shows that abnormal bacterial carriage in the throat and/or gut and infection increases mortality [1]. Similar data in the paediatric intensive care unit (PICU) setting is limited, particularly in children following complex cardiac surgery who are at especially high infection risk.
Aims: To determine the (i) incidence of abnormal flora in the study group, (ii) aerobic Gram-negative bacilli (AGNB) involved in abnormal carriage, (iii) impact of abnormal flora on mortality and (iv) on morbidity.

METHODS. A 5-year prospective study in a tertiary 20-bed PICU, in all patients requiring 4 or more days of intensive care following cardiac surgery. The microbial carrier state of the children was monitored by surveillance cultures obtained on admission and twice weekly afterward, with diagnostic cultures obtained on clinical indication. Post-operative antibiotic treatment consisted of surgical prophylaxis, selective decontamination of the digestive tract (SDD) and additional therapeutic regimes as clinically indicated.

RESULTS. During the 5-year study period, there were 821 study patients (38% of all cardiac cases), median age 2.3 months (IQR 0.4-9.5), length of ventilation 7 days (IQR 4-13). 74% of the children received enteral SDD therapy, 90% of them demonstrated a marked decrease in bacterial growth densities or eradication of their AGNB. 80% of children had abnormal flora on admission to PICU. Klebsiella (34%), Enterobacter (19%), Escherichia (14%), Citrobacter (11%) species were the most common AGNB involved in abnormal carriage. Mortality in the study group was 9.9%, with no association between mortality and abnormal flora on PICU admission (OR 0.96, 95% CI: 0.83–1.11, P=0.3). There was a tendency towards mortality when abnormal flora developed after admission (OR 1.25, 95% CI: 0.96–1.62, P=0.08), and a positive association between mortality and development of new abnormal bacterial flora on SDD treatment (OR 2.57, 95% CI: 1.62–4.11, P<0.01). Abnormal bacterial flora on PICU admission and thereafter was associated with increased length of ventilation (P<0.01). There was correlation between bacterial overgrowth and bacterial growth densities of AGNB and length of ventilation (P<0.01). Abnormal bacterial flora was associated with infection (OR 2.31, 95% CI: 1.61–3.31, P<0.01) and infections on the PICU were associated with death (OR 4.03, 95% CI: 2.62–6.19, P<0.01).

CONCLUSION. Abnormal bacterial carriage is common in children admitted to PICU following cardiac surgery. Mortality is higher in children with abnormal bacterial flora, compared to those with normal flora. Length of ventilation and incidence of infections are higher in children with abnormal bacterial flora.

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0984

STREPTOCOCCUS PNEUMONIAE BACTERAEMIA IN ICU PATIENTS: PROGNOSIS FACTORS AND MORTALITY

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INTRODUCTION. Streptococcus pneumoniae (SP) is a leading cause of pneumonia, sepsis and meningitis among adults. Mortality associated with invasive disease remains high, and use to require intensive care unit (ICU) treatment. The objective of the present study is to estimate S. pneumoniae bacteraemia (SPB) attributable mortality, and to identify risk factors for predicting mortality.

METHODS. we retrospectively registered all consecutive episodes of SPB admitted at our ICU, between December 1999 and January 2006. The following data were collected: demographic data, underlying condition (rated according with McCabe criteria Charlson co-morbidity index), APACHE II, SOFA and SAPS II scores, complications developed during the ICU stay, SP antibiotic susceptibility and mortality.

RESULTS. 31 patients were included in this study. Mean age was 48±15 years, 32.3% had COPD, 29% were HIV+ and 35.5% had liver cirrhosis. The severity of the underlying condition was: rapidly fatal 1 (3.2%), ultimately fatal 17 (54.8%) and non-fatal 13 (41.9%), with a mean Charlson's index of 3.4±3.2. Portals of entry of SPB were pneumonia in 28 and meningitis in 3 patients and only 2 episodes were nosocomial infections. At ICU admission, 20 patients had septic shock (64.5%) and mean PO2/FiO2 ratio was 108.3±64.4. Mean SOFA, SAPS II and APACHE II scores were 10.7±4.2, 50.6±22.1 and 22.4±9.3 respectively. 90.3% patients received adequate empirical therapy at ICU admission. The frequencies of penicilin-susceptible, -intermediate and –resistant were 74.2%, 9.7% and 16.1% and 3.2% of isolates were cefotaxime resistant. Mortality rate was 54.8% and SP attributable mortality was 45.2%., being higher in HIV+ (66.7% vs 50%), cirrhosis (63.6% vs 50%), septic shock at admission (65% vs 36.4%) and SP cefotaxime-resistant isolates (80% vs 50%), although the differences were not significant. Severity index scores were also predictors of mortality: SOFA (OR=1.36; 95% CI, 1.06-1.75; p=0.01), SAPS II (OR=1.05; 95% CI, 1.00-1.10; p=0.03), APACHE II (OR=1.16; 95% CI, 1.01-1.12; p=0.01) and development of shock during ICU stay (RR=11.9; 95% CI, 2.18-65.14; p=0.002).

CONCLUSION. S. pneumoniae bacteraemia in ICU is responsible of high mortality rates, and factors that predict this mortality are those related to illness severity at admission (SOFA, SAPS II and APACHE II), and shock development during ICU stay.

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LOW PREVALENCE OF MULTI-RESISTANT BACTERIA IN SWEDISH ICUS DESPITE HIGH ANTIBIOTIC CONSUMPTION

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INTRODUCTION. ICUs are hot zones for emergence and spread of antibiotic resistance because of high antibiotic pressure, high patient flows and frequent invasive procedures. We report the experience from the first 5 yrs of a programme with the aim of monitoring antibiotic consumption and resistance and provide regular feedback to participating ICUs.

METHODS. Fourteen general ICUs (university hospitals n=5, district general hospitals n=5, local hospitals n=4) participated. The quantity of antibiotics delivered to each ICU was calculated as defined daily dosages per 1000 occupied bed days (DDD_{1000}). Patient specimens for culture were taken on clinical indications and only initial isolates were considered. Species related breakpoints according to the Swedish Reference Group for Antibiotics were used.

RESULTS. Mean (SD) antibiotic use per ICU and year was 1350 (437) DDD_{1000}. Resistance rates are shown in table.

TABLE 1.

	1999	2000	2001	2002	2003
S. aureus					
Oxacillin*	0.4%	0.0%	0.9%	0.4%	1.8%
E. coli					
Cefotax/Ceftazid	1.7% / 1.2%	0.6% / 0.0%	1.2% / 1.1%	4.0%/6.6%**	0.5% / 1.1%
Cipro/Netil	1.2% / 0.0%	2.7% / 0.0%	2.7% / 0.0%	12%/4.2%**	3.9% / 0.9%
Klebsiella					
Cefotax/Ceftazid	1.3% / 0.0	0.0% / 1.6%	1.5% / 0.0%	3.7% / 5.3%	1.5% / 0.0%
Cipro/Netil	2.4% / 0.0%	2.0% / 1.1%	3.0% / 1.3%	2.6% / 0.0%	1.5% / 0.0%

** MRSA, ** Outbreak in a single ICU*

CONCLUSION. Antibiotic resistance was low, although consumption was high. The low resistance rates may be secondary to low antibiotic pressure in the community with low introduction of resistant bacteria to ICUs, and successful infection control within ICUs.

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0986

PREDICTORS OF INFECTION BY PANDRUG-RESISTANT PSEUDOMONAS AERUGINOSA

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INTRODUCTION. In-between September 9 and October 3, 2005, 5 cases of pandrug resistant (PDR = absence of specific antibiotic susceptibility) Pseudomonas aeruginosa infection were identified. Thus, we conducted a case control comparison of patient characteristics, in order to identify relevant independent predictors.

METHODS. Each case-patient was matched to four contemporary controls according to duration of hospitalization, prior hospital admissions, intensive care unit (ICU) admission cause, and Acute Physiology and Chronic Health Evaluation (APACHE) II and Sequential Organ Function Assessment (SOFA scores) on ICU admission day. Recorded variables included age, gender, daily APACHE II and SOFA scores, patient medication, positive cultures and corresponding antibiograms, occurrence of infection, sepsis, and septic shock, other ICU associated morbidity, length of ICU stay and mechanical ventilation, and patient outcome. Molecular testing was performed by repetitive extragenic palindromic sequence based polymerase chain reaction and pulsed field gel electrophoresis. Surveillance cultures, and two hand washing surveys were performed within six months post-outbreak.

RESULTS. Relative to control, the PDR P. aeruginosa group had longer ICU stay, duration of mechanical ventilation, and carbapenem and colistin exposure (all $P < 0.05$). The PDR bacterial infection was treated with carbapenem amikacin combination. All PDR P. aeruginosa isolates belonged to the same genotype and were blaVIM-1 gene positive. The outbreak resolved following case patient isolation. Factor (s) causing disease transmission were not identified. Surveillance cultures performed within six months post-outbreak were negative for PDR P. aeruginosa. The second hand washing survey revealed 69-110% improvements in hand washing practices. Factors associated with PDR P. aeruginosa infection were mechanical ventilation > 20 days, carbapenem-use > 20 days, and combined carbapenem and colistin use for > 20 and 13 days; the latter factor was the sole independent predictor for PDR P. aeruginosa infection by multiple logistic regression (odds ratio: 76.0; 95% confidence interval: 3.7-1487.6; $P = 0.004$).

CONCLUSION. The prolonged combined use of carbapenems and colistin strongly predisposes to infection by PDR P. aeruginosa. The empirical addition of colistin to carbapenems should be avoided.

0987

HUMAN METAPNEUMOVIRUS (HMPV) IN THE ICU: AN OVERLOOKED RESPIRATORY PATHOGEN?

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INTRODUCTION. Several, previously unrecognized respiratory viral pathogens have recently been identified. Since its discovery in 2001 hMPV has now been detected worldwide, frequently causing respiratory tract infections, primarily in very young, elderly and immunocompromised individuals. So far no reports on hMPV in ICU patients have been published.

METHODS. Recently two autologous peripheral blood stem cell transplant (APBSCT) recipients were admitted to our ICU for treatment of severe respiratory insufficiency.

RESULTS. Patient A: A 51 year old male with multiple myeloma stage IIA received an APBSCT, complicated by neutropenic fever with bilateral pneumonia. Bronchoalveolar lavage (BAL) showed no bacteria, yeasts, fungi, herpes simplex virus (HSV) or cytomegalovirus (CMV). 11 days after transplantation he was admitted to the ICU because of severe respiratory and renal insufficiency for which he was intubated and ventilated, and continuous veno-venous hemofiltration was started. 16 days after the initial BAL the polymerase chain reaction (PCR) showed positivity for hMPV. Since the patient's pulmonary condition was already improving at the time the PCR for hMPV became known, we decided against treatment with aerosolized ribavirin as the literature did not show evidence for treatment at this stage of infection. After 44 days the patient was discharged from the ICU.
Patient B: Four days after the admittance of the first patient, his 64 year old male roommate, with diagnosed stage IV mantle cell lymphoma was admitted to the ICU for respiratory insufficiency. He also had undergone an APBSCT, complicated by neutropenic fever with bilateral pneumonia. A BAL was performed, which showed no bacteria, yeasts, fungi, HSV or CMV. 11 days after the transplantation the patient was admitted to the ICU with respiratory insufficiency. 3 days later he was intubated because of progressive respiratory insufficiency. 24 hours after intubation the patient died due to persisting respiratory failure. Post mortem PCR of the BAL showed hMPV.

CONCLUSION. Until recently BAL samples from patients in the ICU were not routinely checked for hMPV. In a recent series of respiratory insufficient patients with underlying haematological malignancies, several tested positive for hMPV in the BAL whereas no other pathogens were isolated. It could be that hMPV is a more common cause of respiratory disease in immunocompromised patients with underlying haematological disease than previously recognised, in whom it can give rise to serious morbidity and mortality.

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BACTERIAL COLONIZATION OF ENDOTERACHEAL TUBES AND THEIR ANTIBIOTIC RESISTANCE PATTERN

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INTRODUCTION. Bacterial colonization is a risk factor for consequence infections. It can be a causative factor for ventilation associated pneumonia especially in intensive care units.

METHODS. A descriptive study was performed. 320 Specimens were collected from intubated patients sampling method was endoteracheal aspiration (ETA). All samples were transported to laboratory after routine bacterial culture, isolated were assessed for susceptibility based on disk diffusion (Bauer&Kirby) method.

RESULTS. 311 (97%) of cultures were positive. There were:coagulase positive staphylococci (181,40%), Klebsiella (90,20%), Acenitobacter (43,9.5%), Pseudomonas (42,9.3%). Resistance to 3rd gen-cephalosporins Klebsiella >60%, Acenitobacter 90%, Pseudomonas 50%. Resistance to aminoglycosides Klebsiella 40%, Acenitobacter 80%.

CONCLUSION. further efforts have to do to diagnose true pneumonitis from colonization and avoid unnecessary antibiotic therapy.

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0989

SEVERE RESPIRATORY INFECTIONS IN COPD PATIENTS (PRELIMINARY RESULTS OF EU-VAP/CAP STUDY)

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INTRODUCTION. The aim of this study was to determine the impact of severe respiratory infections and underlying diseases on outcome of mechanically ventilated (MV) patients with chronic obstructive pulmonary disease (COPD).

METHODS. An observational, prospective, international, multi-center study was conducted in European ICUs. During the first 3 months of the study 309 consecutive patients that required invasive mechanical ventilation for >48 hours were included in the database; 55 of them have underlying COPD. Statistic analysis was performed using SPSS11.0. Continuous variables were compared using student's t test, while categorical variables were compared with chi-square. Variables with p<0.1 were introduced in the multivariate analysis.

RESULTS. Of the 55 mechanically ventilated patient with COPD 18 were admitted with or developed lower respiratory infection (CAP:9, HAP:4, VAP:5). The COPD patients with lower respiratory infection had more days on MV (14.2 ± 11.8 vs 8.0±8.5, p=0.03) and longer ICU stay (16.0±12.9 vs 9.4±8.6, p=0.03) compared to COPD patients without infection. Univariate analysis showed that septic shock (p=0.002), lower respiratory infection (p=0.07), and diabetes (p=0.05) were related with increased mortality, while fluoroquinolones' use acted as a protective factor (p=0.09). Multivariate analysis identified only diabetes as a factor that increases mortality (p=0.03)

CONCLUSION. Severe respiratory infections are associated with longer duration of MV and ICU stay in COPD patients. The results of our study also showed that the presence of diabetes in COPD patients was related with an increase in mortality.

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0990

BACTERIOLOGY OF COMMUNITY-ACQUIRED ASPIRATION PNEUMONIA

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INTRODUCTION. Aspiration pneumonia is a significant complication of conditions such as cardiac arrest, poisoning, and neurologic disorders. Bacteriology and recommended treatment are often inconsistent. The study was designed to identify pathogens responsible for community-acquired aspiration pneumonia in non-hospitalized, intubated and mechanically ventilated patients.

METHODS. Adult immuno-competent patients with observed or proven aspiration, requiring intubation/mechanical ventilation following conditions such as cardiac arrest, poisoning, and neurological disorders were eligible. Exclusion criteria were pre-treatment with antibiotics, recent hospitalization (<5 days) or permanent nursing home residence, progressive cancer, and recurrent/chronic pulmonary infection. Tracheal aspirate was sent for microbiological testing immediately after admittance with special emphasis on anaerobic bacteria. The regional ethics committee approved the protocol.

RESULTS. 45 patients (19 women, 26 men) aged years 20-85 were included; 14 patients deceased during their ICU stay. The most frequent conditions leading to intubation/mechanical ventilation were myocardial infarction (15), poisonings (14), and coma of unknown cause (7). All patients showed clinical signs of infection within 24 hours after admittance (fever, CRP, PCT). 35 gram-pos. and 24 gram-neg. bacteria were identified with usually >1 isolated pathogen per patient. In 15 cases normal oropharyngeal microflora was reported in addition to the identified bacteria or alone, and in one case no bacteria were found. In 4 (5%) cases obligate anaerobic bacteria (Bacteroides, Prevotella) were identified. The most frequently (in >2 patients) isolated bacteria were: S. aureus (17), H. influenzae (6), S. pneumoniae (5), Coag.-neg. staphylococci (4), K. pneumoniae (3), and M. catharralis (3). 45% of the identified bacteria were resistant to antibiotics, in most cases to penicillin G, ampicillin (/sulbactam), erythromycin, clarithromycin.

CONCLUSION. S. aureus was the most frequently reported pathogen in our patients, and in 5% of our patients anaerobic bacteria were isolated. These findings and the resistance to antibiotics found should be considered making an initial choice of antibiotics in patients with community-acquired aspiration pneumonia.

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NOSOCOMIAL AGENTS SURVEY FOR VENTILATOR ASSOCIATED PNEUMONIA – A FOUR YEAR STUDY

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INTRODUCTION. Ventilation associated pneumonia (VAP) and the emergency of resistant agents is a ICU concern. The antibiotic pressure is one of the identifiable factors for the spread of resistant microorganisms and change in the ICU flora. This study aimed the evaluation of VAP microorganisms during 4 years follow-up.

METHODS. Prospective study of all patients admitted in the ICU for more than 48 hours receiving mechanical ventilation, between 2002 and 2004. The VAP diagnosis was made by new radiographic infiltrate for at least 48 h and at least two of the following criteria: fever >38.5 or <35.0°C; leukocytes >10,000 or <3,500/μL, purulent sputum, or isolation of pathogenic bacteria from lower respiratory tract. The microbiological samples were collected by proximal or distal bronchial aspirated.

RESULTS. Results are summarised in table 1 and 2

TABLE 1.

	2002	2003	2004	2005
Population (n)	202	234	236	256
SAPS II (mean)	49.1	50.4	51.0	51.9
VAP/1000 vent days	31.5	29.1	22.6	20.6
Documented agents	63.2	76.6	63.6	77.3

TABLE 2.

	2002	2003	2004	2005
Gram + (%)	35.5	23.6	20.0	36.9
Gram - (%)	48.3	73.8	68.0	63.1
Sta aureos (%)	35.5	23.6	16.0	15.8
MRSA (% total SA)	54.7	55.5	25.0	33.5
Pseudomonas (%)	29.0	31.6	16.0	21.4
Acinetobater (%)	0	26.3	24.0	10.5

CONCLUSION. The relative percentage of gram positive/gram negative agents had significant variance during the four years studied. The incidence of Sta. aureus and the relative percentage of MRSA decreased. The Acinetobater spp incidence reflected the occasional outbreak in ICU. The incidence of Pseudomas spp infection had some variation.

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BOTH EARLY AND LATE-ONSET VENTILATORY ASSOCIATED PNEUMONIA ARE MAINLY DUE TO GRAM NEGATIVE BACILLI

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INTRODUCTION. Early-onset ventilator-associated pneumonia (VAP) are usually due to antibiotics sensitive pathogens. However, one study (1) reported a large prevalence of multiresistant pathogens both in early and late-onset pneumonia. We therefore compared the clinical outcomes and the causative pathogens of early-onset and late-onset VAP diagnosed by bronchoalveolar lavage (BAL) in our ICU.

METHODS. Prospective, observational, epidemiological study.
During a 7-years period, all first episodes of VAP were prospectively included. Diagnosis was confirmed by a BAL with a threshold of 10 4 cfu/ml. Late-onset pneumonia was defined if occurred after the seventh day after mechanical ventilation. After checking normality of the distribution, results were analysed with t-test, Mann-Whitney test, Chi-2 test or exact Fisher's test for continuous or qualitative variables respectively.

RESULTS. Demographics characteristics were similar in both groups of patients. 113 VAP were studied. 55 were early-onsets and 58 late-onsets. 37% of early-onset VAP and 70% of late-onset VAP were due to potential multiresistants pathogens. Pseudomonas aeruginosa was the most commonly isolated bacteria both in early-onset and late-onset VAP (23% and 38% respectively). Morbidity and mortality were not statically different between the two groups (early-onset and late-onset VAP).

CONCLUSION. In our study, both early-onset and late-onset VAP were mainly caused by mulitresistants bacteria, most commonly gram negative bacilli. Clinicians should be aware about a previously hospitalization more than 15 days or a previously antibiotic treatment for extrapulmonary infection to avoid the administration of inadequate initial antimicrobial treatment

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0993

PROGRAM TO HANDLING VENTILATOR-ASSOCIATED PNEUMONIA IN AN OPEN STAFF HOSPITAL

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INTRODUCTION. Ventilatilator-associated pneumonia(VAP) is associated with high mortality taxes. This paper describes a multidisciplinary approach to the VAP with interventions in the diagnosis and treatment process in a nonacademic open clinical hospital.

METHODS. This study was conducted in an 32- bed ICU. In a period of 5 months it was implemented a qualification project involving diagnosis and treatment of VAP. One intensivist MD and a nurse were selected, along a physiotherapist and a nurse infectologist, to be in charge of a daily round with all patients requiring MV. The goal was the identification of VAP patients, with antibiotic use orientation and subsequent follow up. A radiologist evaluated the chest x-ray observing new or progressive pulmonary infiltration. Two of the following signs were evaluated by the staff: leucopeny, leukocytosis, fever, hypothermy and changes in pulmonary secretion. Subsequently, the staff suggested the collection of cultures and the initial use of empiric antibiotics according to the direct exam of the traqueal smear (piperacilina-tazobactam associated, or not, to vancomicin if necessary). These patients were followed up according to the response to the chosen scheme, which was adjusted, after the cultural results, aiming the de-escalation and the time reduction of antibiotic use.

RESULTS. 1455 patients/day in MV were evaluated and 23 patients were initially treated for VAP; from those, 6 were diagnosed with another infection. The 17 remaining patients had an average age of 69.8 ± 15.8 years, APACHE II 19.5± 6.31 and time of MV before VAP 7.63± 5.6 days. 82% were in use of antibiotics previously. The initial average CPIS 7.29± 1.72 and the 3rd day 6.33± 2.47. In 13 (76%) patients it was started early empiric antibiotics guided by the direct exam of the traqueal smear according to the protocol. This choice was appropriate in 7 (54%) cases; in 2 (15%) the antibiotics was inappropriate; and in 4 (31%) the culture was negative. The most prevalent agent was pseudomonas aeruginosa in 6 cases (46%). Acinetobacter sp. in 2 (15%), gram positives in 2 (15%) and others gram negative agents in 3 (24%). It was possible an estrategic change in the antibiotics in 7 patients (41%); de-escalation was feasible in 5 of those (29%).

CONCLUSION. The multidisciplinary evaluation of patients in MV may be a way of helpping the adoption of the best evidences related to the use of antibiotics in VAP, providing its early and guided use and de-escalation when possible.

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HOSPITAL ACQUIRED PNEUMONIA – PSEUDOMONAS VERSUS OTHER GRAM-NEGATIVE ORGANISMS

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INTRODUCTION. Pseudomonal pneumonia has been associated with an increase in mortality in critical care patients1. Previous assessments, however, have failed to compare outcome solely with other hospital-acquired Gram-negative organisms.

METHODS. We have performed a retrospective casenote review of patients with pure respiratory cultures of Pseudomonas species and other hospital-acquired Gram-negative organisms. From 1998 to 2005 110 patients had a pure culture of Pseudomonas sp and 57 had other Gram-negative organisms. Case note review involved assessments of illness severity, clinical pulmonary infection scoring (CPIS), critical care and hospital survival and critical care stay. We have currently reviewed 103 casenotes, preliminary results are presented here.

RESULTS. Of the 103 casenotes reviewed there were 77 treated pneumonias. One patient had both pseudomonal and another Gram-negative pneumonia during the same admission and one patient, with bronchiectasis, presented with a pseudomonal infection from the community. These two patients were excluded from further analysis. 48 patients were infected with Pseudomonas sp and 27 had other Gram-negative infections. The 2 groups of patients were well matched, with similar age, sex, CPIS scores, incidence of bacteraemia and APACHE II scores at diagnosis. There were no outcome differences between the groups with respect to hospital and critical care survival and critical care length of stay (Table 1).

TABLE 1.
Clinical outcome related to infecting organism

	ICU Survival (%)	Hosp. Survival (%)	ICU Stay in days (sd)
Pseudomonas sp n=48	35 (73)*	31(65)**	35.6 (25.4)***
Other Gram neg sp n=27	19(70)*	18(67)**	37.4 (21.2)***
	*p=0.75 MWU test	**p= 0.56 MWU test	***p=0.6 MWU test

CONCLUSION. In this retrospective series there appears to be no survival disadvantage associated with pseudomonal pneumonia when compared to other hospital-acquired Gram negative infections.

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0995

PNEUMOCYSTIS PNEUMONIA IN NON-HIV PATIENTS ADMITTED TO INTENSIVE CARE UNIT: EPIDEMIOLOGY AND OUTCOME

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INTRODUCTION. The incidence of Pneumocystis pneumonia (PCP) is increasing in non-HIV patients but the epidemiology and prognosis of these patients when admitted to the ICU remains poorly described.

METHODS. We retrospectively examined the epidemiological features and outcome of non-HIV patients as compared to HIV patients admitted to our ICU for severe PCP from January 1993 to march 2006.

RESULTS. We identified 47 HIV patients and 23 non-HIV patients with microbiologically-confirmed PCP. The proportion of non-HIV patients significantly increased after year 2000 (4 (13%) cases among 31 patients from 1993 to 1999, 19 (49%) patients among 39 patients from 2000 to 2006.
The underlying disease in non-HIV patients was inflammatory disorder (n=8), organ tranplant (n=7), solid cancer (n=4) and haematologic malignancy (n=4). Twenty non-HIV patients received steroid treatment prior to PCP, at a dose ≤15mg equivalent prednisone for 10 of them. None of the patients were receiving PCP prophylaxis at the time of infection. Tracheal intubation was required in 57% of non-HIV patients and 34% of HIV patients ($p<0.05$).
In-ICU mortality was higher in non-HIV than in HIV patients (44% vs 17% respectively, $p<0.05$). This difference between non-HIV and HIV patients remained in case of tracheal intubation (77% vs 50% respectively, $p<0.05$). By multivariate analysis, factors associated with increased in-ICU mortality were the HIV positive status (odds ratio [OR]=0.25), the SAPS II score (OR=1.06) and the need for ventilatory support (OR=17.04).

CONCLUSION. The outcome of PCP requiring ICU-admission is worse in non-HIV than in HIV patients. The occurrence of severe PCP in non-HIV patients with low dose corticotherapy raises the issue of PCP prophylaxis in this population.

0996

PRO-INFLAMMATORY CYTOKINES FAILS TO PREDICT PROGNOSIS IN VENTILATOR-ASSOCIATED PNEUMONIA

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INTRODUCTION. Inflammatory cytokines have a key role in the pathogenesis of acute lung injury (ALI). However, their role as biomarkers in ventilator-associated pneumonia (VAP) is unclear. This study evaluates the ability of IL-8 and IL-6 in the alveolar and plasma compartment to predict mortality in patients with VAP.

METHODS. Over a 14-month period, patients with VAP (ATS diagnostic criteria) were included. Plasma and bronchoalveolar lavage (BAL) were collected for microbiological analysis, IL-8 and IL-6 measurements. Continuous variables [median (interquartile range)] were compared by Mann-Whitney test.

RESULTS. 33 patients were evaluated (73[51-81]years), APACHE II was 17 (14-21), SOFA was 7 (5-10) and CPIS was 9 (7-9). 20 (67%) had ALI and global mortality rate was 39%. IL-8 levels were higher in BAL compared to plasma and cytokine levels in plasma and BAL were similar in survivors and non-survivors. Patients with IL-8 levels >350pg/ml in BAL had a trend towards higher mortality (67% vs 41%, $p=0.07$). IL-6 and IL-8 levels had no correlation with PaO2/FiO2 or SOFA score.

TABLE 1.
Cytokine levels (pg/ml) in patients with VAP (n=33)

	BAL	Plasma	P-value
IL-6	68(17-184)	84(26-241)	0.26
IL-8	270 (200-420)	17(12-52)	<0.0001

TABLE 2.
Cytokine levels (pg/ml) in survivors and non-survivors with VAP (n=33)

	Survivors (n=20)	Non-Survivors (n=13)	P-value
IL-6 plasma	157(39-359)	53 (24-272)	0.46
IL-6 BAL	70(22-180)	51 (10-224)	0.91
IL-8 plasma	16(8-37)	21 (13-69)	0.28
IL-8 BAL	263 (200-347)	383 (202-677)	0.12

CONCLUSION. Despite its role in pulmonary inflammation, IL-6 and IL-8 lack the capacity to discriminate survivors and non-survivors of VAP and are not associated with disease severity.

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PLASMA LEVELS OF NON-LIPOPHILIC BETA-BLOCKERS ARE PREDICTIVE FOR MORBIDITY IN BETA-BLOCKER POISONING

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INTRODUCTION. In clinical poisoning plasma levels may be useful for decision making and therapeutic options. We hypothesised that plasma levels of beta-blockers may be predictive for outcome in poisoning.

METHODS. Over 5 years (2001 till 2005) we examined retrospectively all patients with beta-blocker toxicity admitted to the ICU in an tertiary university hospital. Patients who co-ingested other cardiotropic medication like calciumchannelblockers, tricyclic anti-depressive agents or anti-arrhythmic drugs, were excluded. Plasma levels were determined using HPLC (REMEDI, Bio RAD). Primary and secondary outcome parameters like mortality, shock, cardiac arrest, need for mechanical ventilation, need for catecholamines and aspiration pneumonia. Statiscal analysis was performed with SPSS 12.0.1 for Windows using Mann-Whitney U test (nonparametric, 2 independent samples, significant $p< 0.05$).

RESULTS. We evaluated 98 patients. Data of 86 patients were available for analysis. Of all beta-blockers, propranolol (41), atenolol (18) and acebutolol (9) were most frequently used. Atenolol levels were significantly ($p< 0.05$) related with shock, cardiac arrest, need for mechanical ventilation, need for catecholamines and aspiration pneumonia, but not with mortality. Plasma levels of propranolol and acebutolol did not correlate with primary and secondary outcome parameters.

CONCLUSION. In clinical poisoning, plasma levels of atenolol may be predictive for outcome parameters. We hypothesised that plasma levels of non-lipophilic betablockers like atenolol, sotalol, esmolol and celiprolol may be helpful in clinical poisoning. Further prospective studies are needed to confirm these retrospective data.

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0998

POTENTIALLY LETHAL METHEMOGLOBINEMIA AFTER ANILINE INTOXICATION: A CASE REPORT

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INTRODUCTION. Substantial aniline intoxication leads to methemoglobinemia and usually lethal generalized hypoxic organ failure.

METHODS. University hospital medical intensive care unit; Case report

RESULTS. A 42-year old man was brought to the emergency department of a city hospital with cyanosis and in an agitated state after an attempted suicide with 20-100 mL 99% aniline solution. After counseling with a Poison Center, and failed treatment of severe methemoglobinemia (65%) with 3 mg/kg body wt. methylene blue in two doses and 600 mg toluidine blue intravenously, the patient was transferred to our unit. On arrival, the patient was sedated and fully controlled ventilated with 100% O2. Initial blood tests after arrival showed 60.5% methemoglobin. Repeated toluidine blue treatment, and an immediate 4-hour hemodialysis did not substantially impact on methemoglobin levels. With a suspected glucose-6-phosphate dehydrogenase deficiency, exchange transfusion (3 Liters) was performed. During the procedure, skin color almost normalized and methemoglobin fell to 19.8%. Within the following 22 hours, methemoglobin decreased to 3.7% without further intervention. To prevent liver damage from acetaminophen being a significant metabolite of aniline, the patient was started on intravenous acetylcysteine and silibinin immediately after arrival (acetaminophen levels were 32.9 mg/L then). With a latency of 18-24 hrs after intoxication, the patient destabilized and developed acute respiratory failure, rhabdomyolysis and acute renal failure, and he was started on continuous veno-venous hemofiltration and ciprofloxacin/tazobactam-piperacillin. Within 5 days, the patient was weaned off to non-invasive, assisted ventilation using a mask. Finally, 15 days after the intoxication, the patient was fully oriented and cooperative. Despite persisting anuria, the general condition of the patient improved during the following days, and he was transferred back to the referring hospital 21 days after intoxication. Hemodialysis was discontinued 34 days, and the patient was discharged 45 days after the attempted suicide.

CONCLUSION. Here we report a case of a survived attempted suicide with a potentially lethal aniline dose, which was successfully treated with exchange transfusion. Following acute improvement, the patient developed generalized hypoxic organ failure.

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CONTINUOUS ELECTROENCEPHALOGRAM AND BIESPECTRAL INDEX UTILITY IN BARBITURATE COMA MONITORING

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INTRODUCTION. Establish a comparison, in the barbiturate coma, between, on one hand, Biespectral index (BIS) and continuous electroencephalogram (EEGc) and, in the other hand, conventional EEG (EEG-conv), taken as "gold-standard".

METHODS. In four patients 172 simultaneously measurements were made of: Burst Suppression Ratio (BSR) from EEGc (EEG INFINITY POD-SIEMENS), BIS value and suppression ratio (SR) from BIS (BIS XP-ASPECT). With an interval of 24 hours EEG-conv was also made, establishing four suppression levels: Level 0 (0-25% suppression), Level 1 (26-50%), Level 2 (51-75%), Level 3 (76-100%). Statistical analysis was made calculating means with a 95% confidence interval for the measurements of BSR, BIS and SR in level 1 and 3 of the EEG-conv.

RESULTS. 105 measurements of BSR, BIS and SR on level 3 of the EEG-conv were made and 40 measures of the same parameters on level 1. We excluded 27 (15.7%) measures, 10 because of technical problems (poor BIS signal's transmission and disadjustment of the EEGc electrodes) and 17 because of EEG low voltage on EEGc tracing.
- Level 3 de EEG-conv: Mean BSR 95% CI : 86.68 (82.87 – 90.49); Mean SR95% CI: 52.02 (45.76 – 58. 3); Mean BIS 95% CI: 24.16 (20.42 – 27.9).
- Level 1 de EEG-conv: Mean BSR 95% CI: 68.85 (55.11 – 82.59); Mean TS 95% CI: 18.63 (14.59 – 22.66); Mean BIS 95% CI: 44.53 (40.13 – 48.9).

CONCLUSION. 1) Is necessary to check BIS signal transmission, electrodes adjustment on EEG-conv and other monitoring problems for a correct interpretation. 2) BIS can be useful to discriminate different levels of suppression on EEG-conv. Although SR also discriminates between the two studied levels, is not clear the breakpoint because it does not match with the percentage of suppression on the EEG-conv. 3) The BSR seems to indentify Level 3, but does not discriminates between the two Levels evaluated.

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RELATIONSHIP BETWEEN SLEEP STAGES AND RAMSEY SCORE IN MECHANICALLY VENTILATED PATIENTS

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INTRODUCTION. Mechanically ventilated patients do not sleep well in intensive care unit (ICU) even when they look sedated appropriately. It leads to nightmare or insomnolence after discharge from ICU. Sedatives and/or analgesics should be administered adequately, however, it is difficult to assess sleeping stages of the patients. We investigated if mechanically ventilated patients slept well in our ICU. In addition, we compared the sleep stages with Ramsey score.

METHODS. Five adult patients were enrolled in the study. They were mechanically ventilated for longer than 24 h. Midazolam (0.1∼0.3mg/kg/h) or dexmedetomidine (0.4∼0.7 microgram/kg/h) was administered to sedate them. Sleep stages were measured by polysomnography (PSG) (SANDMAN®, Tyco healthcare, USA). PSG was monitored for 24 h, and sleep stages (wake, non-rapid eye movement (non-REM) sleep stage I∼IV, REM) were analyzed later. Ramsey score was checked and recorded every 2 h by nurses. Relationship between sleep stages and Ramsey score was analyzed by Spearman's rank correlation.

RESULTS. Proportion of each stage was as follows; wake 3.6±2.8%, stage 33.1±23.1%, stage II: 58.8±19.8%, stage III: 4.3±9.3%, stage IV: 0%, REM 0.1±0.2%. Sleep stages and Ramsey score were related significantly ($r=0.38$, $p=0.02$).

CONCLUSION. Sleep stages in substantial part of time were stage II and stage III in mechanically ventilated patients, and they did not sleep well. Sleep stages was able to be evaluated by Ramsey score at bedside.

Grant acknowledgement. departmental fund

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PROGNOSTIC FACTORS OF MORTALITY AND NEUROLOGICAL OUTCOME IN TRAUMATIC BRAIN INJURY

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INTRODUCTION. Several studies have examined factors associated with mortality and neurological outcome in patients with traumatic brain injury (TBI), but some of them are still under discussion. The aims of this study were to value morbidity and mortality at ICU discharge and to analyse prognostic factors of mortality and neurological outcome in our brain-injured patients.

METHODS. Observational prospective analysis of all patients with moderate and severe traumatic brain injury admitted in our ICU (1999-2005). Results are expressed as mean (SD) or percentage, using a $p < 0.05$ as significance level. We have applied SPSS win with Chi-square and logistic regression tests, calculating odds ratio with their confidence interval for the significant variables.

RESULTS. Patients n=191 (76% M), age 41.9 (22.4) yrs. Worst Glasgow Coma Score (GCS) in the first 6 hours of evolution was 6.6 (3). 35% of the patients required acute neurosurgical treatment. Mortality rate was 28%. We find a poor neurological outcome at ICU discharge (defined as 1-3 points in Glasgow Outcome Scale) in 70% of the patients.
Independent factors associated with mortality at ICU in multivariate analysis were: worst CT scan (by Marshall)(OR 13.01 (2.55-66.44), p=0.002), hypotension in ICU (defined as SBP<90mmHg) (OR 8.6 (2.5-29.5), p=0.001), acute renal failure (creat> 1.8mg/dl) (OR 19.1 (3-121.4), p=0.002), hypernatremia (Na> 150mEq/l) (OR 7.3 (1.9-28.6), p=0.004) and coagulation disorders (Quick's T<50%) (OR 4.6(1.2-17.7), p=0.025)
Independent predictors of neurological outcome at ICU discharge were: worst GCS (75.4 (9.1-624.3), p <0.001), barbiturate coma (OR 5.4 (1.2-25), p=0.003), hypotension in ICU (OR 2.6 (1.1-6.5), p=0.034), hypernatremia (OR 6.5 (1.4-29.6), p=0.002) and coagulation disorders (OR 5.9 (1.8-19.5), p=0.003).

CONCLUSION. 1) In our large series, brain-injured patients had a relevant mortality and a poor neurological outcome at ICU discharge.
2) These findings suggest that, in the acute stage of TBI, systemic disorders could be related to secondary brain damage which is associated with a significantly worse outcome.
3) A knowledge of these prognostic factors and the correct management of them may help to improve outcome and to reduce morbidity and mortality.

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HIP FRACTURE IN ICU-AMBULANCE: PAIN RELIEF WITH REMIFENTANIL, 3TO1 BLOCKADE & MORPHINE

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INTRODUCTION. Hip fracture is a common pathology in old patients, especially in out-hospital emergencies. We compared three strategies for pain relief: remifentanil in continour perfusion, iv morphine and "3 to 1 blockade", evaluating haemodinamic changes, adverse effects and comfort of the patient.

METHODS. It is a prospective, randizomed study, envolving 16 patients, followed during 5 months in the ICU ambulance of our Community.
Patients received:
A group: 3 to 1 blockade with bupivacaine (0.25%)
B group: iv morphine (0.1 mg/kg)
C group: remifentanil (0.1mcgr/kg/min: inital dose)
Heart rate, respiratory rate, median BP and ETCO2 were measured at 1.10 and 20 minutes.

RESULTS. Mean age was 68 years: 42% were women and 68% were men. Results are presented in Table 1. No serious side effects were noted.

TABLE 1.

	VAS (PAIN SCALE)	Median BP	HEART RATE	RESP. RATE	SAT O2 (%)	ANXIETY SCALE: 1-4
PREVIOUS	8.1	92.1	92.7	18.2	93.8	3.1
GROUP A 3TO1 BLOCKADE	3.6 (66%)		77 (17%)	15.8 (17%)		1.5
GROUP B REMIFENTANIL	3.1 (61.8%)		54 (41.7%)	10.1 (44.6%)		1.3
GROUP C MORPHINE	5.3 (34.6%)		68 (26.6%)	12 (34.1%)		1.7

CONCLUSION. Remifentanil can be helpful in controlling pain caused by hip fractures in out-hospital patients, compared with intravenous morphine and 3 to 1 blockade, with less side effects and controlling anxiety.

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NEED OF INVASIVE MONITORING IN TRAUMA BRAIN INJURY: CAN THE PATIENT BE MANAGED IN A GENERAL ICU?

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INTRODUCTION. The trial concerns traumatic brain injury (TBI) patients. It will investigate if the clinical and radiological data are predicting the need of invasive neurological monitoring or neurosurgical treatment. This could be useful in order to discuss the requirement of transferring this kind of patients from general intensive care units (ICUs) to ICUs specialised in neuropathology.

METHODS. We analyzed all the patients admitted in an ICU of reference during 2005, with the principal or coexisting diagnosis of traumatic brain injury. The data of clinical and radiological value, apart from sex and age, were: starting point (admitted in the emergency room of the centre or transferred from other hospitals), GCS score sending the patient to the ICU (evaluated on the centre, or by physicians of others hospitals, or physicians in emergency transport), classification of the first CT (computed tomography) referring to The Traumatic Coma Data Bank (TCDB), presence or not of subarachnoid haemorrhage (SH), Injury Severity Score (ISS), APACHE II and APACHE III. As neurosurgical techniques were recorded intracranial pressure monitoring (ICP), neurosurgical treatment, and when they were performed.

RESULTS. 113 cases were analyzed. Medium GCS was 8.5. 13% of the patients had a grade I CT, 55.8 grade II, 8% grade III, 5.3% grade IV, 14% grade VI. 12 cases needed ICP monitoring: none with a grade I CT, 3 with a grade II CT. 26 cases needed surgery, none with a grade I CT, 6 with a grade II CT. There were 63 cases with a grade II on CT. 34 of them had a GCS < 9. None of the patients with GCS >9 needed invasive monitoring nor neurosurgery. The patients who needed monitoring or neurosurgery were not different in the ISS, APACHE II or presence of SH from the patients wich did not need.

CONCLUSION. Patients with a GCS > 12 and with a CT grade I or II on TCDB classification do not need to be transferred to a reference centre in neuropathology ICU. These patients can be managed in a general ICU, always there is a rapid access to a neurosurgery centre.

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EXPERIENCE IN USING ROCURONIUM FOR OROTRACHEAL INTUBATION IN THE MOBILE ADVANCED LIFE SUPPORT UNIT

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INTRODUCTION. The use of neuromuscular blocker (NMB) for rapid sequence orotracheal intubation (OTI) in critically ill patients is usual in the hospitalary environment, however, in the out-of-hospital circles, it turns out to be controversial. Our aims is to evaluate the safety, efficacy and conditions of the non-depolarizing NMB rocuronium (R) for OTI in the extrahospitalary environment, as well as the possibility of haemodynamic alterations and the need for using other NMB.

METHODS. A prospective and descriptive study was carried out from March 2005 to March 2006, according to the OIT protocol with R (dose:0.6mg/kg) in the out-of-hospital environment in the mobile Advanced Life Support Units (ALSU). The following parameters were evaluated before and at minute 1, 5 and 10 after OTI : age, sex, OTI indication, OTI conditions according to Cormack-Lehane (C-L) classification and Krieg (K) scale, haemodynamic parameters : Mean Arterial Pressure (MAP), Heart Rate (HR), and arterial oxygen saturation (SatO2). The need for other type of NMB and the possible complications were also analysed. Cardiac arrest, neck injury and patients <15 years old were excluded.

RESULTS. 23 patients (16 males, 7 females) were included. Mean age was 51±20 years old, OTI indications were: neurological (GCS< 9) in 18 patients, cardiological in 3 patients and respiratory in 2 patient. The conditions for OTI, according to K scale were : grade I (good jaw relaxation , vocal cords open, no coughing) in 19 patients, grade II (same as grade I, with coughing) in 1 patient and grade III (vocal cords moving) in 2 patient and gradeIV (impossible OTI) 1 patient; and according to C-L classification were : grade I (most of the glottis seen) in 14 patients and grade II (posterior portion of glottis can be seen) in 8 patients and grade IV (epiglotis cannot be seen)1 patient. The haemodynamic parameters before and at minute 1, 5 and 10 after the OTI were respectively: MAP: 75±8, 70±7, 69±8, 71±8 mmHg; HR : 107±18, 102±18, 104±20, 93±27 and SatO2 : 91±6, 98±2, 99±1, 98±4. After the induction dose with R there was no need for administering other type of NMB nor complications were observed.

CONCLUSION. According to our study, R, a non-depolarizing NMB, is a safety and effective drug for OTI in the critically ill patients in the extrahospitalary environment.

Grant acknowledgement. SERGAS

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THE IMPORTANCE OF CPR TRAINING FOR ASSESSING THE KNOWLEDGE AND SKILLS OF HOSPITAL PERSONNEL

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INTRODUCTION. Saving a life demands only two hands and some basic knowledge. A qualified person can open airways, resuscitate, massage a heart and call for help. A person with CPR training can sustain an ailing person's heart and brain for a short time.
Knowledge of CPR guidelines and skills is not enough; medical and nursing practitioners must practice and train regularly to hone those skills.
Western Galilee Hospital is the first and only institution in Israel, and one of the few in the world, that has developed simulator programs for surprise CPR training exercises in all hospital departments.
Objective: To use surprise drills in order to improve the quality of resuscitation and CPR methods.

METHODS. ACLS instructors use a computerized simulation mannequin (SIM 4000). 2-3 surprise drills are done in the hospital each week. At the end of each drill, a final report is given to the department head and a staff meeting is held to discuss the drill results. Between the years 2003-2005, 131 drills were carried out in 30 different departments of Western Galilee Hospital.
Nine criteria are measured and scored in the drill: reaction time, ABC principles, calling the doctor, CPR knowledge, CPR skills, resuscitation management, staff work, resuscitation cart, and defibrillator management. Drills are compared with previous drills done in the same department, and with drills done in other departments. Data is analyzed using Anova, Kruskal-wallis, Independent t-test and Spearman correlation coefficient test.

RESULTS. Improvement was found in the results of the drills held from 2003-2005, mainly in the medical departments as compared with the surgical departments and ambulatory clinics. The average score in 2005 was 77.2 ($p=0.001$), compared with 74 ($p=0.012$) in 2004, and 59 ($p<0.001$) in 2003. Improved criteria included: calling the doctor, staff work, CPR knowledge, and defibrillator ($p<0.05$).

CONCLUSION. It is our belief that surprise resuscitation drills are the key to improve functioning during actual emergency resuscitation, both on a departmental and a general hospital level.

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PROGNOSIS OF PATIENTS ADMITTED TO THE INTENSIVE CARE UNIT AFTER A SUDDEN DEATH

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INTRODUCTION. Sudden death constitutes a major sanitary problem with high mortality and serious neurological complications. The objective of this study was to analyze the prognosis and the characteristics of patients who initially recovered after an episode of cardiac arrest and who were admitted to the intensive care unit (ICU).

METHODS. We retrospectively studied the clinical characteristics and outcome of 65 patients admitted to the Intensive Care Unit during a 3- year period with aborted sudden death.

RESULTS. 65 patients, 44 (67.7%) men and 21 (32.3%) women. Middle ages 69.1 +/- 13.9. Middle stay 5.4+/- 7.7. 29 (44.6%) out of hospital and 36 (55.4%) into hospital sudden death. First attention was made by health officer in 52 cases (80%) and by family or others in 13 (20%). Cardiopulmonary resuscitation was <10 minutes in 28 cases (43.1), and >10 minutes in 37 (56.9%). 36 (55.4%) of all sudden deaths were of cardiac origin, 17 (26.2%) respiratory, 5 (7.7%) neurological, 2 (3.1%) metabolic and 5 (7.7%) unknown origin. 37 patients (56.9%) died and 28 (43.1%) survived the episode. It was LET in 11 cases (16.9%). 29 (44.6%) of all had post- anoxic encephalopathy and most died before discharge from ICU. Of 28 survivors, 5 patients were discharged alive with post-anoxic encephalopathy (17.8%) and 23 were discharged without neurological disturbances (82.2%). This was more frequent when sudden death was into hospital (p 0.009) and cardiopulmonary resuscitation was <10 minutes (p 0.045).

CONCLUSION. High number of the patients admitted to a Intensive Care unit with aborted sudden death died during ICU stay. Many patients had post-anoxic encephalopathy and most of these died. So, up to 35% of the patients admitted after an episode of cardiac arrest were discharged alive and without severe neurological damage.

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ACUTE POISONING RELATED TO CARDIOTOXIC DRUGS: EPIDEMIOLOGY AND OUTCOMES

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INTRODUCTION. In this study, we aimed to evaluate the epidemiologic characteristics of cardiotoxic intoxications and their outcome.

METHODS. We studied retrospectively all patients who were admitted from April 1994 to April 2004 in a 30–bed ICU for cardiotoxic intoxications: β blockers, calcium-channel blockers, antidepressants, carbamazepine, carbamates, quinidine, antiarrhythmics, and neuroleptics.

RESULTS. 1451 patients were included (8.4% of drug intoxications). 59% of patients were women and the SAPS II was 13 ± 11. 54.5% were poly intoxications. Intoxications with antidepressants were the most frequent (38%), followed by carbamates (16%), neuroleptics (11%), β blockers (8%) and several cardiotoxics 20%. Others cardiotoxics represented less than 3%.
In symptomatic patients (31.4%), neurological failure (coma, seizure, other) was present in 68.5%, ECG abnormalities in 34.9%, cardiac failure (hypotension, arrhythmia) in 42%.
Sodium lactate was used in 19.4%, catecholamine (isoprenaline, dobutamine, norepinephrine) in 21.3% of symptomatic patients. Mechanical ventilation was necessary in 60.5% of symptomatic patients with a duration of 46 ± 122 h.
Complications included infections in 11.1% (aspiration pneumonia 96.4%) and metabolic disorders in 13.2% of all patients. Neurological failure was more frequent in patients with psychotropic-drugs intoxications (70.5%). Hypotension was frequent with Calcium-channel blockers (25%), sotalol (25%), quinidine (16.7%) and carbamates (17.3%). Bradycardia was associated with cardiotropics (53.3%) with more use catecholamine. Haemodialysis was performed in 3 patients, hemoperfusion and temporary pacemaker in 1 patient and calcium gluconate in 4 patients.
5 patients died (0.3%) (3 poly cardiotoxics, 1 carbamazepine and 1 antidepressants), including 1 refractory shock.

CONCLUSION. The cardiotoxic intoxications are frequent but often asymptomatic. They are responsible for many complications, especially aspiration pneumonia. However, the mortality rate is low in these patients.

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NEW ECG PARAMETERS AMONG CRITICALLY ILL OBSTETRIC PATIENTS: A PILOT STUDY

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INTRODUCTION. ECG parameters dispersion is a new tool to evaluate critically ill patients. P-wave dispersion may be mediated by the alleviation of the fluid overload [1]. QRS dispersion is associated with increased mortality in chronic heart failure patients [2]. A cutoff value >40 ms had a good sensitivity and specificity in predicting the occurrence of sudden death. Increased QRS dispersion > 50 ms was a strong predictive factor of recurrent malignant arrhythmic events. We examined the incidence of P-wave, QT and QRS dispersion among critically ill obstetric patients.

METHODS. 12lead ECG was recorded from 37 critically ill obstetric patients after delivery. they were compared to 37 obstetric patients who delivered at the term of normal pregnancy. The QRS-complex duration was measured from the beginning of the QRS complex to its end. The QT interval was measured from the onset of the QRS complex to the end of the T wave. The P-wave, QT, QRS and dispersions were defined as the difference between the maximum and minimum P-wave, QT and QRS values. We also studied the rate corrected QT duration QTc. The threshold of significance was 0.05.

RESULTS. The average QRS dispersion was significantly lower in critically ill obstetric patients (25.80 ± 12.17ms vs 37.89 ± 16.18ms, $p=0.013$). The average QTc was significantly lower among critically ill obstetric patients (306.42 ± 37.63ms vs 336.31 ± 26.29ms, $p=0.0012$). There was no statistical difference in P-wave and QT dispersion (50.96 ± 21.81ms vs 49.47 ± 19.28ms, $p=0.40$ and 26.25 ± 19.30ms vs 31.57 ± 15.37ms, $p=0.14$).

CONCLUSION. Physiologic changes in cardiovascular status among pregnant patient could explain these parameters. The clinical implications of these results are unknown. This difference could be an poor prognostic factor among obstetric critically ill patients. Further studies are needed in order to elucidate its exact role in this setting.

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SURFACE COOLING WITH A NOVEL COOLING-BLANKET FOR RAPID INDUCTION OF MILD HYPOTHERMIA IN HUMANS

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INTRODUCTION. Mild hypothermia (33-36˚C) proved to be beneficial when induced during or after cardiac arrest in humans. Reaching the target temperature rapidly in patients inside and outside hospitals remains a challenge. Therefore, a novel cooling-blanket (EMCOOLS®), independent of an energy source during use, was developed. The primary objective of the study was to evaluate the efficacy and safety of surface cooling with this novel cooling-blanket in patients successfully resuscitated from cardiac arrest.

METHODS. Between 09/05 and 02/06, 12 patients with restoration of spontaneous circulation after cardiac arrest, admitted to our department, were included. The cooling-blanket consists of multiple cooling units, filled with a combination of graphite/water. These cooling units were cooled to -20˚C before use, and heve the advantage of being independant of any energy source during cooling. Cooling was started as soon as feasible until an esophageal temperature (Tes) of 34˚C was reached, when the cooling blanket was removed. Target-temperature of Tes 33˚C was kept for 24 hours, and then re-warming was started. Data are presented as median and interquartile range (25-75%).

RESULTS. One patient was excluded from analysis due to severe sepsis (Tes 38.9˚C) and the need of additional cooling with an intravascular cooling catheter. The remaining 11 patients weighted 85 ± 22 kg. In one patient, cooling was terminated after 115 min because of acute heart surgery. The cooling-blanket decreased Tes from 35.9 (35.2-36.1)˚C at baseline to 34.0˚C within 37 (29-45) min, and to target temperature Tes 33˚C within 54 (44.5-60) min after initiation of cooling, resulting in a cooling rate of 3.4 (2.5-3.9)˚C/h. Parts of the cooling-blanket (30% of total size) had to be reapplied in 10 patients to maintain the target temperature of Tes 33˚C. Mean arterial pressures and heart frequencies remained within normal ranges. In 3 patients, minor adverse reactions (frost bites II˚, with complete healing) were observed.

CONCLUSION. The novel cooling blanket, independant of any energy supply during use, showed to rapidly induce and maintain mild hypothermia in patients after cardiac arrest in the hospital setting. The feasibility and efficacy of this device in the out-of-hospital setting (ambulance service) is under investigation.

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SERUM NEURON-SPECIFIC ENOLASE AS EARLY PREDICTOR OF OUTCOME AFTER CARDIAC ARREST: A COHORT STUDY

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INTRODUCTION. Outcome after cardiac arrest is mostly determined by the degree of hypoxic brain damage(1). Patients recovering from cardiopulmonary resuscitation are at great risk of subsequent death or severe neurological damage, including persistent vegetative state (2). The early definition of prognosis for these patients has ethic and economic implications (3,4). The main purpose of this study was to investigate the prognostic value of serum neuron-specific enolase (NSE) in predicting outcome in patients early after cardiac arrest.

METHODS. Forty-five patients resuscitated from in-hospital cardiac arrest were prospectively studied from June 2003 to January 2005. Blood samples were collected any time between 12 and 36 hours after the arrest for NSE measurement. Outcome was evaluated six months later using the Glasgow outcome scale (GOS). Patients were divided into two groups according to GOS category: Group 1 (unfavorable outcome) included GOS 1 and 2 patients; and Group 2 (favorable outcome) included GOS 3, 4 and 5 patients. Mann-Whitney's U test, Student's t test and Fisher's exact test were used to compare the groups.

RESULTS. The mean GOS score was 6.1±3 in Group 1 and 12.1±3 in Group 2 (p< 0.001). The mean time to NSE sampling was 20.2±8.3 hours in Group 1 and 28.4±8.7 hours in Group 2 (p=0.013). Two patients were excluded from the analysis because of sample hemolysis. At six months, favorable outcome was observed in nine patients (19.6%). Thirty patients (69.8%) died and four (9.3%) remained in persistent vegetative state. The 34 patients (81.4%) in Group 1 had significantly higher NSE levels than those in Group 2 (median NSE 44.24 ng/ml range 8.1-370 vs. 25.26 ng/ml range 9.28-55.41; p=0.034).

CONCLUSION. Early determination of serum NSE levels is a valuable ancillary method for assessing outcome after cardiac arrest.

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Poster Sessions
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NON-INVASIVE CARDIAC OUTPUT MEASUREMENT IN THE CARDIAC SURGICAL ENVIRONMENT

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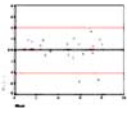
INTRODUCTION. Measurement of cardiac output (CO) in the cardiac surgical environment is important for management. A number of methods are commonly used ranging in complexity, accuracy and invasiveness. However there remains a need for a non-invasive alternative, particularly in children. USCOM (USCOM Ltd, Sydney, Australia) is a novel non-invasive point and measure Doppler device specialised for simple accurate CO measurement. This study compared USCOM measurements with various standards of care methods in children and adults.

METHODS. 560 paired CO measures were analysed from 24 subjects of various ages attending a heart failure transplantation clinic. CO was measured using the clinical standards of care methods (STD), including Fick (3), Echo (2), PAC (11), and Mechanical assist devices (CardioWest (7) and BiVad (1)), and USCOM. Methods were compared using Two Tailed T-Tests, Bland-Altman analysis and linear regression.

RESULTS. USCOM was feasible in all subjects (mean age 46.5yrs, range 3mths to 82yrs), with a mean CO by USCOM and STD of 4.69±2.35 and 4.68±2.39l/min respectively (range 0.85 to 8.00l/min). The mean difference between methods was 0.002±0.204l/min, with a mean % error of -1%. There was excellent correlation of measures without significant difference (r=0.996, p<0.005), and CO STD=1.012CO USCOM-0.06l/min.



CONCLUSION. USCOM measurements of CO compared favourably to current clinical measures and is a non-invasive alternative in the cardiac surgical environment in children and adults.

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TRENDS IN INTRAAORTIC BALLOON COUNTERPULSATION WEANING: RESULTS OF AN AUSTRALASIAN SURVEY

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INTRODUCTION. Weaning intraaortic balloon counterpulsation (IABP) incorporates the withdrawal of mechanical assistance provided by the IABP console, a reduction in pharmacodynamic support and in most cases, mechanical ventilation. Opinion and practice relating to support withdrawal varies dramatically. The aims of this study were to generate baseline data describing Australasian IABP weaning practice and determine if practice variation had differing responses on patient outcome following the withdrawal of IABP support.

METHODS. This study employed a non-experimental design using a five stem questionnaire. The survey was surface mailed to every level one, two and three intensive care unit in Australasia (192 units).

RESULTS. Response rate for this survey was 60%. The majority of hospitals informing practice were public (65%), had between 100 and 500 beds (69%) and treated a minimum of 11 patients per annum with IABP (60%). IABP support was weaned by ratio reduction only (61%), ratio followed by augmentation (17%), augmentation followed by ratio (11%) and augmentation only (4%). Although not of strong statistical significance, ratio reduction weaning appears more successful than variations of augmentation weaning (p=0.068). Units most likely to undertake ratio weaning were higher end users of IABP (>21 per annum) (p=0.04). The predominant sequence of systematic treatment withdrawal in the combined setting of IABP, mechanical ventilation and pharmacological support was IABP, ventilation, then pharmacology (22%) or pharmacology, IABP then ventilation (20%). For 39% of respondents no usual order was followed. The sequence of support withdrawal did not affect patient outcome following IABP removal. ICU's with a documented weaning policy (26%) were most likely to demonstrate a good outcome post IABP regardless of their weaning strategy (p=0.06). Following removal of IABP an increase in pharmacological support was occasionally required (57%), however, reinsertion was rare (71%).

CONCLUSION. Australasian approaches to IABP weaning are eclectic. While ratio reduction weaning appears the most successful, this may be a consequence of a volume outcome relationship with high end users yielding improved results through IABP familiarity.

Grant acknowledgement. The Prince Charles Hospital Foundation.

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OSTEOPROTEGERIN AND SRANKL AS INDICATORS FOR AORTIC VALVE CALCIFICATION

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INTRODUCTION. The Osteoprotegerin/RANK-system acts as an important regulator of osteoclastogenesis. An influence of this system on arteriosclerosis is known and was shown to be an excellent predictor for outcome in patients undergoing CABG. The impact OPG/RANK in the pathogenesis of aortic valve calcification is unknown. We hypothesized that OPG and sRANKL are able to identify patients in the different stages of aortic valve calcification.

METHODS. We studied 94 consecutive patients (>70 yrs) admitted with a broad spectrum of heart diseases. Serum Osteoprotegerin (OPG) and sRANKL levels were determined using a sandwich ELISA (Biomedica, Vienna, Austria). Aortic valve morphology was investigated by 2-D echocardiography and Doppler analysis and divided into 6 categories: Group1: normal aortic valve; Group 2: increased echo density; Group 3: thickening or calcific deposits >3mm; Group 4: thickening or calcific deposits >3mm with mildly restricted motion (mean pressure gradient < 17mmHg); Group 5: aortic stenosis (AS) with mean pressure gradient 17–49 mmHg; Group 6: AS with mean pressure gradient >50 mmHg. OPG and sRANKL levels were compared between these groups using Kruskall-Wallis Test. Also a total of 21 anamnestic, laboratory and clinical parameters were controlled for correlation to degree of aortic pathology by Spearman Rank Test.

RESULTS. Within all controlled parameters only sRANKL (r=-0.98; p=0.0001) and OPG (r=0.45; p=0.0002) showed a significant correlation.

TABLE 1.
OPG and sRANKL in the different stages of aortic valve calcification

	Group 1 (n = 15)	Group 2 (n = 17)	Group 3 (n = 23)	Group 4 (n = 12)	Group 5 (n = 17)	Group 6 (n = 10)
OPG pmol/l	4.4 (3.5/5.7)	6.2 (4.3/7.8)	6.8 (4.6/8.6)	7.4 (6.1/8.6)	8.7(6.4/10.6)	7.3 (5.8/8.7)
sRANKL pmol/l	1.3 (0.7/1.2)	0.5 (0.4/0.5)	0.3 (0.3/0.3)	0.2 (0.1/0.2)	0.1 (0.1/0.2)	0.1 (0.1/0.1)

data are shown as mean (lower/upper quartile)

CONCLUSION. In our patients sRANKL levels are significantly different in individuals with normal heart valves compared to those with different stages of aortic valve calcification. Our results indicate that OPG and especially sRANKL may identify patients with aortic valve sclerosis and stenosis.

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EFFICACY OF LEVOSIMENDAN IN CARDIOGENIC SHOCK POST NON STEMI AMI > 12 H ONSET

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INTRODUCTION. The novel calcium sensitizer and ATP-dependent potassium channel opener levosimendan has been introduced for routine use in several European countries. Recent reports on clinical experience confirm the positive hemodynamic results and beneficial clinical effects in patients with severe low-output heart failure. Aim of the study was to evaluate the efficacy of levosimendan in cardiogenic shock due to non STEMI AMI presenting to our attention after 12h onset.

METHODS. 10 patients (6M/4F) SAPS II 49.8±13.8. All were affected by cardiogenic shock post non STEMI acute miocardial infarction. All patients received standard monitoring and hemodynamic parameters (C.I. SVRI DO2 SVV MAP) where controlled by means of LiDCO plus system. Values where recorded before and after 24h of infusion. All patients received a levosimendan infusion at a constant rate of 0.1 mcg/kg/min with no starting bolus for 24 hours. Levosimendan infusion was allways preceeded by optimisation of the effective circulating volume based on the SVV and MAP values.

RESULTS. C.I, SVRI, DO2, EF%, MAP before and after treatment with levosimendan where respectively 1.6 ± 0.36 ; 2510 ± 88.69 ; 2510 ± 878.6 6± 201 ; 22.2± 2.4; 34±+ 12 and 2.6 ± 0.78 ; 1405± 495 ; 972± 230.4 ; 38.7± 7.5 ; 64 ± 10. 2 cases reporting a SVV < 10% received norepinephrine infusion while 8 cases presenting a SVV > 15% received fluids to obtain a MAP > 65mmHg. Mortality was 40%.

CONCLUSION. In a small series of patients with cardiogenic shock after myocardial infarction the inotropic and vasodilating actions of levosimendan may be of value in a setting were even interventional management may be discussed.

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PRELIMINARY RESULTS OF A CARDIOGENIC SHOCK (CS) REGISTRY IN A COMMUNITY HOSPITAL

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INTRODUCTION. The majority of studies on patients (pts) with CS focuses on risk factors, echocardiography and revascularization. Little is known on the accompanying ICU treatment. For this reason we designed a CS-registry with special attention to ICU treatment like hemodynamic monitoring, mechanical ventilation (MV) and vasopressor therapy. Preliminary results of this registry in a single centre community hospital will be presented.

METHODS. All consecutive pts with CS complicating myocardial infarction admitted to our ICU during 2004+2005 were analysed. Pts with other causes for CS or severe life limiting diseases (cerebrovascular disorders, cancer) were excluded.

RESULTS. A total of 29 of more than 700 pts treated in the CCU/ICU fulfilled the inclusion criteria in 2005. 37% were in CS following cardiopulmonary resuscitation (CPR). MI-treatment consisted of primary PCI in 41%, thrombolysis in 30% and was initially conservative in 29%. MV was used in 85% (electively in 41%, in emergency situation in 59%). An IABP was implanted in 74% but in only 20% on ICU before coronary angiography for hemodynamic stabilization. Further hemodynamic treatment consisted of dobutamine (median dose 6(3-6)µg/kg/min) and norepinephrine/epinephrine (cumulative dose 0.25(0.09-1.15)µg/kg/min). The median EF was 29(25-36)%. A pulmonary artery catheter (PAC) was used in 21 pts (72%) but only 14% received the PAC before PCI. After PCI the initial recorded median cardiac index (CI) was 2.5(2.25-2.65)l/min/m^2, the pulmonary capillary wedge pressure (PCWP) 17(12-23)mmHg, the systemic vascular resistance (SVR) 1051(916-1386) and the cardiac power (CP) 0.7(0.6-0.9). At 24/48hrs CI was 2.8(2.4-3.2)/3.2(2.7-3.9)l/min/m^2, PCWP 18(13-22)/14(10-18)mmHg, and SVR declined to 1013(935-1317)/887(667-1036) but CP remained constant at 1(0.7-1.3)/1(0.8-1.2), the median dobutamine dose was 6(4-6)/6(6-8)µg/kg/min and the combined vasopressor dose was 0.19(0.11-0.53)/0.26(0.2-0.78)µg/kg/min. A systemic inflammatory response syndrome (SIRS) was present in 52% of pts during the first 48hrs but in only 21% on diagnosis. The initial C-reactive protein was 44(15-114)mg/L and 132(76-203)/181(110-294)mg/L at 24/48hrs. Respectively, 30-day mortality was 60% in the overall group of patients (7-day mortality 52%) and 70% in pts after CPR, 67% in pts with elective MV institution, 67% in pts with SIRS after PCI, 57% in pts with SIRS at 24h, 57% in pts with PAC, 55% in pts with IABP.

CONCLUSION. 1) SIRS is frequent after diagnosis of CS reaching >50% within the first 48h. 2) The standard hemodynamic criteria of CS (CI<2.2-2.5; PCWP >15) are fulfilled in only a minority of pts despite a clear clinical history. 3) Pts with CS after CPR have, but patients with emergent rather than elective intubation have not a higher 30-day mortality. 4) The simple use of PAC without definition of therapy guidelines does not influence mortality.

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ARGININE VASOPRESSIN DURING THE POSTRESUSCITATION PHASE AFTER CARDIAC ARREST

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INTRODUCTION. Arginine vasopressin (AVP) has been employed successfully during cardiopulmonary resuscitation, but there exist only few data about the effects of AVP infusion for cardiovascular failure during the post-cardiac arrest period. Cardiovascular failure is one of the main causes of death after successful resuscitation from cardiac arrest. Although the "post-resuscitation syndrome" has been described as a "sepsis-like" syndrome, there is little information about the hemodynamic response to AVP in advanced cardiovascular failure after cardiac arrest.

METHODS. In this retrospective study, hemodynamic and laboratory variables of 23 patients with cardiovascular failure unresponsive to standard hemodynamic therapy during the post-cardiac arrest period were obtained before, 30 minutes, 1, 4, 12, 24, 48, and 72 hours after initiation of a supplementary AVP infusion (4 IU/h).

RESULTS. During the observation period, AVP significantly increased mean arterial blood pressure (58±14 to 75±19 mmHg, p<.001), and decreased norepinephrine (1.31±2.14 to 0.23±0.3 µg/kg/min, p=.03), epinephrine (0.58±0.23 to 0.04±0.03 µg/kg/min, p=.001), and milrinone requirements (0.46±0.15 to 0.33±0.22 µg/kg/min, p<.001). Pulmonary capillary wedge pressure significantly changed (p<0.001); an initial increase being followed by a decrease below baseline values. While arterial lactate concentrations (95±64 to 21±18 mg/dL, p<.001) and pH (7.27±0.14 to 7.4±0.14, p<.001) improved significantly, total bilirubin concentrations (1.12±0.95 to 3.04±3.79 mg/dL, p=.001) increased after AVP. There were no differences in the hemodynamic or laboratory response to AVP between survivors and nonsurvivors.

CONCLUSION. Supplementary AVP infusion successfully reversed advanced cardiovascular failure that was unresponsive to standard therapy in >90% of patients surviving cardiac arrest.

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PACO2 BECOMES GREATER THAN PVCO2 DURING APNEA TESTING FOR DIAGNOSIS OF BRAIN DEATH

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INTRODUCTION. The apnea test (AT) is a necessary requisite to complete the diagnosis of brain death. The goal of apneic oxygenation is to document the absence of breath once PaCO2 arise the appropriate level to stimulate the respiratory center.

METHODS. Arterial and venous central (venous catheter central) blood samples for PaCO2 and PvCO2 measurements were obtained before and after apnea testing in 20 patients to complete the diagnosis of brain death. The patient was disconnected from the respirator while receiving pure oxygen via a catheter inserted into the endotracheal tube down to the level of the carina.

RESULTS. Prior to apnea, PvCO2 (35 +/- 2.1 mm Hg) was greater than PaCO2 (30 +/- 1.9 mm Hg.) but after the onset of apnea, this relationship was reversed with PaCO2 (59 +/- 2.0) mm Hg.) becoming greater than PvCO2 (50 +/- 1.8 mm Hg.).

CONCLUSION. We hypothesize that there is an increase in the partial pressure of CO2 due to the production of CO2 by the pulmonary parenchyma and that CO2 is transported dissolved rather than as carbamino compounds which is the form in which CO2 is preferentially transported in the venous circulation.. However, we do not know whether a reversed gradient between PvCO2 and PaCO2 should modify these criteria and to assess Pv CO2 more than PaCO2 since acid-base capillary balance is better represented by the venous than the arterial blood.

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PLASMA CYTOTOXICITY IN CARDIAC ARREST PATIENTS DOES NOT INVOLVE H2O2

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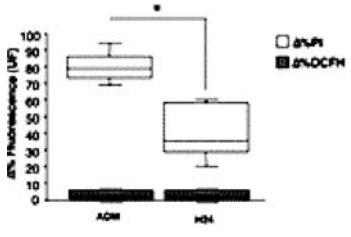
INTRODUCTION. Patients successfully resuscitated after an out of-hospital-cardiac-arrest (OHCA) present an inflammatory response described as a post-resuscitation disease wich involves ischemia reperfusion mechanisms. The aim of our study was to investigate the induced endothelial oxydative stress and cytotoxicity in plasma of patients after cardiac arrest (CA).

METHODS. Blood samples were collected from OHCA patients on ICU admission and 24 hours after CA. Witten consent was obtain from patients' next of kin. Fluorescent microscopy was used to study the radical oxygen species (ROS) production by perfused HUVEC (DCFH fluorescent dye) and the plasma cytotoxicity (PI fluorescent dye).
HUVEC were exposed to patient plasma during 15min. Statistical analysis was performed using Mann-Whitney test.

RESULTS. 12 consecutive OHCA patients studied. Mean age was 62±13 years, SAPS II was 64±14. mean total cardiopulmonary resuscitation was 23.5±9.9 minuts and mortality rate was 59%. On ICU admission (ADM), patient plasma induced high cytotoxicity (cell death rate : 80% [68-98]). Cytotoxicity significantly decreases at H24 post-OHCA. No H2O2 production by HUVEC was noticed.



CONCLUSION. The plasma of OHCA patients induces in vitro endothelial cell death. This plasma cytotoxicity significantly decreases 24 hours after cardiac arrest. This cytotoxicity seems independent of H2O2 production. More experiments are needed to investigate the role of other ROS like O2-, OH- and NOO- in this cytotoxicity.

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CEREBRAL BLOOD FLOW (CBF) AND OXYGEN EXTRACTION (EO2) DURING POSTRESUSCITATION SYNDROME

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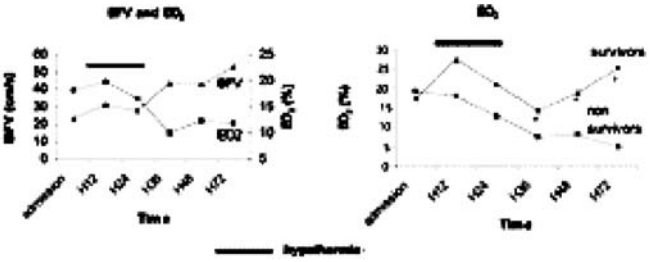
INTRODUCTION. Most of survivors of out-of-hospital cardiac arrest (OHCA) will subsequently die from post-anoxic encephalopathy. In animal studies, severity of brain damages is influenced by the duration of cardiac arrest and the cerebral blood flow abnormalities observed during the postresuscitation period.

METHODS. Consecutive patients admitted after OHCA from cardiac etiology were studied every 12 hours. CBF were assessed by measuring the mean blood flow velocity (BFV) and pulsatility index (PI) of mean cerebral artery using transcranial doppler. EO2 were obtained using a retrograde jugular catheter (EO2=[(SaO2-SvjO2)/SaO2]). These parameters were studied during the first 3 days and compared between survivors and nonsurvivors.

RESULTS. Eighteen patients (60.2+/-16.6 years) were included and treated with mild therapeutic hypothermia (32-34°C). No flow duration was 7 +/-6 min, low flow was 15 ± 8 min. At 1 month, 12 patients were died, 6 patients were alive with no or mild neurologic sequelae. BFV values were low at admission but quite normal after 72 hours for all the patients (28.4 ± 8 cm/s vs 52 ± 23 cm/s, p<0.01). PI was high at admission but decreased quikly (1.49 ± 0.49 vs 0.9 ±0.26 at H36, p=0.03). EO2 was similar between survivors and nonsurvivors at admission (18± 8% vs 24± 17%, ns) but was different at H72 (24± 11% vs 8± 5%, p=0.05). In survivors, BCF/EO2 ratio remained stable during postresuscitation syndrome but increased in nonsurvivors.



CONCLUSION. CBF and EO2 are altered during post resuscitation syndrome. The increase of BCF/EO2 ratio in nonsurvivors suggests the appearance of a "luxury cerebral perfusion" that is linked to a poor neurologic outcome.

Grant acknowledgement. Study founded by SFAR-SRLF grant.

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FULL-SCALE SIMULATOR TRAINING RAPIDLY IMPROVES CRISIS RESOURCE MANAGEMENT SKILLS

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INTRODUCTION. Health care is not as safe as it should be. Deaths in hospitals due to preventable adverse events still remain in the top 10 of the leading cause of death (1). Roughly 80% of these events are related to the so called human factor due to a lack of knowledge of proper Crisis Resource Management (2). Patient simulators are receiving increasing support as an educational tool. Therefore, we studied whether frequent simulation sessions during an anesthesia residency programme increase knowledge of CRM and thus patient safety.

METHODS. All members of our department (n=62) participated in simulation sessions on a regular basis (residents twice a year, board-certified anesthesiologists once a year) to teach both, technical abilities (hard skills) as well as Crisis Resource Management (soft skills). All scenarios were developed using a full-scale-simulator (HPS, METI). After 18 months the quality of the simulation sessions was evaluated using a standardized questionnaire (20 questions). All questions could be answered by using standard school grades (1-6). Grades were then devided in three groups (1-2: agree, 3-4: intermediate, 5-6: disagree).

RESULTS. Simulation sessions on a regular basis improved hard skills (68%) and soft skills (81%). After 18 months of simulation training, 53% of the participants reported that simulations sessions influenced their every day practise. 51% stated that they altered their behaviour in an OR setting in terms of communication and team organisation. All scenarios were evaluated as being very realistic (92%) and appropriate in terms of skill level (95%). 52% of the questionnaires were answered.

CONCLUSION. 18 months after establishing a full scale simulation programme modulation of the individual performance can clearly be attributed to our programme. Therefore, consequent and frequent simulation sessions increase knowledge of CRM and may thus contribute to the improvement of patient safety.

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DIAGNOSIS RELATED AND NON-RELATED WORKLOAD IN PATIENTS ADMITTED TO THE ICU. A MANAGEMENT TOOL

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INTRODUCTION. NAS (Nursing Activity Store) is a workload expression system based on attending times, expressed as percentages of FTE (full time equivalents) needed for caring patients admitted to ICUs. So, one nurse can not cope with more than 100 NAS points during one shift. Our aim has been to assess the different workloads linked to admission diagnosis or other circumstances not related to diagnosis.

METHODS. During 2005, 1069 consecutive patients were admitted to our ICU. Admission diagnoses were classified according to FRICE IRS 1.0. Circumstances not related to admission diagnosis were infection detected after ICU admission (92 cases), isolation procedures (71), intermediate care attention (255), and intraICU death (165). Patients attendance processes were evaluated by NAS, expressing results as NAS 1 (first day workload), NAS TOT (whole stay and NAS PRO (daily average). Length of stay (LOS) and NAS were expressed as for days.

RESULTS. (Only admission reasons with more than 25 patients were considered). NAS 1 score ranged between 41.53 ± 13.5 (for rhythm disturbances) and 52.6 ± 14 (for obstruction / perforation secondary peritonitis) (p: 0.083). NAS TOT ranged between 109.2 ± 262.9 (CNS tumours scheduled postoperative patients) and 768.9 ± 830.4 (head injury with or without other accompanying injuries) (p: 0.000). NAS PRO ranged between 39.7 ±10.9 and 49.5 ± 11.3 (p 0.003)
The table shows different values for NAS associated with the considered non related admission reasons (bold black if $p < 0.05$)

TABLE 1.

	LOS	NAS 1	NAS TOT	NAS PRO
ALL PATIENTS	5.4 (8.8)	46.2 (12.8)	288.9 (444.8)	44.1 (9.6)
ICU DEATHS	8.3 (10.9)	53.7 (13.2)	438 (479.1)	52.9 (8.9)
INTERMEDIATE CARE	2.9 (3.4)	42.7 (10.6)	186.4 (351.2)	41.9 (8.9)
ISOLATED	22.4 (19.4)	50.1 (13.4)	1052.8 (942.4)	47.4 (6.7)
INFECTED	24.1 (17.5)	51.3 (13.9)	1048.7 (800.9)	47.9 (7.1)

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CONCLUSION. It seems not adequate to define nursing staffing according to the ICU size and is occupancy rate, and by the contrary the admitted case-mix is the main factor to consider for ascertaining the real needs of manpower. ICU managers must reinforce the attitude of adapting staffing to their particular case-mix and patients flow, even if seasonal variability has to be considered.

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SUCCESSFUL ACTIVATION OF A CRITICAL CARE DISASTER PLAN IN A LARGE GENERAL HOSPITAL

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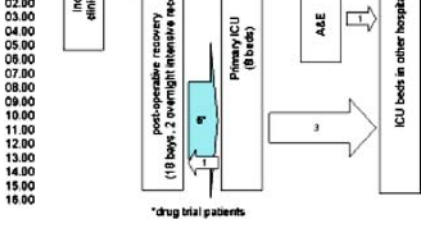
INTRODUCTION. On March 13th 2006, six healthy volunteers developed multiple organ failure after infusion of a phase I trial drug (TGN1412, TeGenero AG, Germany) and required emergent admission to an 8 bed ICU in a 610 bed acute hospital. At the time the ICU had only one available bed.

METHODS. Analysis of patient movements, operational decisions taken and outcomes of all transferred patients.

RESULTS. A total of 19 patient moves were made, shown with time of day on vertical axis. A postoperative recovery area adjacent to ICU was converted into a 5 bed ICU. Most patients destined for external transfer were held until 0800 when multiple transfer teams were available. There was no adverse outcome from any transfer.



CONCLUSION. Short term surge expansion of an ICU to 165% capacity was possible due to flexible use of operating department space, cross-skilled staff, and staged transfer.

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APPROPRIATENESS OF INDICATIONS OF ICU ADMISSIONS OF OLDEST OLD PATIENTS

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INTRODUCTION. The few published general recommendations of ICU admission are addressed to intensivits, however the first triage occurs in the emergency department. There is no published recommendation regarding specifically old patients, although population of oldest old requiring intensive care will increase in future years. Using a Delphi method, we built a list of indications of ICU admission of patient over 80 from recommendations of the SCCM. We confronted the list to data from the multicenter ICE-CUB study, analysing frequency distribution, rate of ICU request and admission of each item.

METHODS. First, a panel of six physicians built a 79-item list of indications of ICU admission based on the North-American published guidelines. 26 emergency physicians were asked to rate the appropriateness of each indications of the list on a 9-unit numerical scale. Appropriateness of each item was determined from the median and agreement from the range of the ratings. Using a Delphi method physicians were asked to review their rating until an acceptable level of agreement was obtained for each indication. We analysed frequency distribution, rate of intensive care request and ICU admission of every indications.

RESULTS. Three Delphi rounds were performed. Only one item was considered inappropriate : "Intracranial hemorrhage with potential for herniation". Among the most frequent indications : "myocardial infarction" (4.4%) was rated appropriate with a poor level of agreement. ICU admissions were requested for only 5.5% of patients and only 1.82% of patients were finally admitted. Death rate was 12.7%. "Gastrointestinal bleeding" (2.12%) was rated appropriate with a poor level of agreement. ICU admissions were requested for 32.1% of patients and 22.64% of patients were finally admitted. Death rate was 11.32%. "Septic shock" (6%) was rated appropriate with a poor level of agreement. ICU admissions were requested for 38% of patients and 19.3% of patients were finally admitted. Death rate was 61.3%.

CONCLUSION. ICU admission are rarely requested even for indications considered appropriate by the emergency physicians. Less than half the patients proposed to ICU are finally admitted. Those informations should help building a list of indications of ICU admission of oldest old patients. Long term outcome of patients evaluated in the ICE-CUB study will also be helpful.

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ITALIAN ICUS APPROACH TO HIV INFECTED CRITICALLY ILL PATIENTS: RESULTS OF A MULTICENTRE SURVEY

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INTRODUCTION. Up today no study exists in literature to produce clear hints or to inform ICU physician practice in terms of admitting or not HIV-infected/AIDS patients to ICU.

METHODS. To provide new insights into this topic, we are conducting a multi-stage stepwise research project. For Phase I, we sent a detailed questionnaire, in January 2006, to GIVITI (Italian Group for Evaluation of Interventions in ICU) ICU membership list. We survey, among other aspects (hospital and ICU main characteristics), if ICU physicians were aware both of number and mortality of AIDS/HIV-infected patients admitted to their ICU and of their main causes of ICU admission or rejection. Moreover they were asked (i) if any shared criteria for ICU admission or rejection for AIDS/HIV-infected patients existed (ii) if such criteria were generally share with other, like infectious disease specialist. SPSS software was used for statistical analyses and p values less than 0.01 were considered statistically significant.

RESULTS. A total of 103 ICUs out of 244 of the GIVITI membership lists responded, mainly polyvalent (92.1%), from community (54%) and university associated (25.4%) hospitals, with a median (IQR) number of beds of 8 (5-10). Only 30.4% of ICUs considers always appropriate an admission of HIV-infected patients to ICU, whereas only 14.3% of them usually admit a critically AIDS patient. The median (IQR) referred number of yearly admission is 5 (5-7). The most frequent referred admission reasons is respiratory failure (70.8%), being Pneumocystosis in 46.2% of cases; on the other hand the most prevalent cause of ICU admission rejection are neoplasia (37.5%), hepatic failure (33.3%) and wasting syndrome (16.7%). However the most intriguing results is that there is a strong correlation between the presence of an infectious disease (ID) (present in 60.3% of considered hospitals) ward and the intensivist approach towards HIV-infected patients: ICUs from an hospital with an ID ward always admit a HIV/AIDS patients in 70.3% of cases (vs 29.7%, p= 0.02, Spearman rho: -0.536); (ii) the decision of admission is taken with an ID doctor (78.2%, vs 14.3%, p=0.0000, Spearman rho: -0.2046).

CONCLUSION. This questionnaire from a large national cohort reveals that the number of HIV-infected patients admitted yearly to Italian ICUs are still very low. Intensivists decision in terms of admission is still strongly influenced by the presence in the hospital of an ID ward.

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RESULTS OF THE USE OF A CLINICAL PATHWAY FOR CARDIAC SURGERY PATIENTS IN THE INTENSIVE CARE

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INTRODUCTION. A clinical pathway (CP) is a multidisciplinary care plan describing from admission up to discharge all the goals and activities goals that must be performed and obtained to secure a smooth, short and uncomplicated hospital stay and is also an instrument for measuring and improving the quality of care. CP's for coronary artery bypass surgery do exist, but well described pathways for the intensive care period are rare. We developed an 'hour to hour' CP with a special variance report for all cardiac surgery patients admitted into our IC. Variances can be considered as deviations of the pathway and are usually registered in a report and used for care evaluation. Our Radboud variance report contains predefined variances coupled to pre-defined actions, which allows the nurse to act as fast as possible to get the patient back on the pathway track. This CP and the target values were developed in cooperation with the medical and nursing staff of the ICU, the cardiac surgery department and physiotherapists. Fast hemodynamic stabilization, early extubation and mobilization and prevention of a postoperative temperature drop were main points. Exclusion criteria for the CP were the use of high doses of inotropic agents, life threatening cardiac arrhythmias or necessary re-operation.

METHODS. After training the nurses and the medical staff we started with the CP in January 2006. The primary outcome measures were the duration of weaning from the ventilator, extubation time and incidence of temperature drop (decreasing temperature $> 0.3^{\circ}$C. after arrival on the IC). The outcome from the first 29 patients was compared to a matched control group from 2005 for the type of operation, age, gender and length of stay.

RESULTS. Median weaning time was 4 hours and decreased to 2.35 hours with CP. Median extubation time decreased from 7.30 hours to 6.15 hours. The incidence of temperature drop decreased from 27.6% to 10%. Three patients were excluded for reasons of preoperative hemodynamic instability (1), high doses of inotropic agents (1) a necessary reoperation (1). Recently an additional 71 patients were included. In total 78% stayed in the CP. The median weaning time was 3 hours, the median extubation time 6.15 hours and the incidence of temperature drop was 14%.

CONCLUSION. The use of a CP with the Radboud model of variance report is a good instrument for faster weaning and extubation after cardiac surgery and a lower incidence of temperature drop. The care is transparent and standardized and analysing the variance report probably increases the quality of care.

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INTERMEDIATE RESPIRATORY CARE UNITS IN SPAIN: A NATIONWIDE SURVEY

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INTRODUCTION. An appropriate setting to manage patients needing non-invasive ventilation (NIV) and through tracheostomy are intermediate respiratory care units (IRCU). Since no information on these areas existed in Spain, we conducted a nationwide survey of IRCUs.

METHODS. A questionnaire with 28 groups of items regarding the existence of IRCUs, their location, organization, staffing, equipment, and use of highly-specific respiratory therapy such as NIV or ventilation through tracheostomy, was sent to all Spanish hospitals with departments of Pneumology from January to April 2004. A nurse/patient ratio of at least 1:4 per shift, availability of adequate continuous non-invasive monitoring, and expertise for NIV were considered in defining an IRCU.

RESULTS. Complete information was obtained from 76/117 (65%) contacted hospitals. We identified IRCUs in 16 (21%) centres, having 4.6 ± 1.9 beds. These units were integrated within a respiratory ward in 13 (81%) cases and independently located in 3 (19%) cases. Monitoring included pulseoximetry in 100%, electrocardiogram in 88%, and non-invasive blood pressure in 81% IRCUs. There were facilities for NIV in 100%, invasive ventilation in 38%, and emergency intubation in 75% IRCUs. A pneumologist on duty was available 24 hours per day in 4 (25%) and on call in 6 (38%) IRCUs. Despite that 58 (76%) centres used NIV and 36 (47%) used ventilation through tracheostomy, these therapies were applied in centres with IRCUs in 15 (26%) cases for NIV and 13 (36%) cases for ventilation through tracheostomy only.

CONCLUSION. Despite the wide use of NIV and ventilation through tracheostomy among Spanish hospitals with departments of Pneumology, the majority of these centres do not have areas appropriately staffed and equipped to manage these patients.

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IDENTIFYING ONLINE EDUCATIONAL RESOURCES TO SUPPORT COMPETENCY-BASED ICM TRAINING

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INTRODUCTION. CoBaTrICE (**Co**mpetency **Ba**sed **Tr**aining in **I**ntensive **C**are in **E**urope) has defined 102 competencies required of a specialist in Intensive Care Medicine (ICM) (1). Educational materials are necessary to support the acquisition of these competencies. We aimed to identify existing educational resources which could be integrated into a web-based competency training programme.

METHODS. A structured search was combined with an iterative review process. Searches were conducted by ICM trainees using pre-defined terms applied to two major online search tools (Medline & OMNI) and specific web-sites recommended by ICM specialists. Searches were limited to online, English-language resources, published or updated within the last 5 years. Personal recommendations were also permitted. An online database was used to collect *information* about suitable resources, not the resources themselves. A multi-national group of ICM specialists reviewed all recommended resources, applying criteria based on mandatory and desirable characteristics, and their own professional judgement of the context, content, format & educational value of the resource.

RESULTS. Trainees from 18 countries conducted online searches over a three month period using 163 primary search terms. Information about 588 resources was collected. Following specialist review, 360 resources were retained in the database. Almost half are freely accessible abstract or full text journal articles (n = 157); 95 other documents (26%) and 80 e-learning resources (22%) are included. More detailed review criteria were defined as the search and review processes progressed; these were applied by an editorial group to promote consistency, and facilitate cross referencing between competencies. Educational resources were linked to single or multiple competencies in all CoBaTrICE domains.

CONCLUSION. A structured search strategy, and iterative review process, has enabled us to identify existing online educational resources which can be linked electronically to the CoBaTrICE competencies. We have initiated the development of a bibliographic database of ICM resources which can now evolve to assist trainers and trainees with educational activities and facilitate lifelong learning.

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THE 1999 SOHO BOMBING AND THE JULY 2005 LONDON SUICIDE BOMBINGS: A COMPARISON

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INTRODUCTION. On July 7th 2005 four suicide bombers attacked the transport network in Central London killing 55 and generating more than 700 casualties. On April 30th 1999 a nail bomb was detonated in a London pub, killing 3 and injuring more than 75. We compare these two blast injured groups to illustrate the different patterns of injury that can occur in urban terrorist events.

METHODS. A retrospective review of the case notes of patients admitted to University College London Hospital's (UCLH) intensive care unit from both incidents.

RESULTS. The Soho Nail Bomb (n = 4) and July 7th cohorts (n = 5) had mean ICU stays of 21.67 and 12.65 days respectively. APACHE II scores for Soho and July 7th were 17.25 and 11.8 respectively. In both groups traumatic amputation was present with haemorrhage, hypovolaemia and coagulopathy dominant features in early management. However, the Soho cohort exhibited mean body surface area burns of 16.75% with none seen in the July 7th victims. Inhalational injury was not significant in either cohort but ARDS was more prevalent after Soho.

CONCLUSION. Terrorist attacks involving improvised explosive devices are not uncommon in Central London. The heterogeneity between the Soho Nail Bomb and 7th July cohorts illustrates the need to recognise that not all elements of blast injury management can be easily generalised. The Soho attack produced realtively low lethality but high morbidity while the reverse was true of the July 7th bombings. Many factors contribute to the different clinical courses of these blast injured groups. These include: location of incident, type of device and changes in trauma resuscitation and surgical practice.

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LONG TERM EFFECTIVENESS OF AN INNOVATIVE STRATEGY TO IMPROVE POTENTIAL ORGAN DONORS IDENTIFICATION

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INTRODUCTION. Faced with a low identification rate of potential organ donors (POD) in 2002-2003 in our center (464-bed level I academic trauma center), we developed a new referral strategy centered on respiratory therapists. Since one of the major challenges in improving care is to sustain the modified behavior, we perform the present study to address the long term efficacy of our strategy.

METHODS. During February and March 2004, the daily worksheet of the respiratory therapist team was adapted to include a section on POD. All respiratory therapists were then asked to refer every intubated patient with a severe brain injury to the on-call organ donation coordinator which could provide support and information if needed. To assess the effectiveness of our strategy, all hospital deaths from February 2003 to January 2004 (before intervention) and from April 2004 to March 2006 (after intervention) were reviewed to identify POD and assess if they were adequately referred or not. A POD was defined according to specific criteria based on provincial guidelines. To limit bias, the chart review process was standardized and completed by the same team of reviewers.

RESULTS. The average identification rate before the intervention was 60% (Table 1). Immediately after implementation, the referral rate increases above 90% and remains significantly elevated during the first and the second year after implementation (p 0.001; Chi-square).

TABLE 1.
POD identification before / after intervention

	BEFORE 12 months	AFTER 12 months	AFTER 12-24 months
All hospital deaths, (n)	1057	1170	1122
Potential / Referred organ donors-total, (n)	90 / 54	87/ 82	74 / 69
Referral rate, (%)	60%	94%	93%

CONCLUSION. A focused approach, implicating a small group of health care professionals, achieves a rapid and sustained high identification rate of POD. Such an approach may prove to be particularly efficient and cost-effective when compared to "more general" educational campaigns.

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COMPARING PERFORMANCE OF A GENERAL ICU WITH BRAZILIAN DATABANK ON ICU THE QUATI

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INTRODUCTION. Everyday more management of ICU depends on objective data instead of dubious and personal impressions. In this sense, an information system is essential. The QuaTI software is a Brazilian software used in more than 50 ICUs in our country which works in this direction. We compared performance of our general ICU versus the databank of QuaTI.

METHODS. The study was from January to December 2004. We compared the followed variables: age, sex, length of stay in ICU (LOS), occupation rate (OR), hospital mortality rate, mechanical ventilation rate, non-planned extubation, accidental pneumothorax, pressure ulcers and case-mix.

RESULTS. Age ICU = 63.8 X Quati = 66 years-old; sex : ICU - male = 50 X Quati = 52%; LOS - ICU = 4.2 X Quati = 6.0 days; OR - ICU = 93 X Quati = 60.4%; hospital mortality rate - ICU = 7.7 X Quati = 12.1%; mechanical ventilation rate - ICU = 18 X Quati = 27.4%; non-planned extubation - ICU = 2.9 X Quati = 3.8%; accidental pneumothorax ICU = 3.4 X Quati = 1.4%; pressure ulcers - ICU = 4.4 X Quati = 3.3%; case-mix - ICU = 30.6% neurological, 12.1% respiratory; 22.1% cardiovascular; in Quati, case-mix is 33.3% cardiovascular, 16.5% neurological and 14% respiratory.

CONCLUSION. Performance of an ICU is very dependent of case-mix.
A specific outcome could be different of a standard, and this doesn't indicate better or worst performance. Benchmarking is very important, but we must compare similar institutions. To compare ICUs with different case-mix, in the same way, to compare Brazilian versus European ICUs is not ideal and has the risk to give incorrect information which could generate wrong decisions. The QuaTI is an excellent tool in this direction. In our study, the main difference in case-mix was the presence of more neurological patients in our ICU versus more cardiovascular patients in the QuaTI. The outcome mortality is so different – 7.7% versus 12.1%. Mechanical ventilation rate is predominant in the QuaTI and occupation rate is also so different.
Major importance is to has our own data by model of unit, which let us to establish strategies for improvement, comparing new data with our former performance.

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ASSESSMENT OF EMERGENCY CALLS TO INTENSIVE CARE UNIT

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INTRODUCTION. We aimed to classify emergency calls to our intensive care unit (ICU) according to the departments asking for consultation, reasons of consultation requests, whether the situation is truly emergent or not, and to determine the number of patients we could accept to our intensive care unit.

METHODS. The examination forms of 509 patients consultated by our ICU were retrospectively evaluated. Applied procedures were evaluated in 4 groups as cardiopulmonary rescucitation (CPR), invasive procedures, ICU indication, and suggested treatment. Data were determined in percentages.

RESULTS. Our ICU serves with 12 beds to 14 departments 24 hours. Departments asking for consultations (in %) were internal medicine (40.9), general surgery (26.7), coronary care unit (7.9), cardiology (6.1), plastic surgery (5.9), cradiovascular surgery (3.5), infectious disease (2.6), ENT (2), neurosurgery (1.2), dermatology (1), urology (1), radiodiagnostic (0.8), paediatric surgery (0.4), ophtalmology (0.2). When interventions which performed during consultations is evaluated, it is determined that of 55.4% patient received advise and treatment at bed-side, of 0.4% patient received invasive interventions, of 11.6% patient applied CPR and of patient 32.6% had intensive care indication. Only 10% of the patients transport to an ICU could have been accepted to our ICU and the rest were tranported to other ICUs. The way of consultation request was by phone call (93.1%), and written (6.9%). And it was emergent in 87.8%. The reasons for consultation requests were: respiratory failure (59.9%), sudden loss of conscious (12.8%), cardiopulmonary arrest (10.2%), deterioration of general health status (10.9%), sepsis (6.5%).

CONCLUSION. The number of the beds limits the acception to our ICU. It was seen that consultation requests were mostly emergent and respiratory problems have the highest rate among the consultation demands. 55.4% of the patients evaluated by our ICU were treated at the moment of consultation which suggests that intensive care units should be capabile to respond other clinical departments.

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OUTCOME AFTER ICU ADMISSION DURING OFF HOURS

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INTRODUCTION. Caring for the critically ill is a 24 hr responsibility. Some authors have reported an outcome which is worse for patients admitted to the ICU during the night or in the weekend. We studied our database to see if admission during off-hours resulted in a worse outcome.

METHODS. The unit is a closed format mixed surgical and medical intensive care in a 550 bed general hospital. Intensivists are on duty round the clock. Information for the database is collected prospectively. All ICU admissions from January 1st 2004 until December 31st 2005 were studied. Off-hours were defined as between 20 pm and 8 am, or in the weekend, working hours were defined as between 8 am and 20 pm during weekdays.

RESULTS. There were 1482 ICU admissions in the study period. Results are presented in table 1. None of the observed differences were statistically significant at the 0.05 level (or even at the 0.1 level).

TABLE 1.

	Admitted during working hours	Admitted during off-hours
Number of patients	910	572
Mean age (years)	66.9	66.5
Mean APACHE II	14.0	13.7
ICU mortality	9.3%	9.6%
Hospital mortality	16.3%	15.0%
Mean ICU length of stay (days)	2.76	3.0
Mean hospital length of stay (days)	17.3	15.6

CONCLUSION. In a closed format intensivist led ICU, outcome is not influenced by admission at off-hours.

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COMPARING PERFORMANCE OF TWO GENERAL ICU UNDER THE SAME MEDICAL COORDENATION

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INTRODUCTION. Today management is a science which works with information to generate outcomes. QuaTI, a Brazilian software used in more than 50 ICUs works in this direction. We compared performance of two general ICUs, now called ICU-1 and ICU-2, under the same medical coordination, studying outcomes.

METHODS. The period was from January to December 2004. We compared variables age, sex, length of stay (LOS) in ICU-1 and 2, rate of occupation (OR), rate of hospital mortality, rate of mechanical ventilation, non-planned extubation, accidental pneumothorax, pressure ulcers and case-mix.

RESULTS. Age ICU-1=63.8 X ICU-2=58.5 year-old; sex: ICU-1-male= 50% X ICU-2=1.7%; LOS-ICU-1=4.2 X ICU-2=8.5 days; OR-ICU=93% X ICU-2=100%; mortality rate - ICU-1=7.7 X ICU-2=15.3%; mechanical ventilation rate -ICU-1=18 X ICU-2=26%; non-planned extubation-ICU-1=2.9 X ICU-2=1.6%; accidental pneumothorax ICU-1=3.4 X ICU-2=2.2%; pressure ulcers-ICU-1=4.4 X ICU-2=5.4%; case-mix-ICU-1= 30.6% neurological, 12.1% respiratory; 22.1% cardiovascular; in ICU-2, case-mix is 41.3% cardiovascular, 17.3% neurological and 19.7% respiratory.

CONCLUSION. The study of performance in ICU is very important. The best is to try to establish our performance, comparing it in the time.
Comparison among units is always dangerous and has the chance of mistake.
In our study, two ICUs under the same medical co-ordination and with same resources, have different performance. Major difference was in case-mix, where the presence of more neurological diseases in ICU-1 versus more cardiovascular and respiratory diseases in ICU-2. Outcome mortality is so different – 7.7% versus 15.3%. Mechanical ventilation rate is bigger in ICU-2.
It is very important to has our own data by unit, establishing strategies to improve quality and safety. QuaTI is a tool which works in this direction.

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LEVOSIMENDAN OPTIMIZES CARDIAC PERFORMANCE IN GENERAL SURGERY PATIENTS WITH CHRONIC HEART FAILURE

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INTRODUCTION. Levosimendan has been shown to improve cardiac performance and hemodynamics in decompensated heart failure patients. We have used levosimendan preoperatively in patients with chronic cardiac failure undergoing non cardiac surgery.

METHODS. Patients with chronic cardiac failure with ejection fraction less than 35% who were scheduled for elective general surgery were included. All patients were preoperatively admitted to the surgical Intensive Care Unit for monitoring during the 24 hours administration of levosimendan. Hemodynamic measurements included echocardiography, continuous pulse rate and arterial pressure monitoring, and right cardiac catheterization.

RESULTS. Nine patients were enrolled in the study. Levosimendan infusion resulted in significant increase of cardiac index 24 hours after treatment initiation which was also sustained during the next 24 post-infusion hours ($p<0.001$). Systemic resistance decreased substantially 10 minutes after treatment initiation ($p=0.009$) and remained reduced during the observation period ($p<0.001$). Echocardiography showed improvement of ejection fraction at re-examination seven days post infusion ($p<0.05$). There was no significant cardiac event at 30 days follow up and no adverse effect attributed to the levosimendan.

CONCLUSION. Our data show that levosimendan is a safe and efficient agent in preoperative optimization of chronic heart failure patients.

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NON-INVASIVE TEST OF PULMONARY VASODILATATION INDUCED BY INHALED NITRIC OXIDE

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INTRODUCTION. Pulmonary hypertension (PHT) is an independent risk factor for right ventricular failure and death, after heart transplant and some other heart surgery procedures. Nitric oxide (NO) is a powerful and selective vasodilator, but its response is unpredictable. Thus it should be assessed prior to the operation. However, preoperative assessment has not been generalized due to its difficulties and risks. Main goal of our study is the description of a Non-Invasive Pulmonary Vasodilatory Test with NO administered through a non invasive ventilation (NIMV) device and evaluation of its vasodilatory response by Eco-Doppler.

METHODS. The test is the result of combining two non invasive techniques (Non invasive mechanical ventilation and Doppler technology). We enrolled 15 patients with severe PHT all of them on preoperative assessment for heart transplant. Threshold was: Systolic Pulmonary Artery Pressure (SPAP) > 65 mmHg. NO (10 ppm) was administered through a hermetic mask connected to a conventional volume ventilator. Patients were instructed in advance by breathing air trough the device until air leak was small enough to be ignored and a stable minute ventilation was achieved. Systolic Pulmonary Artery Pressures (SPAP) were measured simultaneously by Doppler. SPAP can be calculated by adding the Tricuspid Regurgitation maximal gradient measured by Continuous Doppler, to the Central Venous Pressure (CVP) as estimated in a semiquantitative way by a combined clinical and echocardiography approach. Since NO effect is so short-lived, response could be evaluated immediately. Pulmonary Artery Preassures were meassured through a Pulmonary Artery Catheter in the control group.

RESULTS. All patients agreed to be enrolled.: All of them achieved a comfortable equilibrium breathing air through the non invasive respiratory device before adding NO to the respiratory mixture. No problems, interruptions or complications were noted. Average measured values were those of n=15, SPAP (basal 69.09 mmHg CI 95%: 61.14-77.00 SD: 14.32 and with NO 53.93 mmHg CI 95%: 44.43-63.44 SD: 17.16). Difference was 15.13 CI 95%: 9.92-20.34 SD: 9.40 ($p < 0.0005$). Control group n = 28 (basal 75.15 mmHg CI 95%: 68.08-82.23 SD: 11.70. With NO SPAP 61.08 mmHg CI 95%: 53.74-68.41 SD: 12.13). Difference was 14.07 CI 95%: 7.22-20.92 SD: 11.33. No changes were noted in Central Venous Pressure, Cardiac Output or Pulmonary Artery Wedge Pressure in the control group. No significant differences were found between both groups.

CONCLUSION. A non invasive pulmonary vasodilatory test with NO is feasible and useful in selecting patients with severe Pulmonary Hypertension as receptors for heart transplant. This test could also be used in some other indications

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SHORT TERM FOLLOW-UP OF FANTONI PERCUTANEOUS DILATIONAL TRACHEOSTOMY AFTER CARDIAC SURGERY

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INTRODUCTION. Elective percutaneous dilational tracheostomy (PDT) is one of the most often performed procedures in ICU. Different Authors [1,2] showed advantages of percutaneous techniques compared to surgery, but yet no consensus has been reached about the best technique to be performed. We report about our experience with the Fantoni PDT in a 14 bed post-cardiac surgery ICU.

METHODS. We investigated 15 patients (7F/8M, mean age 76 ± 10 years) treated with the Fantoni PDT during a time interval from 2004 to 2005. Exclusion criteria were: major haemocoagulation disorders, purulent airway secretions and previous tracheostomy. All patients were fasted for 6 hours prior to intervention and standardised intravenous anestesia was provided. Continuous hemodynamic and oxygenation monitoring was performed, an operating theatre in stand-by was available. Rigid fibreoptic bronchoscopy was performed and immediate (<48h) and late complications were recorded. Procedure time, ICU length of stay (LOS) and hospital mortality were recorded. Three month after hospital discharge a follow-up telephone interview was performed. Informed consent was obtained from all patients or next of kin. Data are expressed as mean values ± standard deviation (SD), variables were compared by Student's t-test, a two tailed p value < 0.01 was considered statistically significant.

RESULTS. Mean inubation time before tracheostomy was 12 ± 4.2 days, mean ICU LOS was 31 ± 17.9 days and mean procedure time was 24 ± 8 minutes. ICU mortality in the PDT group was significantly higher than in the general ICU population (26.7% vs. 3.6%, $p<0.01$) as was disease severity (SAPS II 42.8 ± 13.4 vs. 28.2 ± 9.8, $p<0.01$), we observed no procedure related death. At 3 month follow-up 6 patients (40%) were still hospitalised (3 without tracheostomy) and 5 patients (33.3%) were discharged home without tracheostomy.

CONCLUSION. Fantoni PDT is a safe and easy to perform technique, no immediate or late complications were seen and no procedure related mortality was observed. Patients in the PDT group suffered a significantly higher hospital mortality than patients in the general population. Patients discharged from the hospital after a PDT recovered completely. We consider the Fantoni PDT as a first choice technique in post cardiac surgery patients.

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THE INTERVENTIONAL LUNG ASSIST (ILA) DEVICE IN SEVERE LUNG INJURY AFTER CARDIOPULMONARY BYPASS

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INTRODUCTION. Acute respiratory distress syndrome (ARDS) is a potential complication of cardiac surgery with cardiopulmonary bypass (CPB). Prolonged mechanical ventilation (MV) in the treatment of acute respiratory failure (ARF) can cause further lung injury, and aggravate pre-existent lung damage. Extrapulmonary support of gas exchange by using a new pumpless arteriovenous extracorporeal membrane oxygenator (interventional lung assist (ILA)) (NovaLung, Hechingen, Germany) is a possible alternative to traditional lung protective strategies. With this device the mechanical part of ventilation that may contribute to the lung failure is replaced by passive extrapulmonary CO2 elimination. We analysed the effects of ILA system in a patient complicated by ARDS after CPB.

METHODS. A 69-year-old man underwent mitral valve repair and coronary artery surgery was studied. In the immediate post-operative period the patient needed multiple blood transfusions and reoperation for bleeding. During the intensive care stay, an acute and progressive worsening of the pulmonary function was observed. X-ray and computed tomography (CT) scans showed conventional signs of ARDS. Prolonged MV was needed, and inhaled nitric oxide and intravenous steroid therapy was started. After standard therapy had failed, the ILA system was installed using the femoral blood vessels. After two weeks the ILA was removed.

RESULTS. After NovaLung implantation, a significant removal of CO2 by ILA was observed: PaCO2 decreased from 59 to 38 mmHg. A significant increase in PaO2 was also observed (from 63 to 153 mmHg). PaO2/FiO2 ratio improved from 80 to 250. After minimizing the invasiveness of MV, airway pressures decreased and dynamic compliance significantly improved from 14 to 40 ml/cmH2O. X-ray and CT scan showed remarkable regression of severe lung injury patterns.

CONCLUSION. CO2 elimination and PaO2 raise by ILA were pronounced, and made ILA beneficial in the treatment of ARF by facilitating lung-protective ventilation strategies. To our knowledge, this is the first Italian case report describing the usefulness of ILA device in cardiac surgery complicated by ARDS. This new system seems a useful ventilatory support in acute lung injury after CPB. Further studies should be addressed to assess its strength in improving mortality in cardiac surgical patients complicated by ARDS.

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HYPOXEMIA AFTER CARDIAC SURGERY: A COMPARISON AMONG PATIENTS WITH/WITHOUT CARDIOPULMONARY BYPASS

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INTRODUCTION. Cardiac surgery has important organic repercussion, specially at the respiratory tract. Cardiopulmonary bypass is widely accepted to be a major cause of postoperative morbidity, including hypoxemia. Over the last years, off-pump surgery has become a common practice, but there is little information about the rate of hypoxemia in this group and let alone comparing results with on-pump techniques.
Objective: to compare the incidence and clinical significance of hypoxemia in the early period after off-pump versus on-pump cardiac surgery (first 48 hours).

METHODS. DESIGN: Prospective observational study. SETTING: University hospital. INCLUSION criteria: Adult patients who underwent elective or emergency cardiac surgery with and without cardiopulmonary bypass (on-pump/off-pump). EXCLUSION criteria: Patients with pulmonary insufficiency, whatever the origin, prior to cardiac surgery. DEFINITIONS: Hypoxemia was arbitrarily defined as arterial oxygen tension-inspired oxygen concentration ratio (PaO2-FiO2) less than 200. STUDY PERIOD: three months. INTERVENTIONS: Preoperative respiratory history and pulmonary function test (PFT) were recorded. Over the first 48 hours after cardiac surgery, the PaO2-FiO2 ratio and oxygen saturation were recorded as well as symptoms and signs suggesting hypoxemia (dyspnea, tachypnea).

RESULTS. Over three months, 120 patients underwent cardiac surgery. Nineteen were excluded due to preoperative respiratory insufficiency or death within the first 6 hours after surgery. On-pump surgery was performed in 74.26% (75/101) and off-pump in 25.74% (26/101). Overall, hypoxemia was present in 26.73% (27/101), with 19 (25.3%) in the first group and 8 (30.77%) in the second one. Comparison among patients with hypoxemia in the on-pump/off-pump group showed: mean age: 65.4/67, men: 63%/87.5%, coronary patients: 39.8%/75%, currently or past smokers: 47.4%/75%, respiratory diseases: 47.4%/37.5%, abnormal PFT: 75%/60%. No risk factors: 42%/ 25%. Onset of hypoxemia in less than 12 hours: 57.9%/62.5%. Mild tachypnea: 52.6%/50%. Patients in the off-pump group were older, there were more men than women and more smokers although with less respiratory diseases and less proportion of abnormal PFT than those undergoing on-pump surgery.

CONCLUSION. This study shows that hypoxemia depicted by low Pa02-FiO2 ratio in the early period of cardiac surgery is common regardless of the procedure, and without marked differences in the onset of presentation or clinical manifestations.

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CAUDAL EPIDURAL ANALGESIA IN ESOPHAGEAL ATRESIA

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INTRODUCTION. Many congenital annomalies can endanger newborn children's life, one of these is esophageal atresia, which means an interruption of esophageal continuity.
Tracheoesphageal fistula is associated most times, but also different malformations can appear (Vacter syndrome). This anatomic defect requires surgycal correction in the first 24-48 hours of life.

METHODS. We report several cases of esophageal atresia associated to different tipes of tracheoesophageal fistula (tipe C and H). Preoperative cares included insertion of nasogastric tube with continuous low pressure suction, water-electrolite balance correction and albumin administration. Stomach descompression by gastrostomy was not achieve before surgery. General anesthesia was iniciated by fast intubation sequence and mechanical ventilation was kept, as an intensive hydric support. Before surgery, caudal epidural catheter was placed and rised until thoracic level T4-T5, to keep intra and postoperative analgesia.

RESULTS. After surgery, patients were moved to neonatal intensive care unit with ventilatory support and we started a continuous infussion of ropivacaine 0'125% to 0'4 ml/h through caudal catheter. This analgesia was kept for 72 hours, with good clinical evolution, what allowed an early and successful extubation in first 24 hours without respiratory disturbances.

CONCLUSION. Thoracic surgical damage is associated to numerous ventilatory problems during postoperative period. One of the main reasons for respiratory complications is hard pain associated to this surgery. An important strategy to avoid these complications is appropiate analgesia. Locorregional thoracic tecniques are rejected in infants, so caudal epidural catheter is a good alternative to get high thoracic levels. Low postsurgical pain is a preventive and therapeutic strategy to minimize ventilatory disturbances. The physiological hemodynamics, endocrine and respiratory effects are specially favorable with this tecnique.

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1040

A MULTIMODAL ANESTHETIC APPROACH FOR ESOPHAGECTOMY REDUCES POSTOPERATIVE PULMONARY MORBIDITY

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INTRODUCTION. Esophagectomy followed by gastric tube reconstruction is a major intervention, associated with frequent morbidity and mortality rates. Impaired tissue perfusion may lead to surgical complications such as anastomotic leakage or stenosis; whereas a general inflammatory response may lead to pulmonary morbidity in the postoperative period. Recent studies suggest that a multimodal approach of the peroperative regimen can improve the postoperative conditions in these patients.

METHODS. We introduced a multimodal anesthetic regimen, aimed at improved pulmonary function and stable hemodynamic conditions. Keystones of this regimen are thoracic epidural analgesia, restricted fluid regimen, hemodynamic support with vasopressive agents, and immediate postoperative extubation.

RESULTS. From June 2005 until February 2006, 41 patients were treated according to the new regimen (NR) and compared to a similar number of patients from the same period in 2004-2005 (old regimen: OR). Both groups were comparable for demographic data, ASA classification, type and duration of surgery, blood loss, urine output and use of vasopressive agents. Significantly less fluid was administered under the new regimen, resulting in a net positive fluid balance of 3.6 ± 0.3 l vs. 6.0 ± 0.3 l ($P<0.05$), in the NR and OR group respectively.
Within the first 10 postoperative days, 49% of the patients in the OR group vs. 18% in the NR group developed a pneumonia, as defined by findings on X-ray and a positive sputum culture ($P<0.05$). ICU stay was 5.5 ± 0.6 days in the NR group vs. 9.7 ± 2.0 in the OR group ($P<0.05$); total length of hospital stay was similar in both groups: 24.2 ± 2.4 days in the NR group vs. 20.5 ± 2.2 days in the NR group.

CONCLUSION. With the introduction of a multimodal anesthetic approach of esophagectomy patients, with limited fluid administration and early postoperative extubation, postoperative pulmonary morbidity and ICU stay could be significantly reduced. Despite the difference in fluid balance, peroperative urine production was similar in both groups, suggesting that an even lower net fluid balance can be achieved. Finally, the restricted fluid regimen did not result in an increased incidence of local anastomotic problems.

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PERIOPERATIVE COMPLICATIONS AFTER THYMECTOMY BY STERNOTOMY OR VAT IN PATIENTS WITH MYASTHENIA GRAVIS

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INTRODUCTION. The postoperative period after thymectomy in patients with myasthenia gravis (MG) is associated with several life threatening complications, including the exacerbation of MG symptoms with respiratory insufficiency, myasthenic crisis and other surgical and medical problems. It is generally accepted that the less invasive surgical procedures result in decreased perioperative stress with comparable outcome.
The aim of the study was to assess the incidence of the postoperative complications in the patients with MG who underwent thymectomy by VATS technique or sternotomy approach.

METHODS. We analyzed retrospectively 66 pts divided to the group A-40 pts after sternotomy and the group B-26 pts after VATS thymectomy. Incidence of respiratory insufficiency requiring prolonged ventilatory support, myasthenic crisis, postoperative bleeding and other complications in both groups were compared.

RESULTS. Demographic data, past clinical course of MG and grade of symptoms according to the Osserman classification, pyridostygmine requirement, ASA status, preoperative lung function tests, procedure length, anesthesia type, myorelaxants use and the histological findings were similar in both groups. Patients in the group A had more advanced MG symptoms according to MGFA Clinical Classification (p=0.04). Prolonged postoperative mechanical ventilation was necessary in 14 patients (35%) in the group A and 8 patients (31%) in the group B (NS). Myasthenic crisis developed in 3 pts (7.5%) in the group A and 4 pts (15.4%) in the group B (NS), with mechanical support lasting for 96±8.5h. In the group A one patient had resternotomy on the first postoperative day due to bleeding, in the group B two patients underwent conversion to thoracotomy due to intraoperative bleeding (NS). Blood transfusions were necessary in 3 patients in group A and 4 patients in group B (NS). Mean ICU length of stay were 3.4±1.9 vs 2.6±2.3 days in groups A vs B (p=0.06).

CONCLUSION. The incidence of perioperative complications after thymectomy performed by sternotomy and VATS were comparable.
The most frequent complication in the early postoperative period after thymectomy was prolonged respiratory insufficiency.
Myasthenic crisis after thymectomy occurred in 10.6% of patients.

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ADAPTIVE SUPPORT VENTILATION (ASV) AND REMIFENTANIL AS USEFUL STRATEGY FOR FAST-TRACK EXTUBATION IN CARDIAC SURGERY

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INTRODUCTION. The adaptive support ventilation (ASV) is a mode of mechanical ventilation that maintains a predefined minute ventilation by automatically adapting inspiratory pressure and ventilation rate depending on patients conditions. The aim of this study is to determinate the most useful extubation protocol in non-complicated cardiac surgery patients with a reduction of tracheal intubation time, reducing its complications and ICU lenght of stay.

METHODS. We examine 2 groups of 27 and 41 patients of cardiac surgery, without intraoperative complications and a extracorporeal pump less than 130 min. The group A (n: 25) follows a weaning protocol of ASV mode of ventilation (Hamilton Respirator Galileo) and the group B (n: 41) follows a weaning protocol of SIMV+PS (Hamilton Respirator Amadeus). Both were anesthesiated with combined sevofluorano and remifentanil and the postoperative sedoanalgesia was done only with a perfusion of remifentanil in the ICU. The weaning strategy was started after 2nd complete blood analysis that rule out any doubt of bleeding and all patients must be supported with a FiO2 of 0.5% (PaO2/FiO2 > 200).

RESULTS. The control group of SMIV+PS need more time for extubation (4.5 h +/- 1.25) compared with ASV group with a significative difference. The ASV group has lower respiratory parameters in Ppeak and RRate (p 0.05) with no diferences in acid-base analysis. The comfortability and safe of the weaning process with ASV was a good as the control group with SIMV+PS.

CONCLUSION. We think that remifentanil and ASV it's a good combination for fast-track extubation in a non-complicated patients of cardiac surgery. The administration of sort acting drugs with a combination of sedo-analgesia effects make us possible to use adaptative support ventilation that change the respiratory paramenters depending of patients collaboration. The ASV mode of ventilation is safe and confortable for patient and doctors.

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RISK FACTORS FOR PROLONGED ICU STAY AND EARLY DEATH FOLLOWING PULMONARY ENDARTERECTOMY

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INTRODUCTION. Pulmonary endarterectomy (PEA) is the treatment of choice for patients affected by chronic thromboembolic pulmonary hypertension. We studied pre and postoperative risk factors for prolonged ICU stay and early mortality after PEA.

METHODS. Between April 1994 and December 2005, 141 patients underwent PEA at our institution; 87 of these patients were admitted to our ICU for postoperative management. Early mortality was defined as death in ICU or within 60 days ICU discharge; ICU stay >6 days was judged prolonged.

RESULTS. Mean lengths of mechanical ventilation (MV) and ICU stay were 6.3 ± 8.6 and 10.6 ± 12.6 days. The early mortality was 5.7% (5/87). Patients who experienced early death were older (68.6 ± 7.5 vs 52.5 ± 14.9; p<0.01), had higher preoperative Pulmonary Vascular Resistance (1436 ± 349 vs 1029 ± 387 dynes s-1 cm-5; p<0.05) and Systemic Vascular resistance (2669 ± 448 vs 2115 ± 651; p<0.05), lower preoperative Cardiac Index (1.44 ± 0.28 vs 1.97 ± 0.52; p<0.02). Patients staying >6 days in ICU were older, had higher preoperative and also postoperative PVR (468 ± 225 vs 353 ± 254; p<0.02) and mean Pulmonary Artery Pressure (36.7 ± 8.6 vs 30.8 ± 9.4 mmHg; p<0.002). 24 patients (27.6%) showed postoperative PVR >500: compared with patients with lower postoperative PVR, they experienced more prolonged (18.2 ± 16.9 vs 7.7 ± 9.1 days; p<0.0002) and complicated ICU stay, in terms of length of MV (11.5 ± 11.8 vs 4.3 ± 6.0 days; p<0.0002), rate of extubation failure (42% vs 11%; p<0.01), pneumonia (50% vs 19%; p<0.05), need for tracheotomy (21% vs 3%; p<0.05). They also had worst gas exchange at any moment (preoperatively, at ICU admission, at the time of extubation and ICU discharge), needed more frequently inhaled nitric oxide (42% vs 16%; p<0.05), higher levels of PEEP (8.9 ± 2.1 vs 7.7 ± 1.9 cmH2O; p<0.01) and longer C-PAP administration after being weaned from MV (3.8 ± 4.7 vs 1.8 ± 1.2 days; p<0.01). High residual PVR following PEA did not affect mortality: only 1/24 patients with PVR >500 died (4.2%), compared with 4/63 patients with lower postoperative PVR (6.3%).

CONCLUSION. In our series, early mortality after PEA was associated with poor preoperative conditions. High residual PVR after PEA led to prolonged and complicated postoperative ICU stay, but did not increase early mortality rate.

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THE SUBMENTAL INTUBATION IN THE WEANING PROCCESS OF MECHANICAL VENTILATION AND EXTUBATION TIME OF HEAD AND NECK SURGERY. COMPLICATIONS

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INTRODUCTION. The submental intubation has developed a new alternative management of the airway in head and neck surgery. The indications of this technique have been defined during last years basically in mid facial trauma, oncology and other many situations. Some controversies are on the table about their complications specially compared with tracheotomy. The extubation moment is where anesthesist and intensivist feel safer with tracheostomy thinking that maxillary blocking and submental intubation are a high risk combination. The aim of this study is to compare both techniques and quantify the complications.

METHODS. We examine two groups of patients of n:16 and n:36 of head and neck surgery. The group A (n:16) was treated with a submental intubation for the performing of the surgery and the group B (n:36) was treated with tracheotomy. We compared the further complications, specially those related with the length of intubation and the length of mechanical ventilation and with the technique itself.

RESULTS. The results of this study show that there were no differences in the lenght of mechanical ventilation and the extubation, avoiding the complications of it. There were no differences in postoperative complications as bleeding, infection or re-intubation (only 1 in group A). The tracheotomy group need more re-exploration (4) in the OR for bleeding problems of tracheostoma and 1 patient needed a chest tube for neumothorax and subcutaneous enfisema. The tracheotomy group needed more transfusion of blood products but without significance.

CONCLUSION. The patients under submental intubation process dont have more complication than those with tracheotomy and can avoid the problems of an unnecessary tracheotomy. The weaning of mechanical ventilation is performed safely and as soon as with tracheotomy. We think that anesthesist/intensivist who are under responsibility of removing the tracheal tube and postoperative care need to know the safety of this technique and the importance of avoiding unnecessary or irreversible surgical procedures as tracheotomy for the patients.

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REIMPLANTATION DISEASE IN THE POSTOPERATIVE PHASE OF LUNG TRANSPLANTATION

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INTRODUCTION. Reimplantation disease (RD) is a postoperative complication in lung transplantation. It is defined as hypoxemia (PaO2/FiO2 ratio < 150 mmHg), radiologic infiltrates and decrease of lung compliance. The aim of this study was to analyze the incidence, possible correlated factors, outcome and prognosis of the patients with RD.

METHODS. 56 patients (37 men, 19 women) submitted to lung transplantation (6 singles, 50 bilateral) and admitted in the postoperative phase in our intensive care unit (period 2003-2005) were analyzed prospectively. Descriptive factors, surgical parameters and outcome in ICU were analyzed. Chi-cuadrado and t-Student tests were used for statistical analysis according to the different variables.

RESULTS. 23% of the patients (13/56) developed RD. Neither the age, sex or primary lung disease influenced the RD appearing. The only parameter correlated with the RD's appearing was the APACHE III to the arrival in ICU: 88±43 versus 60±31 (p:0.02). Isquemic or surgery times although were longer in the patients with RD did not attain the statistical significance. The patients with RD presented a progressive improvement, equalizing in the 72 following hours with the ones that did not present it. There were no statistically significant differences in mortality, duration of mechanical ventilation and length of ICU stay.

CONCLUSION. RD is a common complication in the postoperative phase of lung transplantation. It is correlated to a higher APACHE III. The prognosis is excellent with resolution in the 72 following hours without affecting the outcome of the patients during their ICU stay.

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ORGANIC DISFUNCTION AND INFECTION IN PATIENTS ADMITTED IN ICU UNDERGOING ESOPHAGECTOMY FOR NEOPLASIA

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INTRODUCTION. Esophagectomy for neoplasia is associated with a high morbidity and mortality. Organic disfunction and infection are frequent complications, and increases the length of stay and in-hospital deaths. Our aim was to analyze organic disfunction and infectious data of patients undergoing esophagectomy for neoplasia.

METHODS. Retrospective study of the patients admitted in our ICU between 1994 and 2004 in the immediate postoperative of esophagectomy. We registered the demographic data, organic disfunction and infection characteristics. Statistical analysis performed by SPSS 12.0.

RESULTS. We included 95 patients, median age of 64 years (P25:54, P75: 71), 82 men (86%) and 13 women (14%), median length of ICU stay of 4 days (P25: 2, P75: 8), median length of hospital stay 21 days (P25: 15, P75: 34), ICU mortality 6/95 (6%), total mortality 10/95 (10.5%). Hemodinamic failure was observed in 43/95 (45%), respiratory failure in 27/95 (28%) and renal failure 8/95 (8%). Infection, as positive cultures, was documented in 46/95 patients (48%). The first infection was diagnosed on day 7.5±4.7 and the second on day 12.7±8. The principal focuses were infection of the cervicotomy (37%), respiratory tract (30%), urinary tract (11%), primary bacteriemia (6.5%) and others (15%). The etiology was: P. aeruginosa 17.4%, E. coli 13%, meticillin-sensible S. aureus (MSSA) 11%, meticillin-resistent Staphilococcus aureus (MRSA) 11%, Enterobacter sp. 11% and S. pneumoniae 11%. A second infection was detected in 8/95 patients (8.4%). There were 14/46 (30%) of early-onset infections and 32/46 (70%) of late-onset infections. The most frequent early-onset focus was the respiratory tract, and infection of the cervicotomy for the late-onset focus (p<0.002). The etiolgy for early-onset infection was: E.coli 21.4%, H. influenzae 21.4%, P. aeruginosa 14.3%, Citrobacter sp.14.3% and S. pneumoniae 14.3%. For late infection: P. aeruginosa 19%, MSSA 15.6%, MRSA 15.6% and Enterobacter sp. 15.6%.

CONCLUSION. The most frequent complications in postoperative esophagectomy for neoplasia are infection, hemodinamic and respiratory disfunction. When an early-onset infection is suspected we should first think about respiratory focus, and cover Gram-negative bacilli, including P. aeruginosa. In the presence of a late-onset infection, the focus is mainly surgical, and the suspected etiology are P. aeruginosa, MRSA and other nosocomial agents.

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CORRELATIONSHIP BETWEEN HEMODYNAMICS AND LIMON IN CARDIAC SURGERY PATIENTS

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INTRODUCTION. Liver monitoring with LIMON and Indocyanine-Green Plasma Disappearance Rate (ICG-PDR) has been associated to prognosis in ICU patients (1,2). It is still unknown the ICG-PDR relationship with regional and global perfusion.

METHODS. Prospective study in a 8 bed cardiac surgery ICU. We registered the ICG-PDR, intraabdomial pressure (IAP), hemodynamic variables (CI, SVRI) and lactate and amylase samples at 12 h (t-12) and 24 h (t-24) after admission. Pathological results were considered if ICG-PDR was below 16%/min. Group I included patients with ICG-PDR below 16%/min. In Group II ICG-PDR was equal or superior to 16%/min. Statistics:Significance was considered if p<0.05 and applied ANOVA tests.

RESULTS. We included 108 patients; There were 73 male patients(67.6%); Median age was 69 years old. There were 27 patients in Group I at t-12 and 18 patients at t-24. There were 81 patients in Group I at t-12 and 89 patients at t-24.

TABLE 1.
Main Results

	CI	SVRI	Lactate	IAP	Amilase
Group I t-12	2.71 (0.64) *	2153.8 (802)	2.7 (1.88)	15.85 (6)	293.6 (388.4)
Group I t-24	2.67 (0.53) **	1933.6 (504.7)	1.98 (0.97)	13 (5.35)	360.8 (562.2)
Group II t-12	3 (0.62)	1885.2 (447)	2.08 (1.4)	15.5 (5.5)	105.5 (131)
Group II t-24	3 (0.5)	1732.6 (423)	1.6 (0.63)	14.7 (4.8)	196.3 (410)

** p 0.034; ** p 0.006*

CONCLUSION. Cardiac index seems to correlate well with ICG-PDR. Probably ICG-PDR is influenced by cardiac function because of changes in regional perfusion. Other variables had also a tendency of worse results in Group I. IAP do not correlate with ICG-PDR.

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THE AUDITORY EVOKED POTENTIALS INDEX VS. BISPECTRAL INDEX TO DETECT SEDATION LEVEL IN ICU PATIENTS

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INTRODUCTION. Usefulness of the bispectral index (BIS; Model A-1050; Aspect Medical Systems Inc., Natick, MA) and the auditory evoked potentials index (AAI; Alaris aepTM, Alaris, Hampshire, UK) to detect the sedation level in the intensive care unit (ICU) have been controversial (1,2). The aim of the present study was to compare the AAI and the BIS in relation with the Observer's Assessment of Awareness/Sedation (OAA/S) score in mechanically ventilated patients sedated with propofol in the ICU.

METHODS. After the approval of the research committee and informed consent, 40 patients who underwent mechanical ventilation in the ICU were enrolled in this study and randomly divided into two groups. They were sedated with propofol 1-3 mg/kg/hr to obtain the OAA/S score at 1-4. OAA/S score and the AAI and the BIS were measured 10 times in each patient. Values were analyzed by fractorial measures analysis of variance with Bonferroni correction as a post hoc test. A p-value < 0.05 was considered to be statistically significant.

RESULTS. Patients were 20 male and 20 female. Score dependent differences were observed in the AAI, while no differences were seen in the BIS among the different OAA/S scores.

TABLE 1.

	OAA/S 1	OAA/S 2	OAA/S 3	OAA/S 4
AAI	22 ± 19	31 ± 18*	53 ± 24**	71 ± 24***
BIS	69 ±15	71 ± 16	73 ± 21	80 ± 16

**p < 0.05 vs OAA/S 1, **p < 0.05 vs OAA/S 2, ***p <0.05 vs OAA/S 3*

CONCLUSION. The AAI could differentiate OAA/S score 1, 2, 3 and 4 in mechanically ventilated patients sedated with propofol, whereas the BIS could not.

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AUTOMATED WEANING FROM MECHANICAL VENTILATION WITH A NEW KNOWLEDGE BASED SYSTEM

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INTRODUCTION. Knowledge based systems (KBS) may be of benefit in weaning patients from mechanical ventilation [1]. Most of the existing systems exhibit several limitations mainly because they control only a limited number of ventilation parameters [2,3]. We present here a novel KBS for automated weaning from mechanical ventilation based on four aspects of ventilation (alveolar ventilation, oxygenatory performance, spontaneous breathing activity, ventilatory load).

METHODS. The KBS was implemented on a computer which remotely controlled a commercially available respirator (EVITA 4, Dräger Medical, Lübeck, Germany). The applicability and safety of the KBS was studied in 19 hemodynamically stable and mechanically ventilated patients. Its effectiveness in reducing the ventilatory load was determined using a newly developed score system. Ventilator settings chosen by the responsible physician were compared with the settings 10 min after the start of the KBS and at the end of the session.

RESULTS. Early settings applied by the KBS did not significantly differ from the initial settings, except of a decrease of the inspired fraction of oxygen. During the later course, the KBS significantly modified most of the ventilator settings and reduced the imposed ventilatory load. The mean time on the KBS ($\pm$ SD) was 173 $\pm$ 53 min. No unsafe ventilator settings and no failure of the KBS occurred. All patients were successfully transferred from controlled ventilation to assisted spontaneous breathing in a mean time of 37 $\pm$ 17 min. 15 patients could be extubated immediately after the weaning with KBS.

CONCLUSION. The new KBS is able to find safe ventilator settings and to decrease the ventilatory load of mechanical ventilation. The practicability, efficacy, and usability of the system have to be examined in randomized controlled trials using different closed-loop controlled ventilators.

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INFLUENCE OF GAS COMPOSITION AND PEEP ON REGIONAL LUNG VENTILATION AND AERATION EVALUATED BY EIT

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INTRODUCTION. Atelectasis formation is an important factor for the deterioration of gas exchange during mechanical ventilation. A large fraction of inspired oxygen (F_IO_2) is associated with atelectasis formation whereas the application of positive end-expiratory pressure (PEEP) improves gas exchange by recruiting non-ventilated regions. The aim was to investigate the influence of F_IO_2 and PEEP on regional ventilation and aeration by electrical impedance tomography (EIT).

METHODS. 8 anesthetized supine pigs (39 $\pm$ 4 kg) were ventilated in a volume-controlled mode with constant tidal volume (394 $\pm$ 72 ml) and a respiratory rate of 20 breaths/min. F_IO_2 was changed from 0.21 to 1 and back to 0.21. At each F_IO_2 the animals were ventilated without PEEP for 15 min followed by a 5-min period of 5 cmH_2O PEEP. EIT measurements (Goe MF II, Viasys Healthcare, Höchberg, Germany) were performed by the end of each period. Changes in regional ventilation and aeration were quantified by determining changes in local tidal and end-expiratory impedance, respectively. For data analysis, each lung was divided into 4 regions of interests, located in the ventral, mid-ventral, mid-dorsal and dorsal areas.

RESULTS. Regional lung ventilation was significantly reduced in the two ventral regions by an increase in PEEP from 0 to 5 cmH_2O. Opposite behaviour was observed in the two dorsal regions. These effects occurred at all consecutive F_IO_2 stages. At zero end-expiratory pressure, a small decrease in ventilation was found in the dorsal region at consecutive measurement phases. Lung aeration increased significantly in the ventral to mid-dorsal regions with rising PEEP. In the dorsal region, lung aeration increased only slightly at F_IO_2 0.21 and remained constant at 1. Local lung aeration decreased with time in all regions at equivalent PEEP levels, mostly pronounced in the dorsal area.

CONCLUSION. EIT is a suitable, non-invasive method for detecting PEEP-induced changes in regional lung ventilation and aeration. The application of PEEP resulted in a redistribution of ventilation with a shift from ventral to dorsal regions independent of F_IO_2. Although tidal changes in regional air content increased with rising PEEP in the dorsal region, the end-expiratory air content was only minimally affected by PEEP at F_IO_2 0.21 and unaffected at 1. Therefore, a PEEP of 5 cmH_2O might not prevent alveolar collapse in this dependent part of the lung, especially at F_IO_2 of 1.

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AUTOMATED ELECTRONIC URINE MEASUREMENT IN CRITICALLY ILL PATIENTS

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INTRODUCTION. Measurement of urine output is a critical requirement in the ICU. Although technology has improved the gathering of physiological data so that all information can be collected automatically, urine output measurement for the most part still depends on manual evacuation of a urine collection container by a clinician. Automated measurement of urine output could be expected to improve accuracy of fluid management, and reduce nursing workload. Despite this, equipment for automated urine measurment is very uncommon in modern ICUs. A new technology for flow measurement was applied to the development of an automated urine flow meter.
We describe our initial experience with a novel, automatic urine flow meter (VitalFlo-AUM) in a group of critically ill patients following cardiac surgical procedures.

METHODS. 20 patients following cardiac surgery who had an indwelling urinary catheter to monitor urine output were enrolled in the study. The protocol was approved by the hospital ethics committee. Informed consent was given by the patient's next of kin. Patient's Foley catheter was connected in series to the VitalFlo-AUM and to a standard urine collection container. Urine output was measured hourly by the nurse in the standard fashion from a urine collection container and compared to the automatic urine measurement. Duration of monitoring was until the patient left the ICU or 5 days, whichever came first. In 5 patients, the urine measurement was also compared to an electronic scale on which the urine was weighed. Statistical analysis was performed using Spearman's correlation for correlation between VitalFlo-AUM, and urine weight, and Bland-Altman analysis to compare VitalFlo-AUM to manual aeasurements.

RESULTS. 20 patients were monitored for a range of 5-138 hours (Mean 51.75+/-35.3). Urine output ranged from 319 to 15.280 ml (Mean 5768+/-4269.2ml). When compared to the weight of the urine, the automated measurement was found to be very accurate (R2=0.98, P<0.0001). Comparison to manual measurements was performed in 1082 measurement points with Bland Altman analysis. The bias of VitalFlo-AUM compared to manual measurement was -1.7ml with 95%CI -4.15 to 0.55 ml.

CONCLUSION. VitalFlo-AUM is an accurate instrument for measurement of urine output in critically ill patient, over a wide range of urine output and for a prolonged time span.

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EVALUATION OF THE ELECTRONIC FLOW METER (MED-DYNAMIX ISRAEL) COMPARED WITH A STANDARD UROMETER

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INTRODUCTION. Standard urometers (SU) are associated with a degree of inaccuracy. The Urexact is a continuous electronic urine flow meter that is designed to reduce error. Our preliminary evaluations over 6hrs revealed that Urexact was on average within 10% accurate of total urine output. However no direct comparison at 24hrs of the two methods is currently available. To ascertain the accuracy of Urexact, we compared it against the standard urometer used on the ICU over a 24 hr period, since this time is appropriate for the calculation of the fluid balance of ICU patients.

METHODS. The urine output (UO) of twenty ICU patients for 24hrs was measured using the SU (n=10) or the electronic Urexact device (n=10). At baseline all urine bags were emptied and the Urexact device was zeroed. At the end of the 24hr period, the accuracy of the two devices was further assessed by manual measurements using a 50ml syringe. The manual measurements were compared against the nursing documentation in the SU group and against the memory of the electronic device for the Urexact group. For all measurements taken from nursing documentation, the risk of cumulative calculation errors was eliminated due to the use of a Patient Data Management System on the ICU.

RESULTS. SU: UO over 24hrs in this group was a mean +/-SD (range) of 1416 +/-847ml (77 to 3594ml). The %difference in measurements ranged from 2.1% to 50% difference from manual measurements, with a mean %difference of 21.6% of total 24hr UO. This indicates that the device was within 10% accurate 30% of the time. Bland-Altman plot of the distribution of the readings showed a bias (limits of agreement) of -189ml (-574 to 196) indicating that the urometer was consistently overestimating.
Urexact: UO over 24hrs in this group was 1416 +/-1072 (828 to 2591ml). The mean %difference from manual was 8.4% (-21% to 23%). The individual measurements were within 10% accuracy 60% of the time. Bland-Altman plot showed that the device was equally accurate with low and high volumes of urine independently from the degree of urine concentration. Compared to the standard urometer, Urexact had a smaller bias of 72ml (-543 to 397).

CONCLUSION. Urexact was easy to use and overall more accurate than the standard urometer even after correcting for arithmentic inaccuracies of the manual method.

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BRONCHIAL MICRODIALYSIS: A METHOD FOR MONITORING THE EPITHELIAL LINING FLUID

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INTRODUCTION. Contents of the epithelial lining fluid (ELF) of the bronchi is of central interest in lung diseases and in acute lung injury. Monitoring the ELF of the bronchi is difficult. Most techniques as broncheoalveolar lavage etc. are invasive and may cause lung injury. Microdialysis (MD) is a method for continuous sampling of extracellular molecules in the immediate surroundings of the catheter. Urea and lactate moves freely over the blood-bronchial barrier (pilot studies), and urea can be used as an endogenous marker of dilution in samples collected from the ELF (1). The aim of this study was to evaluate bronchial MD as a method for continuous monitoring of the ELF

METHODS. Five pigs (22-31kg) were anesthetized, monitored and normoventilated with a PEEP 7 cmH2O and PIP of <= 20 cmH20. Microdialysis catheters (CMA, Custom made, 100 kDa membrane "cutoff", 10 mm membrane length) were introduced into the right subclavian artery and into the right main stem bronchus, forwarded until wedging in a distal bronchus and then retracted 0.5-1 cm to avoid atelectasis. Insertion of the bronchial catheter was guided fibreoptically. Both MD catheters were perfused by phosphate buffered saline at a flowrate of 2 µl/min. Samples were collected in 60 min fractions and analyzed on site for lactate and urea using peroxidase methodology (CMA600). After a 60 min baseline period an intravenous infusion of lactate was started to maintain blood-lactate levels ∼5 mmol/L for 2 hrs and ∼10 mmol/L for 2 hrs (2).
Accuracy was defined as [bronchial MD] divided by [arterial MD] in percent. The accuracy of bronchial MD was calculated with and without correction by the arterial-bronchial ureagradient (3).

RESULTS. The accuracy of bronchial MD with a continuous lactate infusion was mean 25.5% (range 5.7-59.6%) with a coefficient of variation (CV) of 62.6%. The accuracy of bronchial MD with a continuous lactate infusion and a correction by the arterial-bronchial urea-gradient was mean 79.0% (range 57.3-108.1%) with a CV of 17.0%.

CONCLUSION. Bronchial MD is a possible technique for continuous monitoring of the composition of the ELF. Urea as a marker of dilution enhances bronchial MD and makes it useful for monitoring substantial changes in the composition of the ELF

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INFLUENCE OF VENO-VENOUS RENAL REPLACEMENT THERAPY ON TRANSPULMONARY THERMODILUTION MEASUREMENTS

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INTRODUCTION. In principle, various factors may influence the accuracy of transpulmonary thermodilution. We analyzed whether veno-venous renal replacement therapy (RRT) has impact on the measurement of cardiac index (CI), intrathoracic blood volume index (ITBVI) and extravascular lung water index (EVLWI).

METHODS. With ethics approval, we studied 24 critically ill patients (9 female, 15 male) undergoing monitoring by the transpulmonary thermodilution technique for clinical indication and veno-venous RRT. All patients had a 5F-femoral arterial catheter and monitoring system (PV2015L20, Pulsion Medical Systems). 12 patients had a femoral venous 12F-dialysis catheter in situ (Trilyse Expert, Vygon) and 12 patients one placed in the V. cava superior. All patients received heparin for anticoagulation of the extracorporeal circuit. Measurements of CI, ITBVI and EVLWI were performed in triplicate by injecting 15 ml of saline (4-6°C) through the distal port of a triple lumen central venous catheter (Certofix Trio, Braun, Melsungen) into the V. cava superior during RRT, during shortly interrupted therapy (disconnection) and immediately after reconnection.

RESULTS. Global hemodynamics were comparable at the three time points (mean standard deviation).
During RRT, CI (mean change -0.1 l/min/m^2, p< 0.01) and ITBVI (mean change -18 ml/m^2, p= 0.02) were significantly lower. However, EVLWI was not influenced by RRT (mean change +0.1 ml/kg, p= 0.42).

TABLE 1.

Parameter	RRT	No RRT	RRT
Heart rate [1/min]	99 ± 27	100 ± 27	99 ± 27
MAP [mmHg]	74 ± 14	76 ± 12	74 ± 13
CVP [mmHg]	14 ± 4	14 ± 4	14 ± 4
CI [l/min/m^2]	3.8 ± 1.4	3.9 ± 1.3	3.8 ± 1.3
ITBVI [ml/m^2]	934 ± 254	945 ± 255	920 ± 247
EVLWI [ml/kg]	8.3 ± 3.7	8.3 ± 3.6	8.4 ± 3.6

CONCLUSION. Running RRT had no clinically relevant impact on the accuracy of the measurement of CI, ITBVI and EVLWI by transpulmonary thermodilution.

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INTENSIVE INSULIN THERAPY AND BLOOD SAMPLING

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INTRODUCTION. Intensive insulin therapy (IIT) has been shown to produce both mortality and morbidity benefits in the critically ill (1) and has been gaining acceptance as the standard of care in these patients. There are different regimens for IIT but all require frequent measurements of blood glucose. Frequent blood sampling has been recognised as a significant contributor to anaemia on the intensive care unit and we therefore wished to assess the impact of IIT on Hb and blood transfusion requirements.

METHODS. Data were extracted from the records of patients enrolled in a recent dual-centre trial of ITT based at Addenbrookes Hospital (AH) Cambridge and the Queen Elizabeth Hospital (QEH) King's Lynn, ethical approval granted. There were two regimens for blood sampling; in the first unit (QEH) a protocol is in use which limits the volume of wastage when blood is drawn from an arterial line, uses minimum amounts for the sample and returns blood within the line to the patient. In addition only finger prick samples were used for the measurement of blood glucose. The second unit (AH) had no protocol for blood sampling and commonly used Arterial Blood Gas (ABG) samples to measure blood glucose. Hepatology patients were excluded for the purposes of this analysis as this group represent a tertiary referral service of AH which is not reflected at QEH and this group could also be expected to have significantly disturbed glucose control as well as a significantly higher transfusion requirement. Data were analysed with Student T-test and Mann-Whitney U test (SPSS Ver 12.0.2 for windows.)

RESULTS. The data from 221 patients were extracted of which 7 (3.2%) were excluded due to incomplete information. There were statistically significant differences in mean Hb concentration (QEH 10.83g/dl vs AH 10.24g/dl, student t-test, p=0.08) and median number of units transfused per patient (QEH 0 vs AH 2, Mann-Whitney U test, p=0.01) between the two hospitals. There was no significant difference between the two groups in respect to daily mean glucose measurements (student t-test, p=0.590).

CONCLUSION. If IIT is to be universally adopted consideration must be given to blood sampling methods. We recommend finger prick blood drop sampling for IIT and a minimal blood loss technique for ABG sampling.

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TIGHT GLYCAEMIC CONTROL IN ICU WITH MODEL PREDICTIVE CONTROL AND TIME-VARIANT SAMPLING

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INTRODUCTION. Tight glycaemic control (TGC) with intensive insulin therapy (IIT) in critically ill patients saves lives and decreases morbidity. (1,2) Currently used algorithms to implement TGC are not always efficient. We developed a fully automated algorithm based on a model predictive controller (MPC) driving the insulin infusion. This study evaluates MPC in mechanically ventilated ICUpatients for 72 consecutive hours.

METHODS. 10 adult ICU patients were included. Safety was assessed by the number of hypoglycaemic events [blood glucose (BG)<2.2mM]. Efficacy was assessed by calculating average daily BG, time-to-BG-target (BG<6.1mM), hyperglycaemic index (HGI)(3) and frequency of BG measurements.

RESULTS. There were no hypoglycaemic events. Median BG was 6.1mM (IQR:6.0-6.2), frequency of BG-measurements 101min (96-103), HGI 0.35mM (0.29-0.47), and time-to-BG-target 438min (281-554). Daily data are shown in the table (median and IQR). BG was higher at day 1 than at day 2 and 3(p<0.05). Differences between day 2 and 3 was not significant. HGI at day 1 was higher than at day 2 and 3(p<0.05). Difference between HGI on day 2 and 3 was not significant. HGI was lower than the target of 1.5mM in all cases. Frequency of BG analysis was lower at day 2 and 3 than at day 1(p<0.05). Difference between sampling interval on day 2 and 3 was not significant.

TABLE 1.

	BG (mM)	HGI (mM)	Frequency (min)
Day 1	6.6 (6.3-7.0)	0.82 (0.54-1.17)	80 (76-90)
Day 2	5.5 (5.3-5.8)	0.04 (0.00-0.17)	120 (96-160)
Day 3	5.6 (5.2-6.4)	0.19 (0.00-0.40)	144 (103-160)

CONCLUSION. Use of MPC in the ICU was safe in patients with prolonged mechanical ventilation. After the first day, the sampling frequency reduced and TGC was maintained. Within 8 hours of IIT driven by MPC, BG was in the target range. HGI, an indicator of BG control reflecting BG values above the target range, was very low.

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COMPARISON OF PULSE CONTOUR WITH PULSED HEAT CONTINUOUS CARDIAC OUTPUT DURING PERIODS OF INSTABILITY

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INTRODUCTION. There is uncertainty regarding the agreement between transpulmonary aortic thermodilution (TDtpa), pulse contour analysis (PCCO) and pulsed heat thermodilution (CCO) cardiac output (CO) measurements during rapid haemodynamic changes. We therefore studied the agreement, in terms of bias (mean difference between methods) and limits of agreement (LOA) (+2SD of differences), of the measures of cardiac index (CI) and ΔCI induced by VL; and by comparing digital recordings made during periods of haemodynamic instability.

METHODS. We studied 12 sedated and mechanically ventilated patients, post coronary artery bypass graft surgery. Each had a 7.5F CCO catheter (Edwards Lifesciences) and a 5F, 20 cm PCCO femoral artery catheter. We analyzed 45 data sets taken before and after 25 VL of 5 ml of 4% Albumin solution per Kg body weight. In a subgroup of patients, digital recordings were made of the monitor outputs.

RESULTS. The patients had a median (range) age of 62.5(50 to 85) years and were predominantly male (n=10/12). The mean (SD) TDtpa CI, PCCI and CCI, were 2.9(0.7), 2.9(0.7) and 2.7(0.6)L/min/m2 respectively. For pooled data TDtpaCI v PCCI, TDtpaCI v CCI and CCI v PCCI revealed bias (LOA) of 0.02(0.4), 0.3(0.8) and –0.2(1.0) L/min/m2, with mean errors of 13.8%, 28.6% and 35.7% respectively. The comparison of ΔCI, induced by a VL, demonstrated poor agreement of TDtpaCI with CCI and CCI with PCCI with bias (LOA) of 2.4% (39.6%) and 0.9% (45.6%) respectively. The agreement between TDtpaCI and PCCI remained reasonable (bias (LOA) 1.7% (23%)). Digital recordings, in four patients, showed lack of agreement (CCO v PCCO) during periods of haemodynamic instability and introduction of vasoactive infusions. Also abrupt short lived changes due to heart rate fluctuations were observed with PCCO while CCO didn't capture such events.

CONCLUSION. After calibration PCCI has acceptable agreement with TDtpaCI but not CCI; and tracts changes in CI induced by rapid preload increase and abrupt short lived changes to heart rate, whilst CCI does not. However, PCCI develops significant error requiring very frequent recalibration during periods of haemodynamic instability and vasoactive drug infusion.

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NOVEL BREATH BY BREATH METHOD FOR QUANTIFICATION OF AUTOPEEP

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INTRODUCTION. Quantification of the level of autoPEEP has important implications in the management of patients on both non-invasive and invasive mechanical ventilation. We have developed a non-invasive breath by breath method for the determination of autoPEEP. It is based on an end-tidal dilution of the capnogram (etCO2D) measured at the airway opening connection of a Y-piece that includes two unidirectional valves in each of its limbs. One of the limbs is connected to a ventilator capable of maintaining a constant pressure during expiration and the other is open to atmosphere. When intrathoracic end-expiratory pressure in the patient (= the autoPEEP) exceeds the pressure coming from the ventilator a normal complete capnogram is obtained. However, whenever the pressure coming from the ventilator exceeds the level of autoPEEP, the capnogram will be diluted in a characteristic manner[1].

METHODS. In two anesthetized, relaxed and mechanically ventilated pigs (30 kg bw) dynamic hyperinflation was induced by the interposition of a resistance at the proximal end of the endo-tracheal tube. Airway pressure, flow and concentration of exhaled CO2 were measured at the airway opening. Combining different I:E ratios, respiratory rates and tidal volumes, 14 different levels of auto PEEP (range 2.9 – 11.3 cmH2O; mean 7.24 ± 2.3 cmH2O) were studied. At each experimental setting the reference level of autoPEEP was measured by the occlusion method and compared with the etCO2D method. The level of external end-expiratory pressure on the ventilator was increased in steps of 0.2 cmH2O starting from 2 cmH2O below the measured occlusion value until a dilution of the capnogram was observed.

RESULTS. AutoPEEP determined by the occlusion method and etCO2D showed a good linear correlation (R2=0.967; p<0.001) and intra-class correlation coefficient (0.97; p<0.001). These results showed a good agreement also in the graphical Bland-Altman residual analysis. EtCO2D was capable of determining autoPEEP within 0.2 cmH2O of the reference value.

CONCLUSION. This method is a promising accurate and simple way to determine autoPEEP in patients receiving either invasive or non-invasive ventilatory support.

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EFFECT OF I.V. FENTANYL AND PROPOFOL ON BIS INDEX CHANGES DURING TRACHEAL SUCTION IN ICU PATIENTS

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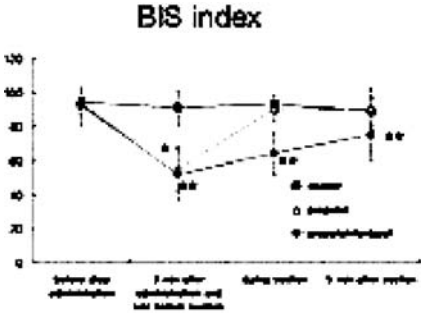
INTRODUCTION. Ensuring adequate sedation and analgesia is an important goal of care of critically ill patients. Bispectral (BIS) index monitoring could be sensitive to the nociceptive stimuli experienced by critically ill patients. The goal of the present study was to evaluate the effect of an intravenous fentanyl and propofol on the variation in BIS level associated with tracheal suction, a stimulus often reported as particularly painful by critically ill patients.

METHODS. 30 ICU conscious patients intubated or with tracheostomy were randomly assigned in 3 groups. Normal saline (control group), propofol 1mg/kg (propofol group), and propofol 1mg/kg plus fentanyl 1 mcg/kg (propofol+fentanyl group) was administered respectively before tracheal suction. We monitored BIS index, blood pressure (SBP and DBP), heart rate and oxygen saturation during the procedure.

RESULTS. BIS index was significantly reduced in propofol+fentanyl group (64±12) compared with control (93±5) and propofol (90±8) group. SBP, DBP and heart rate was significantly reduced in propofol+fentanyl (98±14, 61±12, 72±9 /min) and propofol (107±19, 69±22, 89±18 mmHg) group compared with control group (135±21, 89±15, 110±23 mmHg).



CONCLUSION. Intravenous propofol and fentanyl co-administration before tracheal suction could alleviate the change of BIS index, blood pressure and heart rate by the suction procedure. But only propofol administration could not alleviate the change of BIS index.

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THE EFFECTS OF MECHANICAL VENTILATION MODES ON GEOGRAPHICAL DISTRIBUTION OF LUNG AIRFLOW

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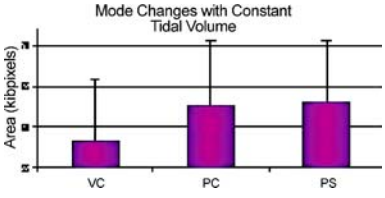
INTRODUCTION. Vibration response imaging (VRI) is a novel imaging technology that measures vibration energy emitted during the ventilation process. The vibrations are detected and displayed by 34 sensors, which are spatially distributed and attached to a patient's back. As air moves in and out of the lungs, the vibrations propagate through the lung tissue and the vibration energy is transmitted to the VRI device and a dynamic digital image is created using proprietary software. The VRI provides an opportunity to observe the effects of different ventilator modes on the geographical distribution of lung vibration during ventilation.

METHODS. Stable, mechanically ventilated patients in the ICU requiring minimal ventilatory support were identified. Serial VR imaging was performed on 26 patients during volume control (VC with square inspiration), pressure control (PC) and pressure support (PS) modes of mechanical ventilation. Tidal volume was held constant (pressure adjustant with PC and PS) control. Geographical area of VRI images was measured at maximal inspiration using digital software. Statistical analysis was done using t-test.

RESULTS. Compared to VC, area of vibration as a surrogate of ventilation were greater for PC (p<0.000001) and PS (p<0.0001) (figure 1).



CONCLUSION. Spatial distribution of vibration in the lungs at maximal inspiration energy was significantly greater in PC and PS compared to VC modes of ventilation. Decelerating flow patterns in both PC and PS modes may provide greater distribution of ventilation of the lungs, as observed at the bedside using VR imaging.

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ADVANTAGE AND DISADVANTAGE OF ECHOCARDIOGRAPHY IN CRITICAL ILL PATIENTS

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INTRODUCTION. The echocardiography in critical ill patient is used like bedside imaging technique for a rapid control of the cardiovascular system. The aim of this report is review the utility of the transthoracic (TTE) and transesophageal (TOE) echocardiography.

METHODS. We make 280 random echocardiographies studies (213 TTE and 67 TOE) in the period of six months to 216 patients admitted to polyvalent intensive care unit (ICU) with 24 beds. The studies were realizad with a Phillips 5000 echocardiography: harmonic transducer S3 for TTE and TS6HC transducer for TOE. A descriptive study was performed for analyse the profitability diagnostic, adopt therapeutic decisions with the two echocardiography modalities (TTE and TOE) and the quelity of the images in both studies. Profitability diagnostic: reject or confirm the diagnostic.

RESULTS. The population of study were composed of: 74.5% medical pathology, 21% traumatic patients, 4% cardiology pathology and 0.5% surgery patients. The quality of images studies were good in 63 TOE and 179 TTE (94% and 84% respectively). The profitability diagnostic in the TOE was 86.5% (confirm 34.3%; rejected 52.5%) and 62% in the TTE (corroborated 25.8%; reject 36.2%). The reasons to realize the echocardiography in the patients were: Fever / Bacteriemia in the 36.4% cases, 15.7% respiratory failure, 6% hemodynamic monitoring and 7% thoracic injury. The therapeutic management changed according to the result of echocardiography in the 34.3% of the TOE and 27.2% of the TTE.

CONCLUSION. We observed a more quelity in the images obtained with the TOR than TTE, but the TTE has a good profitability diagnostic. In the 27% of TTE and 35% of TOE are useful for the therapeutic management. The 56% of TTE were a good techique for hemodynamic monitoring.

Grant acknowledgement. University Hospital Juan Canalejo

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THE EFFECTS OF SEMI-RECUMBENCY IN VENTILATED MORBID OBESE PATIENTS

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INTRODUCTION. Little is known about the physiologic effects and beneficial mechanism of the 45 degrees (semi-recumbent) position. The effects of 45 degrees position on the peripheral oxygen saturation (SpO2) end tidal CO2 (ETCO2) and the rapid shallow breathing index (RSBI) were observed in relation with the body mass index (BMI) especially in morbid obese patients.

METHODS. Eight patients with a BMI > 40 were studied for effects of < 10 degrees (supine) position and 45 degrees position. Body position was changed with a Total Care® bed (Hill-Rom) after results of baseline (10 degrees) were obtained. We also lowered the legs to obtain a reverse Trendelenburg position. The results of body position change in the individual patients were analysed with paired samples T test.

RESULTS. In all patients the SpO2, ETCO2 and RSBI improved significantly after patients were placed in the 45 degrees position.

TABLE 1.

	Mean	Std Deviation	Significance
SpO2 difference Basal minus semi-recumbent	-1.00	1.20	0.05
End-tidal CO2 % Basal minus semi-recumbent	0.65	0.32	0.001
RSBI Basal minus semi-recumbent	9.50	7.78	0.011

Results of semi-recumbent position for SpO2, End-tidal CO2 and RSBI differences

CONCLUSION. There is an improvement of the SpO2, ETCO2 and RSBI in morbid obesity. This is the reason why we think that morbid obese patients benefit from the 45 degrees position with lowered legs, in artificial ventilation.

Poster Sessions
ALI/ARDS, recruitment manœuvres, ECMO
1062-1074

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INFLUENCE OF POSTURE AND PEEP ON V/Q INHOMOGENEITY IN MECHANICALLY VENTILATED SHEEP

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INTRODUCTION. Oxygen tension in expired gas is higher than in arterial blood indicating nonideal gas exchange in the lung. This is due to ventilation (V)-perfusion (Q) mismatch, which depends on three factors: heterogeneity of V and Q distributions and the correlation between V and Q (1). The aim of this study was to examine if improvement in oxygenation with PEEP and/or prone posture was due to more homogenous distribution of V, Q or a higher correlation between them.

METHODS. V and Q were measured in sheep in prone (n=8) and supine (n=8). Each animal was studied in either posture with 0 or 10 cmH_2O PEEP (0 PEEP or 10 PEEP). V and Q were measured by analysing deposition of an aerosol of fluorescent microspheres and i.v. injection of radioactive microspheres. Lungs were dried post-mortem and cut into about 1000 pieces per animal. Heterogeneity of V and Q was expressed as the coefficient of variation, and V/Q heterogeneity as SD logV/Q.

RESULTS. Estimates of V, Q and V/Q heterogeneities were significantly larger in supine than in prone posture (Table). Even though correlation between V and Q was lower in prone PaO_2 was high, because V and Q distributions were homogeneous. Heterogeneity of V and Q distributions increased with 10 PEEP in supine but because correlation between V and Q increased, V/Q heterogeneity decreased and PaO_2 tended to improve.

TABLE 1.

	Prone 0 PEEP	Prone 10 PEEP	Supine 0 PEEP	Supine 10 PEEP
Vcv	0.58 (0.09)*	0.56 (0.29)*	0.83 (0.10)	0.89 (0.10)
Qcv	0.39 (0.11)*	0.32 (0.07)*	0.62 (0.10)	0.69 (0.10)
Correlation	0.66 (0.16)	0.56 (0.13)*	0.69 (0.26)	0.77 (0.20)
SD logV/Q	0.22 (0.05)*	0.21 (0.09)*	0.37 (0.07)	0.32 (0.07)
PaO_2 (kPa)	13.0 (0.7)*	12.2 (1.5)*	10.3 (1.6)	10.7 (2.1)

*Values are means (SD). * P<0.05 compared to supine same PEEP level*

CONCLUSION. Gas exchange in prone was good due to homogeneous distributions of V and Q. Gas exchange in supine, particularly with 10 PEEP, was in contrast dependent on a high correlation between V and Q.

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1064

IS THE POTENTIAL OF LUNG RECRUITMENT RELATED TO THE RESPONSE TO THE PRONE POSITION?

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INTRODUCTION. In ALI/ARDS patients the PEEP and prone position (PP) are useful tools to improve gas exchange. The improvement in oxygenation is based on an improvement in the ventilation/perfusion ratio, although this may be achieved by PEEP or prone position by different mechanisms not mutually exclusive.

METHODS. We aimed to evaluate the "lung recruitability" (PLR) with PEEP and the change in oxygenation with PP. We retrospectively collected data of ALI/ARDS patients, mechanically ventilated, admitted to our intensive care from May 2003 to December 2004 who underwent a whole lung CT scan at 5 and 15 cmH2O and subsequently PP. The lung CT scan was taken during an end expiratory pause (exposure 120 Kv – 250 mA). The outline of the lungs was manually drawn in each image by a physician using dedicated software.
The PLR was defined as the proportion of the weight of not aerated lung tissue regaining aeration between 5 and 15 cmH2O of airway pressure, computed by CT scan quantitative analysis. Gas exchange was measured before and during the prone position.

RESULTS. 23 19.2 yr., BMI±sedated, paralyzed patients were enrolled (10 male, mean age 55.7 2.6 cmH2O,±2 ml/Kg, PEEP 10.4±3.6 Kg/m^2, tidal volume body weight 8.9±23.0 9.9).±8, SAPS II 36.4±PaO2/FiO2 188.
We did not find any relationship between the PaO2/FiO2 ratio from supine to prone position, and the PLR between 5 and 15 cmH2O in supine position (p=0.83 r^2=0.023).

CONCLUSION. Our data suggest that the effect of PP on gas exchange is not related to the amount of PRL in supine position.

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HIGH-FREQUENCY OSCILLATORY VENTILATION FOLLOWING PRONE POSITIONING PREVENTS A FURTHER IMPAIRMENT IN OXYGENATION

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INTRODUCTION. The improvement in oxygenation with prone positioning is not persistent when patients with acute respiratory distress syndrome (ARDS) are turned supine. High-frequency oscillatory ventilation (HFOV) aims to maintain an open lung volume. The aim of this study was to show that HFOV is able to prevent the impairment in oxygenation when ARDS patients are turned back from the prone to the supine position.

METHODS. After an optimization period, forty-three ARDS patientswere assigned to one of the three following groups: (a) conventional lung-protective mechanical ventilation in the prone position (12 hours) followed by a 12-h period of conventional lung-protective mechanical ventilation in the supine position [CVprone-CVsupine]; (b) CVsupine (12 hours) followed by HFOV in the supine position (12 hours) (CVsupine–HFOVsupine); or (c) CVprone (12 hours) followed by HFOVsupine (CVprone–HFOVsupine group).

RESULTS. PaO2/FiO2 ratio was higher at the end of the study period in CVprone –HFOVsupine group than in CVprone-CVsupine group ($p < 0.02$). Venous admixture at the end of the study period was lower in CVprone –HFOVsupine group than in the two other groups.

CONCLUSION. HFOV maintained the improvement in oxygenation related to prone positioning when ARDS patients are returned to the supine position.

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EFFECTS OF PRONE POSITION ON PULMONARY CAPILLARY BLOOD FLOW AND OXYGEN DELIVERY IN ARDS PATIENTS

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INTRODUCTION. Despite the intriguing improvements in the treatment of ALI and ARDS using protective ventilation, mortality of this syndrome remains between 30% up to 58% (1). Ventilation in the prone position (PP) is one of the accepted rescue strategies in severe hypoxia. However, there are limited clinical data on the effects of prone position on the distribution pulmonary capillary blood flow (= ventilated fraction of CO) and oxygen delivery. The aim of this study was to evaluate the effects of prone position on PCBF and parameters of systemic oxygen metabolism.

METHODS. After approval of the study by the local ethics committee 9 patients with ARDS were included into the study. After documenting baseline supine position the patients were turned into the prone position (180°) and observed for 150 min (measurement points 30, 60, 90, 120 and 150 min.). The following parameters were investigated: CO, SVO2, DO2 PCBF, pulmonary shunt, VT, VD/VT, PaO2/FiO2, VCO2. CO was measured by thermodilution whereas PCBF was measured none invasively by the partial CO2 rebreathing technique (DAVID™) (2). Statistical analysis was performed using a paired Student t-test, Fishers exact test and a principal component analysis with VARIMAX-rotation.

RESULTS. Prone position was tolerated in all patients without any adverse events. As expected PP lead to a significant increase of PaO2/FiO2 from 156+/- 91.3 to 237 +/- 127 mmHg p=0, 04. Furthermore PP resulted in a significant improvement of PCBF (4.5 +/- 1.4 to 5.3 +/- 1.7 L/min), SvO2 (67.5 +/- 5 to 72.4+/- 8%) and DO2. Interestingly the CO2 elimination (VCO2) of the lungs increased significantly as well (251+/-59 to 280+/-49ml/min). Using a cut off >0.6 in the principal component analysis it could be demonstrated that after prone positioning PCBF, DO2, SvO2 and CO were associated with the first principal component. Regression analysis showed a significant correlation of PCBF and DO2 after PP (r=0.67, p<0.033).

CONCLUSION. Prone positioning lead to significant improvement of pulmonary capillary blood flow, oxygen delivery and mixed venous saturation and may therefore improve tissue oxygenation. Due to the positive correlation of PCBF and DO2 the non invasive measurement of PCBF may serve as useful tool to guide position manoeuvres in ARDS patients.

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EFFECT OF LONG TERM PRONE POSITION VENTILATION ON GAS EXCHANGE AND LUNG INJURY IN PULMONARY ARDS

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INTRODUCTION. The optimal duration of Prone Position Ventilation (PPV) in acute respiratory distress syndrome (ARDS) is uncertain. It has been pointed out that pulmonary ARDS patients respond less than extrapulmonary ARDS patients. Objective: to study the long term effects of PPV on gas exchange, PEEP, lung injury score and multiorgan failure in pulmonary ARDS patients.

METHODS. Design: prospective (cohort). We studied 40 PPV periods in 31 pulmonary ARDS patients. Measures were taken in supine before PPV and at 1 hour after PPV, and then every six hours until the end of PPV. Statistics: values were expressed in median and interquartile values. Wilcoxon and Kruskal Wallis tests were used. A $p<0.05$ value was considered significant.

RESULTS. Mean age was 44 (25-57) years, the initial Lung Injury Score (LIS) was 3.1(2.75-3.6), PPV was maintained for 91(51-117) hours. The PaO2/FIO2 ratio was 125 (99-181) mm Hg before PPV and 256 (170-298) mm Hg after 1 hour in PPV (p=0.001). This difference with supine PaO2/FIO2 ratio was sustained until the end of PPV. Initial values of PEEP were set at 15 (12-18) cm H2O by constructing a PEEP-compliance curve, there were no differences in PEEP values along the study. Initial values of PaCO2 were 47 (41-69) mm Hg and there were no significant differences along the study period. After 48 hours of PPV, LIS was significantly decreased in comparison to supine before PPV, 3 (2.25-2.7) versus 2.5 (2.2.5-2.75), p=0.001. The multiorgan failure score did not change along the study.

CONCLUSION. PPV had a positive effect on gas exchange even after 6 hours. This effect last along the PPV period. Because its effect on LIS a duration of 48 hours for PPV could be useful in this setting of patients.

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PRONE POSITION EFFECT ON OXIGENATION AND SURVIVAL IN PATIENTS WITH SEVERE RESPIRATORY INSUFFICIENCY

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INTRODUCTION. Prone position improves oxigenation in patients whit severe respiratory failure but, to present, only one study have proven benefits in mortality.

METHODS. We reviewed records from 137 patients who where admitted in our unit for severe respiratory failure, defined as PaO2/FiO2<200, who need mechanical ventilation from June 1999 to December 2005. 46 patients were placed in prone position; PaO2/FiO2 ratio before the first prone period an immediately before to recover supine position were recorded. To study mortality effect of prone position we tried to find a group of control patients whit same age, sex, APACHE II to ICU admission, same cause (primary or secondary) for respiratory insufficiency and who never were in prone position. We recorded the worse PaO2/FiO2 ratio in these control group to compare whit PaO2/FiO2 ratio before prone position in case group.

RESULTS. It was possible to analyse oxigenation before initiating prone and just before to recover supine position in 38 of 46 case-patients. PaO2/FiO2 ratio increased from 84.7 ±30.6 to 144.2±67.0 ($p<0.001$). There were no changes in PEEP nor tidal volume. Time in prone position first period was 20.4 ± 8.6 h (min: 5h, max: 40h). There are no association between time elapsed in prone position and increase in PaO2/FiO2 ratio (Adjusted R2: -0.0275). ICU mortality of the 91 control-patients group whit severe respiratory insufficiency who never were in prone position was 63.7% and 30 days mortality was 66.3%. ICU mortality and 30 days mortality in the 46 case-patients group was 60.9% and 68.9% respectively. There were no differences between both groups from age, sex and admission ICU APACHE II. It was possible to find controls only to 31 patients treated in prone position. ICU mortality was 61% in both (OR: 1, CI 95%: 0.36-2.78). 30 days mortality was 68% in treatment group and 61% in control group (OR: 0.75, CI95%:0.27-2.14). The effect do not change when we control by PaO2/FiO2 ratio, PEEP and organ failure.

CONCLUSION. Prone position improves oxigenation in patients whit severe respiratory insuffiency but, in these little sample, these improvement do not relates with time in prone position nor with survival.

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PRONE POSITION VENTILATION MODULATES THE COURSE OF CRITICAL ILLNESS IN ACUTE RESPIRATORY FAILURE

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INTRODUCTION. In acute respiratory failure (ARF) a change from supine (SP) to prone position (PP) can improve oxygenation, but clinical trials don't show a distinct effect on outcome nor clear evidence for positive effects in the sequel so far. The aim of our study is to analyze how prone position ventilation (PPV) modulates further clinical course in ARF.

METHODS. We studied 110 consecutive patients with ARF (ALI n=18, ARDS n=92; American-European consensus definition; mean age 66±13[SE] years; clinical follow-up design; surgical ICU-university hospital). All patients were ventilated alternating in SP and PP (135°left/right-side-position) for at least 6h in each position. Responders [RS] or non-responders [NR] each after a time interval of 16, 24 and 48h after starting PPV were defined by a higher or lower PaO_2/FiO_2 respectively in comparison to the median of all patients in each time interval. Data collection included baseline characteristics, individual survival time and cause of death in deceased patients. (Statistical analysis: SPSS®(Kruskal-Wallis-test).

RESULTS. N=68 (61%) patients died. The cause of death was known in n=53, n=42 (39%) survived ARF that accompanied their critical illness. Most RS of the 24h-interval lived longer than NR, who often died earlier during their ICU-stay [survival times: <7 days [d] RS n=2 (3.7%) vs. NR n=11 (19.6%); 7-14d RS n=5 (9.3%) vs. NR n=8 (14.3%); 14-27d RS n=9 (16.7%) vs. NR n=9 (16.1%); >28d RS n=38 (70.4%) vs. NR n=28 (50%)]. In deceased patients RS of all time intervals [16, 24, 48h] showed a distinct longer median survival time [15; 17.5; 22d] until death in comparison with NR [10.5; 9; 9d] ($p<0.05$). Death rate as a result of multiple organ failure was lower in RS of all analyzed time intervals in comparison to NR [16h: 14 vs. 23; 24h: 11 vs. 27; 48h: 13 vs. 25]. Death as a result of septic shock occcured more rarely in RS in comparison to NR [16h: 21 vs. 32; 24h: 25 vs. 27; 48h: 21 vs. 30].

CONCLUSION. Our results indicate that PPV is able to modulate further course of critical illness in patients with ARF. Responders to PPV survive longer than non-responders – if they die it occurs later during ICU-stay and they die less frequent as a result of MOF or septic shock than non-responders. Therefore the change of the body position from SP to PP may help to gain valuable time for the critically ill patient and presents a chance to treat life-threatening incidents.

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EFFECTS OF PUMPLESS EXTRACORPOREAL LUNG ASSIST ON OXYGENATION AND CO2 REMOVAL IN ACUTE LUNG INJURY

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INTRODUCTION. Application of extracorporeal respiratory support in ARDS patients is a possible tool for minimizing the invasiveness of mechanical ventilation (1). So far, mainly the successful CO2 removal by a pumpless arteriovenous extracorporeal assist device has been documented. The aim of our study was to evaluate primarily its oxygenation effect in a lavage model of acute lung injury.

METHODS. 7 pigs (48 to 60 kg body weight) were anesthetized and mechanically ventilated. Both femoral arteries and one femoral vein were cannulated and connected with the pumpless lung assist device (Novalung, Hechingen, Germany). Acute lung injury was induced by repeated bronchoalveolar lavage.

RESULTS. Extracorporeal lung assist was applied with different blood flow rates through either one or both femoral arteries. Mean blood flow (± SD) was 15.5 (± 3.9)% and 21.7 (± 4.9)% of cardiac output, respectively. Measurements were repeated at different degrees of pulmonary gas exchange impairment with pulmonary venous admixture ranging from 35.0% to 70.6%. Arterial blood pressures did not significantly differ during baseline conditions, before and after lung lavage. After lung injury, lung assist significantly increased Pao2 from 64 (± 13) Torr to 71 (± 14) Torr and 74 (± 17 Torr) with shunt blood flow through one and both femoral arteries, respectively. O2 delivery through the oxygenator increased with extracorporeal shunt flow (36 (± 14) vs. 47 (± 17) ml O2/min) and reduced arterialisation of the inlet blood. The use of lung assist led to a significant fall of Paco2 from 72 (± 17) Torr to 64 (± 14) Torr and 60 (± 13) Torr, respectively. Moreover, systolic pulmonary artery pressure fell from 53 (± 12) mmHg to 48 (± 9) mmHg and 47 (± 10) mmHg, the diastolic one from 32 (± 8) mmHg to 29 (± 7) mmHg and 29 (± 7) mmHg, respectively.

CONCLUSION. Pumpless lung assist significantly increased oxygenation in severe experimental lung injury, however, this effect was small. The results indicate that the oxygenation effects of this device should not be overestimated especially if the improvement of oxygenation is the primary therapy goal.

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PUMPLESS ARTERIOVENOUS EXTRACORPOREAL LUNG ASSIST IN PATIENTS WITH ARDS

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INTRODUCTION. Pump-driven extracorporeal membrane oxygenation in patients with acute respiratory distress syndrome (ARDS) is a potentially life-saving, however costly and labor-intensive procedure. Attempts have been made to develop less invasive techniques for clinical use. An important approach was the introduction of an arterio-venous pumpless extracorporeal lung assist.

METHODS. Clinical data of 8 patients treated with pECLA in a German ARDS referral center (Berlin ECMO center) have been analysed retrospectively using charts and databases.

RESULTS. All patients treated with pECLA were hypercapnic due to different reasons (n=4 patients withlung fibrosis, one patient with bronchiolitis obliterans organising pneumonia). In n=2 patients pECLA has been established after 5 and 14 days of pump-driven ECMO treatment. In one patient with hypercapnia and severe hypoxemia (PaO2/FiO2 54 mmHg) the combination of pECLA and prone positioning did not improve oxygenation and the patient was switched to venovenous ECMO after 4 1/2 hours of treatment. All patients had pressure-controlled ventilation and a reduction of tidal volume and inspiratory pressures was achieved while PEEP was maintained aiming at establishing a more lung protective ventilation. 4 out of 8 patients survived.

TABLE 1.

Gas exchange and respiratory data (all values shown as mean).

	PaCO2 [mmHg]	pH	PIP [mbar]	PEEP [mbar]	VT / kg bw [ml/kg]
before start pECLA	79	7.25	33	13	4
1 hour after start	62	7.39	30	13	3
6 h	54	7.43	31	13	3
12 h	53	7.45	28	13	2

CONCLUSION. We demonstrated a sufficient and immediate reduction of PaCO2 after implementation of pECLA allowing to reduce tidal volumes and inspiratory pressures. In severe hypoxemia however, pECLA was no alternative to a pump driven ECMO. PECLA might be a useful tool contributing to a more lung protective ventilation.

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DETERMINANTS OF DURATION OF MEMBRANE LUNG (ML) DURING ECMO IN ARDS

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INTRODUCTION. Substitution of extracorporeal circuit parts during ECMO in ARDS is a life threatening maneuver. Most frequent reasons for the replacement of the circuit are thrombosis and decreased performance of ML, and emolysis due to the centrifugal pump. We retrospectively explored which factors may contribute to duration of ML (MLdays) during ECMO in ARDS.

METHODS. We studied 33 MLs (13 heparin-coated silicon and 20 heparin-coated hollow fibers oxygenators) used in 7 ARDS patients undergoing ECMO. Heparin was administered by continuous infusion to maintain an activated clotting time (ACT) between 180 and 240 seconds. Organ function, biochemical, hematological, coagulation, and inflammatory variables were assessed daily. In order to evaluate the effect of sepsis, MLs were grouped in respect to infection diagnosis, positive blood cultures, and signs of a new septic episode.

RESULTS. Length of ECMO ($ECMO_{days}$) was 39.9±24.1 days. ML_{days} was 7.7±4.3(2-18 days). ML_{days} was positively correlated ($p<0.05$) with $ECMO_{days}$ ($r=0.707$), ML blood flow ($r=0.397$), and the level of antithrombin III (ATIII, $r=0.512$). MLs used in patients with positive blood cultures ($n=12$) showed significant ($p<0.05$) less duration (4.7±2.3 vs 9.1±4.5 days), lower platelet count (106700±39200 vs 164000±74200/mm^3), lower ATIII levels (83±19 vs 97±14%, $p<0.05$). In presence of positive blood cultures ML_{days} were positively correlated ($p<0.05$) with $ECMO_{days}$ ($r=0.7$), and negatively correlated with levels of CPR ($r=-0.778$).

CONCLUSION. Duration of MLs during ECMO in ARDS patients increase with persistence of treatment. This is likely due to known alterations of coagulation and platelets activity during ECMO. Higher ML blood flow, and higher ATIII levels may increase the duration of ML circuit. Sepsis with positive blood cultures decreases the duration of ML circuit; in this group the higher the level of CPR was, the shorter the duration of MLs.

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ENDOTOXEMIC PULMONARY HYPERTENSION IS MEDIATED BY ENDOTHELIN RECEPTOR-INDUCED VENOUS CONSTRICTION

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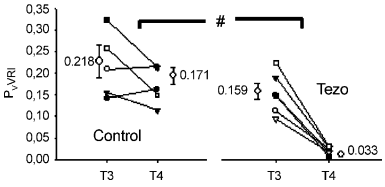
INTRODUCTION. Pulmonary hypertension is a feature of ALI possibly contributing to edema formation. To explore the edema reducing mechanisms of tezosentan in ALI we studied its effects on capillary pressure and venous resistance.

METHODS. 1: Pulmonary arteries and veins from 13 subjects were mounted in a myograph for monitoring of contractile response to phenylephrine, endothelin-1, and sarafotoxin (ETB receptor agonist). 2: 20 pigs were subjected to phenylephrine, endothelin-1, sarafotoxin, endotoxin and tezosentan (dual endothelin receptor antagonist) treatment. Pulmonary capillary pressure used for calculation of arterial and venous vascular resistance was assessed by the pulmonary vascular occlusion technique.

RESULTS. Pulmonary veins were more sensitive than arteries to endothelin-1, both in vitro and in vivo. This difference was more pronounced for the sarafotoxin, where almost no arterial effects were noted. Endotoxin infusion resulted in pulmonary hypertension with a clear venous dominance (T3). These increases including pulmonary capillary pressure were totally abolished by intervention with the dual endothelin receptor antagonist tezosentan (T4).



CONCLUSION. The endothelin system seems to be largely involved in endotoxemic pulmonary venous hypertension, an effect possibly mediated by the endothelin B receptor.

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INCREASED SHUNT FRACTION REDUCE ARTERIAL OXYGENATION AT HYPOVOLEMIA IN A MODEL WITH LUNG COLLAPSE

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INTRODUCTION. It is well known that the negative effect of an intrapulmonary shunt on arterial oxygenation increases when cardiac output decreases at unchanged systemic oxygen consumption due to the decrease in mixed venous saturation (svO2). We hypothesized that also the shunt fraction per se might increase if the collapse is located in the dependent lung region (i.e. most the common clinical location after anesthesia and surgery), due to less perfusion of the non-collapsed non-dependent lung regions.

METHODS. 8 supine anaesthetized pigs were ventilated with VCV, FiO2 1.0, PEEP 10 cm H2O, VT 8 ml/kg. A bronchial blocker (BB) was placed in the left lower lobe bronchoscopically, the BB-cuff was inflated and the air of the isolated lobe was exsufflated. Thereafter the lobe was selectively lavaged with saline in order to induce a dense atelectasis. Measurements were made at normovolemia, and after venesection of 20% and 40% of the blood volume. In addition, selective recruitment (s-LRM) of the collapsed lobe was done through the inner lumen of the cuffed BB. Before and after each procedure arterial and mixed venous blood gases, Crs (compliance), shunt, Cardiac output (CO) and vascular pressures were measured. Shunt was calculated by standard formula. Statistics; Kruskal Wallis test. Median and 25 and 75 percentiles are shown.

RESULTS. No new lung collapse occurred during the experiment as shown by that the reductions in Crs and shunt at all volemic levels were reversible by an s-LRM. As expected, CO and svO2 decreased at hypovolemia (p= 0.061 and 0.0014, respectively). In addition, the shunt fraction through the induced lobar collapse increased significantly (p= 0.0051). The shunt fraction before and after the s-LRM was 8(4.10)% and 3(1.6)% at normovolemia, 20(11.24)% and 4(2.8)% at – 20% and 18(16.33)% and 3(2.7)% at – 40% hypovolemia.

CONCLUSION. The increase in shunt in itself might be an important contributing factor to decreased arterial oxygenation at hypovolemia in subjects with dependent lobar collapse.

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ENDOTHELIAL MIRCOPARTICLES EXHIBIT PROCOAGULANT ACTIVITY IN PATIENTS WITH SEPTIC SHOCK

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INTRODUCTION. Circulating endothelial microparticles (EMPs) are small vesicles released from endothelial cells in response to injurious stimuli and are elevated in a variety of diseases associated with endothelial dysfunction. Recently, in vitro studies demonstrated that EMPs express tissue factor, the initiator of coagulation. The purpose of this study was to further characterize EMPs in patients with septic shock and to examine the influence of EMPs on coagulation

METHODS. The study comprised 15 critically-ill patients with septic shock and 18 healthy volunteers.
10 ml blood samples were dawn into 0.1 M citrate solution and processed within 4 hours. EMPs in platelet-poor plasma (PPP) were measured by flow cytometry with fluorescent antibodies (anti-CD144, anti-CD62E) allowing discrimination of EMPs from platelet microparticles. In a subset of 5 patients EMPs were freshly isolated from PPP and procoagulant activity of EMPs was quantified by determining clotting times with a coagulometer.

RESULTS. Plasma from patients with septic shock contained significant higher levels of CD144 and CD62E double-positive EMPs compared to healthy volunteers (13.69% $\pm$ 3.21 SEM vs. 1.08% $\pm$ 0.36 SEM, $p< 0.05$). Furthermore, clotting time analyses revealed an markedly increased procoagulant activity of EMPs of patients with septic shock (33.6% $\pm$ 0.06% reduction of clotting time compared to control, n=5, $p< 0.05$).

CONCLUSION. Patients with septic shock show high levels of CD144- and CD62E -positive EMPs which exhibit pronounced procoagulant activity. Thus, EMPs may contribute to activation of the coagulation cascade in severe sepsis.

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ALTERED COAGULATION IN SYSTEMIC INFLAMMATORY RESPONSE SYNDROME: ROLE OF

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INTRODUCTION. Evidence has accumulated to suggest that more complex mechanisms might be involved in the relationship between inflammation and coagulation.
Objective:In this study we aimed to use some of coagulation markers especially activated protein C (APC) in diagnosis and prognosis of patients with systemic inflammatory response syndrome (SIRs) wether infectious or non infectious.

METHODS. We enrolled 20 patients who had been hospitalized for SIRs as well as 20 aged and sex matched subjects served as control group. All patients and control groups were subjected to full clinical evaluation with application of APACHE II scoring, routine laboratory investigations as well as specific investigations namely; plasma levels of protein C, D-dimer (DD), antithrombin III (ATIII), and thrombin-antithrombin complex (TAT) upon admission, 48 and 96 hours later and on discharge in survivors.

RESULTS. The study showed that activated protein C levels was consumed significantly in patients with SIRS compared to control subjects (38.6+23% vs 87.8+6.1% $P < 0.0001$) respectively. As when we compared its levels in survivors and non survivors, the former showed persistent rise of the level to normal values in contrast to the latter in which their levels were persistently low (34.8+26% vs 40.6+22% on admission & 82+13% vs 41+21%, $P< 0.01$ after 144 hrs) respectively. Patients with septic shock also showed significantly lower levels of APC compared to those without shock (28.8+12% vs 56.8+28% $P< 0.007$ on admission & 41.7+21.8% vs 82+ 13% after 144 hrs $P < 0.001$) respectively. APC levels also were lower in patients with Multiorgan failure syndrome (MODS) as compared to those without MODS (40.8+27.8% vs 116+29 $P< 0.01$) respectively with statistically insignificant lower level in patients with APACHE $>$ 20 as compared to those with APACHE $<$ 20 (35.2+22 vs 45+24%, P: NS). The other coagulopathy markers of sepsis DD, AT III, TAT complex did not show any significant difference between survivors and non survivors (2+3.6 vs 4.9+8 ng/ml, for DD, 40.75+17.6% vs 40+15.7%, for AT III & 24.7+25 vs 22+19 ug/ml, for TAT, P: NS) respectively.

CONCLUSION. Protein C level is a useful biological marker in patients with SIRS for both diagnostic and prognostic aspects regarding MODS, septic shock and mortality and also it is superior to other coagulopathy markers for determining the ultimate clinical outcome.

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CORRELATION BETWEEN THE INFLAMMATION PARAMETER VALUES AND TESTS OF HEMOSTASIS IN SEPTIC PATIENTS

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INTRODUCTION. In sepsis inflammatory mediators are released leading to numerous pathological events, the most crucial of which being the coagulation abnormality.

METHODS. In two years period we followed the course of inflammation parameters values and tests of hemostasis (INR, PTT, TT, fibrinogen, AT III, D dimer) in septic patients hospitalized in Surgical Intensive Therapy. Data collected were analyzed to determine which parameters show greatest deviation from normal values and their predicting value.

RESULTS. 85 septic patients (mortality rate of 47%) were included in study. The day one APACHE II score mean value was 16 (SD±8) in surviving patients and 25 (SD±8) in nonsurviving patients. Mean value of CRP in survivals was 122.22 (SD±80.69) and in nonsurvivals 164.24 (SD±96.46), mean PCT in survivals was 14.54 (SD±36.42) and in nonsurvivals 20.98 (SD±36.39)). Significant difference was noted for CRP value (p=0.016). In group of survivals compared to nonsurvivals significant difference was observed in ATIII (p=0.002), platelets (p=0.00), PTT (p=0.002) and TT (p=0.035).

CONCLUSION. Despite all already known laboratory tests and clinical signs, early detection of sepsis still remains a problem. The results of our retrograde study show that early detection in changes of tests of hemostasis, especially ATIII, PTT and platelets, could be helpful in early recognition of sepsis. These tests show deviation from normal values even before inflammation parameters reach their peek value and before the clinical evident sepsis- associated acute organ dysfunction occur. They correlate with the survival of patients with sepsis.

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ASSESSING THE COAGULATION SYSTEM IN PATIENTS WITH SEPSIS USING THROMBELASTOMETRY

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INTRODUCTION. The coagulation system is a cascade of central pathophysiologic importance in sepsis. So far, no data on the assessment of the coagulation system in adult sepsis patients using RoTEM have been published.

METHODS. In seven critically ill patients with sepsis, standard coagulation parameters and RoTEM were simultaneously performed.

RESULTS. Even though all patients showed abnormal standard coagulation tests (Table 1), RoTEM revealed normal clotting times and even signs of hypercoagulability (Table 2). No coagulation active therapy was performed in any patient, not even before invasive procedures or major surgical interventions. No bleeding occurred in any study patient.

TABLE 1.

	Diagnosis	PT (%)	aPTT (sec)	Fib (mg/dL)	AT (%)	TC (G/L)
Patient Nr 1	Peritonitis	43	47	532	34	172
Patient Nr 2	Peritonitis	29	72	611	32	612
Patient Nr 3	Peritonitis	36	80	223	29	280
Patient Nr 4	Peritonitis	70	73	344	29	40
Patient Nr 5	Pneumonia	21	61	800	31	80
Patient Nr 6	Pneumonia	37	108	674	52	90
Patient Nr 7	Coxitis	43	43	754	81	191

TABLE 2.

	InTEM CT	InTEM CFT	InTEM MCF	ExTEM CT	ExTEM CFT	ExTEM MCF	FibTEM MCF
Nornal	137-246	40-100	52-72	42-74	46-148	49-71	9-25
Pat Nr 1	187	49	68	43	80	64	23
Pat Nr 2	148	33	81	68	42	79	47
Pat Nr 3	171	41	73	61	39	72	38
Pat Nr 4	214	108	56	65	109	57	25
Pat Nr 5	259	39	95	126	46	95	34
Pat Nr 6	217	90	59	56	90	61	31
Pat Nr 7	162	44	74	52	42	73	31

CONCLUSION. Some critically ill patients with sepsis and abnormal standard coagulation tests may have hypercoagulability. RoTEM can add important clinical and therapeutic information.

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COAGULATION PARAMETERS OF THE ISTH OVERT DIC SCORE: FIRST, THEIR DISTRIBUTION

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INTRODUCTION. The diagnosis of disseminated intravascular coagulation (DIC) can be difficult. The International Society on Thrombosis and Haemostasis (ISTH) has developed a diagnostic scoring system to diagnose DIC with basic coagulation parameters. This scoring system is defined solely for patients with clinical conditions associated with DIC. For overt DIC, this system relies on platelet count, prothrombin time (PTT), fibrinogen and D-dimer concentration. For each parameter, the cut-off points were arbitrarily chosen. We investigated the distribution of values for these parameters in critically ill patients without DIC in order to develop specific cut-off values for this population.

METHODS. We conducted a prospective cohort study in a 18 bed closed format tertiary referral general ICU in a teaching hospital. For 1 month, daily blood samples were drawn from all patients to determine platelet count, PTT, fibrinogen and D-dimer concentration. A panel of experts determined the presence or absence of DIC.

RESULTS. The panel concluded absence of DIC in 121 patients, while ISTH overt DIC scores were >=5 indicating overt DIC in 3 (2.2%) samples in patients with severe drug-induced thrombocytopenia, massive hemorrhage and cardiogenic shock. 39 out of 121 patients had clinical conditions associated with DIC of whom we analyzed 137 coagulation profiles (data given presented as median and range or mean and standard deviation). Platelet count was 188 x 10^9/l; (17-1169 x 10^9/l), PTT was 11.7 ± 2.1 seconds, fibrinogen was 4.3 ± 1.6 g/l and D-dimer was 5.5 μg/ml; (0.49-40.9 μg/ml). The cut-off values of the ISTH overt DIC score were related to the following percentiles in our cohortas follows: platelet count 50 x 10^9/l (2%) and 100 x 10^9/l (15%), PTT 15.7 (96%) and 18.7 seconds (96%), fibrinogen 1.0 g/l (0%) and D-dimer 0.5 μg/ml (1%) and 5.0 μg/ml (44%).

CONCLUSION. The coagulation parameters used in the ISTH overt DIC score show broad distributions in the critically ill without DIC. False-positive scores indicating overt DIC occurred in a minority of patients in clinical conditions clearly to be distinguished from DIC. Adjustment of cut-off values of fibrinogen and D-dimer might improve scoring and thus diagnosing overt DIC.

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COAGULATION FACTORS PROFILE ON SEPTIC PATIENTS AND MORTALITY

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INTRODUCTION. Sepsis is a serious condition with a mortality rate of nearly 20%. The basal pathophysiology of microcirculatory dysfunction can be divided into three categories, thrombogenesis, dysfunction of the vascular endothelium and finally microbleeding before the death (1). Early supply of protein C improves the survival in severe sepsis. However, when Protein C has not initial indication to supply, severe sepsis advances to the final phase with bleeding, and coagulation factors profile implicated on bleeding control has not been analyzed on that kind of patients (2). The aim of this study was to measure coagulation variables on septic patients.

METHODS. I did a prospective observational research study and seventeen critical ill patients admitted to the ICU with sepsis and coagulation abnormalities (high PT, PTT, low platelets or bleeding) were analysed. Investigated Coagulation variables were: age, PT, PTT, platelets, thrombin time, factor VII, X, V, AT-III, D Dimer, fibrinogen, DIC scores, and death. Statistics analysis of data were performed and chi^2 were used to compare mortality and coagulation variables. Statistic differences between coagulation variables were determined by independent *t*-test. The statistical analysis was carried out with the SPSS 10 package, and $p < 0.05$ was considered statistically significant

RESULTS. Differences on coagulation variables on the group of death septic patients, was the studied outcome. Of 17 patients, 58.6% were male and 41.7% were female. Their average age was 41.5±20.7 years. Mortality rate was 64.3%, and the main cause of sepsis were abdominal sepsis 17.6%, colangitis 11.8%, pos-liver transplant 11.8%, other groups 5.9% (HELLP, SLE, leptospirosis, etc.). MOF was 76.6%, and bleeding patients 52.9%.

TABLE 1.
Differences on the group of patients with sepsis and death

	Death Yes	Death No	*p*
TP	32.8±11.7	17.6±4	0.017
PTT	58.9±46.7	36.1±10.7	0.19
Platelets	110.000±129.182	78.600±38.901	0.61
F VII (%)	23.3±13.6	101.6±42.1	0.002
F VII < 60%	85.7%	14.3%	0.006
F X (%)	43±21	92.7±35	0.024
AT-III	48.8±13.7	62.1±28.6	0.34
D Dimer	14.222±16.149	4225±3219	0.25

CONCLUSION. Bleeding is not the most important parameter to neither define mortality nor define diagnostic of DIC on septic patients with coagulation abnormalities. We demonstrated reduction in some coagulation factor important to stimulate the activation of procoagulant enzymes activated on sepsis. It is may be more important to know DIC score, levels of FVII, protein C, FX, PT to detect the patients who need any therapeutic option (FFP). Finally, recombinant protein C could be a therapeutic option not just on the first 24-48 hrs after admission.

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COAGULATION FACTORS PROFILE IN PATENTS WITH DISEMINATED INTRAVASCULAR COAGULATION

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INTRODUCTION. DIC is a serious condition with a mortality rate of nearly 50%. The basal pathophysiology of microcirculatory dysfunction can be divided into three categories, thrombogenesis, dysfunction of the vascular endothelium and finally bleeding before the death. DIC score have usually included only parameters like platelets, PT, fibrinogen, and D dimmer (1). So far, coagulation factors have not been integrated on the diagnosis and management. Inference of coagulation factors in control of bleeding has not been analyzed on critically ill patients (2). Aim: To measure coagulation variables on patients with DIC score.

METHODS. I did a prospective observational research study and thirty critical ill patients admitted to the ICU with coagulation abnormalities (high PT, PTT, low platelets or bleeding) were analysed. Investigated Coagulation variables were: age, PT, PTT, platelets, thrombin time, factor VII, X, V, AT-III, D Dimer, fibrinogen, DIC scores, and death. Statistics analysis of data (mean and standard deviation, ± 2) were performed and chi2 were used to compare mortality and coagulation variables in patients with Japanese, ISTH, and Helsinki DIC score. Statistic differences between coagulation variables were determined by independent t-test. The statistical analysis was carried out with the SPSS 10 package, and $p<0.05$ was considered statistically significant.

RESULTS. Differences on coagulation variables on the group with diagnosis score of DIC and death were studied. The average of DIC diagnosis among three scores was 48.9%. Of 37 patients, 49.5% were male and 40.5% were female, and only 30 were analysed for the variables. Their average age was 44.6±19.3 y. The overall UCI mortality rate was 46.6%, and the main cause of DIC were abdominal sepsis 8.1%, cirrhosis 5.4%, HELLP 5.4%, pos liver transplant 5.4%. MOF was 40.5%.

TABLE 1.

Differences on the group of patients with DIC scores and death

	ISTH score Death vs Alive (*p*)	Japanese score Death vs Alive (*p*)	Helsinki Score Death vs Alive (*p*)
TP	0.083	0.004	0.0005
PTT	0.57	0.1	0.054
Platelets	0.009	0.02	0.19
F VII (%)	0.001	0.0005	0.0005
F X (%)	0.13	0.038	0.007
F V (%)	0.069	0.002	0.008
AT-III	0.22	0.69	0.019
Fibrinogen	0.10	0.067	0.031

CONCLUSION. Bleeding is not the most important parameter to define diagnostic of DIC on critically ill patients. We demonstrated significant reduction in some coagulation factor important to stimulate the activation of procoagulant enzymes activated on our patients with DIC, and that differences were not affected by sepsis. Therefore, the assay of some coagulation factors such as FVII (mainly), FX and/or FV, could be included on the DIC score in order to improve Se and Sp of diagnostic DIC score.

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THE EFFECTS OF PLASMAPHERESIS THERAPY ON COAGULATION PARAMETTERS IN THE CASES OF SEPSIS

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INTRODUCTION. Sepsis and multiple organ failure still have high morbidity and mortality, despite the adequate antibiotic therapy, hemodynamic resuscitation and improved patient care. Severe sepsis, defined as sepsis associated with acute organ dysfunction, results from a generalized inflammatory and procoagulant response to an infection. In a complex chain of events, bacterial toxins, cytokines and mediators contrubite to multiple organ failure during sepsis. In this study, possible changes of coagulation paramaters through removing these mediators and replacing some deficient substances in plasma by therapeutic plasma exchange have been investigated.

METHODS. From november 2003 to June 2005, twenty four patients with severe sepsis and septic shock were eligible. All patients received conventional sepsis therapy. Additionally, all patients were performed therapeutic plasma exchange once within twenty four hours of diagnosis. On blood samples which were taken before and after plasma exchange, studies of complete blood count, PT, PTT, thrombin time, D-dimer, fibrinogen, protein C, protein S and antithrombin III were carried out. At the same time patients evaluated for Disseminated intravascular coagulation (DIC) before and after the treatment.

RESULTS. After plasma exchange, counts of hemoglobin, leucocyte and platelet decreased (respectively, $p<0.001$, $p=0.006$, $p<0.001$). PT, PTT and thrombin time elonged (respectively, $p=0.626$, $p=0.002$, $p=0.258$). Levels of D-dimer and fibrinogen decreased (respectively, $p<0.001$, $p=0.013$). Levels of protein C, protein S and antithrombin III elevated (respectively, $p=0.005$, $p=0.004$, $p=0.492$). Percentage of overt DIC did not change significantly before and after treatment.

CONCLUSION. In conclusion, our data suggested that plasma exchange affects coagulation paramaters. In cases of severe sepsis and septic shock plasma exchange is effective in replacing decreased physiological anticoagulant factors as protein C deficiency and in reducing elevated level of fibrinogen. In addition to the conventional treatment methods, application of plasma exchange may improve dominant procoagulant state which may form in cases of severe sepsis and septic shock.

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ADRENAL FUNCTION: RELIABLE PROGNOSTIC FACTOR OF MORTALITY IN SEPTIC SHOCK TREATED WITH STEROIDS?

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INTRODUCTION. Adrenal insufficiency is considered a frequent problem in septic patients, and there is evidence that steroid replacement therapy improves outcome. However the diagnosis of his clinical situation remains controversial. The objective of this study is to assess different adrenal function tests as prognostic markers of mortality in patients with septic shock treated with steroids.

METHODS. In sixty-eight consecutive patients admitted in the Medical Intensive Care Unit, with septic shock who needed vasopressor therapy, corticotropin stimulation test with 1 and 250 μg was made, with a time interval of four hours. Low doses of hydrocortisone (200-300 mg/day) were given after during 7 days in all the patients. None of them received etomidate or steroids previously. Baseline cortisol levels were categorized as greater/less than 15, 20, 25 μg/dl, and cortisol gradient after corticotropin stimulation as greater/less than 9 μg/dl. A multivariable logistic regression analysis was made with each adrenal function results, controlling five main variables of known prognostic value collected at admission.

RESULTS. 63% male. Their mean age was 56±17 yrs.44% of patients had some previous chronic disease. Severity scores: APACHE II 24±18, SOFA 11±3. The most frequent sepsis etiologies were respiratory (47%) and abdominal (23%). Serum lactate levels 3.9±28 mmol/l. 13% of patients had baseline cortisol level ≤ 15 μg/dl, 31% ≤ 20 μg/dl and 44% ≤ 25 μg/dl. After corticotropin stimulation with 1 and 250 μg 59% and 37% of patients showed gradient ≤ 9 μg/dl respectively. Median stay was 9 days in ICU and 26 days in hospital. Hospital mortality was 47%.
Multivariable logistic regression analysis of adrenal function variables was made controlling age, previous chronic disease, severity scores (APACHE II and SOFA) and serum lactate levels. Baseline cortisol level ≤ 15 μg/dl (OR 11, CI 95% 1.00-124.97, p= 0.05) was the only adrenal function variable associated to hospital mortality independently of age, severity scores, previous disease and serum lactate levels.

CONCLUSION. In shock septic patients treated with steroids, the presence of cortisol baseline levels ≤ 15 μg/dl is an independent prognostic factor of mortality, in contrast to adrenal function reserve tests (corticotropin stimulation).

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ADRENAL FUNCTION IN PATIENTS AT RISK FOR INTRA-ABDOMINAL HYPERTENSION

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INTRODUCTION. Poor abdominal perfusion is considered to contribute to renal failure in patients with intra-abdominal hypertension (IAH). It is not clear whether adrenal function is also compromised in patients with IAH. The aim of this analysis was to study the incidence of adrenal insufficiency (AI) in patients at risk for IAH and to identify patient factors associated with the incidence of AI.

METHODS. We studied all patients admitted to the surgical ICU of the Ghent University Hospital at risk for IAH who had intra-abdominal pressure (IAP) measurements between September 2004 and March 2006. Patients were eligible for the study if a short Synacthen test (SST) was performed during the IAP monitoring period. Normal adrenal function was defined as baseline cortisol greater than 9mcg/dL, increment after SST greater than 9mcg/dL, and peak cortisol greater than 18mcg/dL.
Patient characteristics recorded at admission included gender, age, admission diagnosis, and APACHE II score. The IAP and abdominal perfusion pressure (APP) at the moment of the SST were retrieved from the patient's file. The incidence of IAH (defined as IAP ≥ 12mmHg) and the occurrence of organ dysfunction during ICU stay was recorded, and was defined as follows: cardiovascular: hypotension requiring vasoactive medication, renal: serum creatinine above 2.0 mg/dL or anuria, pulmonary: the need for mechanical ventilation or PaO2/FIO2 ratio<300. Mortality was defined as in hospital mortality.

RESULTS. Twenty seven patients (15 male, mean age 52 years) were included the analysis. A SST was performed after a mean of 7 days ICU stay, and mean IAP in these patients at that moment was 14 mm Hg. Fifty-nine percent of patients had previous abdominal surgery, and in the majority of the patients (85%), an active infectious process was present at the time of the SST.
Twenty patients (74%) had AI. These patients were not different from patients with normal adrenal function with respect to IAP, APP, or age. The incidence of organ dysfunction in these patients was not different, as was outcome (both length of stay and mortality).

CONCLUSION. In this cohort of patients at risk for IAH, AI was a frequent finding, but we could not find patient characteristics associated with AI. Also outcome for patients with AI was not different.

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ADRENAL INSUFFICIENCY IN SEPTIC SHOCK – IMPACT ON THE IMMUNE SYSTEM

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INTRODUCTION. Septic shock is frequently associated with adrenal insufficiency (AI). Since cortisol attenuates systemic inflammation, we speculated that cortisol deficiency is associated with pronounced inflammation.

METHODS. Eighty-six patients with septic shock from 13 Berlin sites were enrolled in the multinational CORTICUS trial of low dose hydrocortisone in septic shock (www.clinicaltrials.gov). Before study drug administration, blood was obtained for immunomonitoring and 250 ug ACTH-test. AI was defined as delta cortisol </= 9 ug/dl (non-responders) or basal cortisol </= 15 ug/dl. Cortisol was measured with electro-chemiluminescence immunoassay (Elecsys, Roche, Mannheim, Germany) at the reference laboratory. Values are medians and 25.75 percentiles.

RESULTS. IL-6 was higher in non-responders (n=28) than in responders (n=58) (458 pg/ml (347,526) vs. 335 (172,498); $p < 0.01$). No differences with delta cortisol were found for IL-10, IL-6/IL-10 ratio, nitric oxide (nitrite/nitrate), HLADR receptors per monocyte, or LPS-induced TNFa-release from monocytes. Patients with basal cortisol </= 15 ug/dl (n=21) had lower IL-6 (243 pg/ml (122,393) vs. 420 (256,513); $p < 0.01$) and lower IL-10 levels (16 pg/ml (7.23) vs. 40 (19,84), $p < 0.001$) than patients with basal cortisol > 15 ug/dl (n=65). However, a basal cortisol </= 15 ug/dl was associated with higher TNFa-release (266 pg/ml (96,379) vs. 69 (23,214); $p < 0.01$) and a higher IL-6/IL-10 ratio (18.4 (10.3,27.8) vs. 9.3 (3.2,17.5); $p < 0.01$). HLADR was low in all groups (< 5000 receptors per cell). Nitrite/nitrate was higher in patients with basal cortisol > 15 ug/dl than in the group with </= 15 ug/dl (266 uM (96,379) vs. 69 (23,214); $p < 0.01$).

CONCLUSION. Overall, AI in septic shock is associated with a more pronounced innate inflammatory response. On the other hand, HLADR expression on monocytes, the cutting site to adaptive immunity, is strongly depressed irrespective of adrenal function. IL-6 mirrors immune activation in non-responders, but not when AI is defined by random cortisol. Nitric oxide production in septic shock seems not to be inhibited by endogenous cortisol.

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RELATIONSHIPS BETWEEN CORTICOSTEROID AND NITRIC OXIDE IN PATIENTS WITH SEPSIS

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INTRODUCTION. The iNOS is induced in vascular smooth muscle by the combination of endotoxin/cytokines leading to a profound vasodilation. Although Glucocorticoids are potent suppressors of iNOS expression and increase during septic shock, they failed to block ongoing iNOS expression due to the inhibitory effect of nitric oxide on GR binding. This is the first trial of relationships between nitric oxide and cortisol in patients with sepsis in time.

METHODS. We serially measured the concentrations of serum NO, cortisol, ADH and lactate in day1, day3, day5, day7 in 26 patients with sepsis. We also analyzed any association among those levels.

RESULTS. 1. Initial NO levels were more elevated in patients with sepsis than healthy controls.
2. Initial NO levels were higher in severe sepsis (n=17) than mild sepsis (n=9).
3. Initial NO levels were positively correlated with cortisol, lactate, ADH levels and APACHE II score.
4. There was no difference in NO levels between septic shock (n=17) and nonseptic shock (n=9).

CONCLUSION. NO and cortisol productions were more prominent in severe sepsis than mild sepsis and they were persistently correlated in time. NO correlates well with severity and sepsis associated parameters.

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PROLACTIN PROFILE IN EARLY SEPTIC SHOCK

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INTRODUCTION. Prolactin, a protein hormone mainly secreted from the anterior pituitary gland, is known to be a mediator in the immuno-neuroendocrine network. Previous studies report prolactin (ProL) levels in early sepsis ranging from undetectable (1) to highly elevated levels (2). We present data from an ongoing clinical study investigating peripheral hormone levels within 24 hours of ICU admission.

METHODS. With institutional ethical committee approval and appropriate consents, patients in septic shock (SS) and critically ill (CI), non-septic, patients were recruited within 24 hours of admission. Clinical data and serum samples were taken 6 hourly. Control samples (CG) were taken from patients undergoing elective hip surgery (n=10). Prolactin was measured by ELISA (VIDAS®, Biomérieux, France). None of the patients received dopamine or metoclopramide.

RESULTS. Median (range) ProL levels in CG were 9.1 (2-27) ng/ml. We found significantly increased ProL-levels in the CI, and even more important in the SS group ($p<0.05$, all time points vs. CG), see table 1. There was a trend towards higher ProL-levels for SS group compared with CI (p=ns, for all time points). However, there was no difference in P-levels between SS-survivors and non-survivors. Hormone levels reached significantly higher levels in septic women (n=8) than in men ($p<0.05$, all time points).

TABLE 1.
Median (range) prolactin levels (ng/ml)

	0 hrs	6 hrs	12 hrs	18 hrs	24 hrs
Septic shock (n=13)	61.3 (24-201)	57.8 (19-179)	58.2 (22-181)	46.9 (27-187)	50.3 (26-165)
Critically Ill (n=4)	37 (20-141)	34.2 (11-168)	28.5 (17-154)	26.6 (10-163)	41.1 (15-167)

CONCLUSION. Our preliminary data suggest that ProL levels are elevated during acute critical illness and septic shock and do not correlate with survival. Gender differences revealed significantly higher levels in female patients. This supports further the concept of a complex stimulation of the hormone axis during acute sepsis.

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SICK EUTHYROID SYNDROME IN SEPTIC SHOCK: RELATIONSHIP TO OUTCOME

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INTRODUCTION. Acute septic shock can cause reduced T3 and elevated reverse T3(rT3) without intrinsic thyroid disease. T3/rT3 and T3, on day 1 of ICU admission, have correlated with patient outcome (1). Similarly, T4 and T3 were higher in survivors by day 5 of ICU admission (1). We present data from an ongoing clinical study describing peripheral thyroid hormone levels within 24 hours of ICU admission.

METHODS. With appropriate consent, patients in septic shock were recruited within 24 hours of ICU admission. Serum samples were taken 6 hourly. Control samples were obtained from patients undergoing elective hip replacement. T4, T3 and rT3 were measured.

RESULTS. T4, T3 and rT3 in healthy controls were 119±10.7,1.5±0.1 and 0.46±0.1 nmol/L (mean±SEM, n=4).
Time of enrolment:T4, T3 and rT3 were not significantly different between survivors (n=5) and non-survivors (n=6). T4 and T3 were significantly different between both survivors and controls and non-survivors and controls.
Initial 24 hours in ICU: Survivors had a significantly higher T4 overall (p=0.035) and at 6,12,18 and 24 hours compared to non-survivors (Table 1). T3 and rT3 did not differ significantly between survivors and non-survivors.

TABLE 1.

	Time 0 Hrs	6 Hrs	12 Hrs	18 Hrs	24 Hrs
T4 Septic Survivors	59.8±9.4	61±11.3	59.4±12.7	60.2±12.6	58±12.2
T4 Septic Non-survivors	44.8±6.2	30.7±3.9	27.5±4.3	34±4.5	31±6.3
p	0.24	0.029	0.02	0.045	0.04

T4 nmol/L (mean+/-SEM)

CONCLUSION. T4 levels may be significantly higher within 24 hours of ICU admission in septic patients who survive their illness. T3 and rT3 were not useful in making a similar conclusion. These data are not in agreement with a previous report (1).

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BIOCHEMICAL MARKERS AS EARLY PREDICTORS OF NEUROLOGICAL OUTCOME IN PATIENTS WITH SAH

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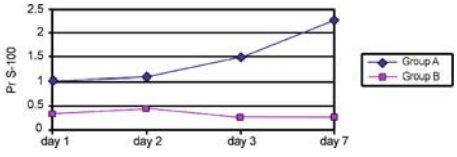
INTRODUCTION. The value of biochemical markers in the evaluation of brain damage is still under discussion. We investigated the time course and prognostic value of neuron specific enolase (NSE), lactate and protein S-100 (Pr S-100) in patients with Subarachnoid Hemorhage (SAH) during the first 7 days after ICU admission.

METHODS. Sixty six patients with SAH were included in this prospective study. Arterial blood concentrations of NSE, lactate and Pr S-100 were measured daily for 7 consecutive days and were correlated with neurological outcome at ICU discharge evaluated by GOS score. The patients were divided in 2 groups according to the neurological outcome: group A: 42 patients (GOS 1-3) and group B: 24 patients (GOS 4-5), and the levels of biochemical markers were compared. The statistical analysis was performed using unpaired t- test and Pearson correlation test.

RESULTS. PrS- 100 blood concentrations were significantly higher in patients with poor outcome (group A) than in patients with good outcome (group B) during the investigation period. There was significant correlation between Pr S-100 levels and the neurological outcome of patients on day one (PrS-100: r = 0.76, p = 0.02), that persisted for the next 7 days. There was no significant difference in lactate and NSE levels between the 2 groups and there was not any correlation of these markers with the neurological outcome. Fig. 1. Pr S- 100 concentrations in 2 groups of patients.



CONCLUSION. Protein S- 100 blood level, in contrast to lactate and NSE, seems to be an early predictive biochemical marker of neurological outcome in patients with SAH.

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IL-18-MEDIATED INFLAMMATORY RESPONSE IN STROKE PATIENTS

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INTRODUCTION. Cytokines are important mediators of neuroiflammation and neurodegeneration. IL-18, a member of IL-1 family, is able to induce gene expression and synthesis of proinflammatory cytokines, adhesion molecules, as well as to activate neutrophils, monocytes, macrophages, and T and NK cells [1]. According to recent experimental and clinical studies IL-18 is also a "key" cytokine in the CNS, controlling two distinct immunological regulatory pathways of cytotoxic and inflammatory responses under neuropathological conditions [2]. The aim of this study was to evaluate initial serum levels of IL-18 in stroke patients compared to septic patients.

METHODS. Twenty critically ill patients, admitted in our ICU, were enrolled. Ten patients were affected by stroke and the others by sepsis. At the first day of stroke and of sepsis diagnosis, respectively, IL-18 serum levels were quantified by ELISA (MBL, Naka-ku Nagova, Japan), according to the manufacturer's instructions.

RESULTS. At the first day IL-18 serum levels were:182.8±35.59 pg/ml in controls, 310.75±53.45 pg/ml in stroke patients and 862±588.8 pg/ml in septic patients. Compared to controls IL-18 serum levels were significantly higher in stroke ($p<0.001$) and septic ($p<0.02$) patients. In septic patients IL-18 levels were significantly higher than in stroke patients ($p<0.05$).

CONCLUSION. IL-18 has shown to be upregulated in several diseases and it represents an important marker in monitoring severe inflammatory conditions. IL-18 upregulation, in the early phase after stroke, might mean a IL-18-mediated inflammatory response to brain injury. In our series high serum levels of IL-18 are not associated with adverse neurological outcome.

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SUBARACHNOID HAEMORRHAGE FOR RUPTURED ANEURISMS AND ENDOVASCULAR TREATMENT WITH GDC

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INTRODUCTION. The aim of this study was to analyze the evolution of patients with subarachnoid haemorrhage (SAH) because of ruptured intracranial aneurysm and treated with GDC.

METHODS. Prospective study of 40 consecutive ruptured aneurysms treated with GDC and performed from August of 2004 to November of 2005. We studied initial clinical status (Hunt and Hess, World Federation of Neurologic Surgeons scale –WFNS-) and CT classification (Fisher Scale), complications and outcome at discharge (Glasgow Outcome Scale –GOS-) and at 6 months (GOS, Modified Rankin and Barthel scales) with a telephone questionnaire. Descriptive statistics.

RESULTS. Age: 52 ± 13.4 years (28-80); men:16 (40%); days in ICU: 14.5 ± 14 (1-55); ventilatory support in 26 patients: 14.3 ± 8.2 days (1-33); Hunt and Hess: I 10%, II 30%, III 17%, IV 15%, V 27%; WFNS: I 25%, II 20%, III 5%, IV 32%, V 15%; Fisher scale: I 0%, II 15%, III 42%, IV 42%. Waiting time to coiling:1.3 ± 1.4 days (0-6). We founded 59 aneurysms, 40 were rupture and their localization: 11 anterior communicating; 10 posterior communicating; 7 anterior cerebral; 4 middle cerebral; 7 posterior circulation; 1 internal carotid. Coiling's complications were: 2 aneurysm rupture, 1 thromboembolism phenomenon, 1 coil migration, without clinical consequences. Complications after coiling were: 3 rebleedings; 5 vasoespasm; 12 stroke; 13 hydrocephalus; 10 intracranial hypertension syndrome. Neurosurgery proceedings were: 4 intracranial haematoma drainage and descompressive craniotomy, 13 ventricular drainages and 6 intracranial pressure catheters (Camino®). Survival at 6 months was 82, 5%. Mortality occurs in ICU in brain death situation by stroke and intracranial hypertension syndrome. GOS at discharge was: I 42%, II 15%, III 17%, IV 5%, V 17%; and at six moths GOS: I 57%, II 24%, III 12%, IV 6, V 0%; modified Rankin: O 45%, I 6%, II 15%, III 15%, IV 9%, V 9%, VI 0%; and Barthel scales: 75.8 ± 33.1 (0-100).

CONCLUSION. 1. - Coiling with GDC is a safe and a good treatment for some ruptured intracranial aneurysms, with few complications. 2. - The most frequent complications in SAH in ICU are stroke and intracranial hypertension syndrome. 3. - We have had good results in functional status outcome, too in poor initial clinical grades of Hunt and Hess and WFNS, this is determinant to practice early and aggressive treatment in this patients.

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EFFECTS OF 7.2% VERSUS 0.9% SALINE IN PATIENTS SUFFERING FROM SUBARACHNOID HAEMORRHAGE

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INTRODUCTION. Hypertonic saline solutions are emerging as an alternative to mannitol in the treatment of intracranial hypertension. There is little data published comparing hypertonic saline with placebo in this setting. The aim of this study was to compare the effects of a bolus infusion of hypertonic saline hydroxyethyl starch with the effects of normal saline (placebo) on intracranial pressure (ICP) and cerebral perfusion pressure (CPP) involving stable patients with spontaneous subarachnoid haemorrhage (SAH).

METHODS. 22 mechanically ventilated SAH-patients with stable ICP between 10 and 20 mmHg were randomized to receive 2 mL/kg of either 7.2% saline in 6% hydroxyethyl starch 200/0.5 (HSS) or of normal saline (NS) over the course of 30 minutes. The effects were observed for another 180 minutes. Unless safety limits were reached during the observation period, the ventilation-variables were kept unaltered, the infusion rates for vasopressors, analgesics, sedatives, and fluids were kept stable, the resistance in the external ventricular drainage (EVD) was unchanged, and the patients were neither stimulated nor moved.

RESULTS. Mean change in ICP after intervention (deltaICP) calculated from the average of all observations was -3.3 (SD 2.6) mmHg in the HSS group versus -0.3 (SD 1.3) mmHg in the NS group. Mean difference between the groups (HSS - NS) was -3.0 mmHg (95% confidence interval -4.9 to -1.1), p = .004. Mean peak change after HSS was -5.6 (range 0.8 to 12.2) mmHg after 64 (range 40 to 115) minutes. Mean difference in deltaCPP between the groups (HSS - NS) was 5.4 mmHg (95% confidence interval 2.2 to 8.6), p = .002, and mean difference in deltacardiac index measured as the area under the curve (AUC) for the whole study period, corresponded to 0.2 L/min/m2 (95% confidence interval 0.03 to 0.4), p = .025. The observed effects outlasted the 210 minutes observational period.

CONCLUSION. In this placebo-controlled study involving SAH-patients with normal to moderately elevated ICP, 2 mL/kg of HSS reduced ICP and increased CPP significantly. Maximum effect was reached at twice the infusion time of 30 minutes. There were also beneficial haemodynamic effects with increased cardiac index in the HSS group.

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PROGNOSTIC VALUE OF BRAIN NATRIURETIC PEPTIDE IN NON TRAUMATIC SUBARACHNOID HEMORRHAGE

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INTRODUCTION. The aim of our study was to analyse the brain natriuretic peptide plasma concentrations, measured as NT-proBNP (BNP), in patients with non traumatic subarachnoid hemorrhage (SAH) and to assess if the increase of the BNP concentration has prognostic value in these patients.

METHODS. Descriptive study, including all patients with non-traumatic SAH admitted to our ICU, over a 23 month period. BNP was measured, at least once, within the first 72 hours after diagnosis. We analysed the Hunt-Hess grade (HH), modified Fisher scale, Hijdra scale, SAH aetiology, presence of cerebral vasospasm (VSP) (symptomatic or not) and Glasgow Outcome Score (GOS) in each patient.

RESULTS. Of 62 patients admitted, 14 were excluded (admission afterwards of 72 hours or not determination of BNP). Forty-eight patients were included, 30 women. Mean age was 49 $\pm$ 13 years. One of 48 patients was HH grade I, 28 were grade II, 6 grade III, 5 grade IV and 8 grade V. The BNP mean plasma concentration was 1297.6 $\pm$ 2632.9 pg/ml (range 38 - 14777; median 513), and was high (>150 pg/ml) in 37/48 patients (77%). BNP levels were found to be higher in patients with HH $\geq$ IV, although this difference not reach statistical significance (p=0.07). The results were also higher in patients with modified Fisher $\geq$ 3 ($p < 0.05$). 64.4% of patients had Hijdra >15 and were found to have BNP mean of 1674.5 $\pm$ 3158.3 pg/ml compared to 391.3 $\pm$ 674 pg/ml in patients with Hijdra $\leq$15 (p=0.002). BNP levels were lower in patients with a negative angiography ($p < 0.05$). Twenty-one patients (43.7%) developed VSP, in whom BNP levels were significantly higher than patients without VSP (2133 $\pm$ 3650 pg/ml vs 647.7 $\pm$ 1139.4 pg/ml; $p < 0.05$). Eleven patients were send back to their remitting hospital shortly after endovascular treatment. Upon hospital discharge the GOS was $\geq$ 4 in 22 patients, 2-3 in 8 patients and 7 died. BNP levels were higher in patients with GOS $\leq$ 3 compared to those with GOS > 3 (2434.2 $\pm$ 4204 pg/ml vs 584.7 $\pm$ 981.7; $p < 0.05$) and there was no significant difference between patients with GOS 2-3 and those who died.

CONCLUSION. A rise in BNP levels is frequently noted in patients with non-traumatic SAH (77% in our study). BNP is higher in patients with SAH due to an aneurysm and is related to subarachnoid blood volume, VSP and a worse neurological outcome. In view of these findings, we feel that there should be a tighter clinical vigilance of patients found to initially have higher levels of BNP.

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LACTIC ACIDOSIS IMPAIRS THE COAGULATION SYSTEM

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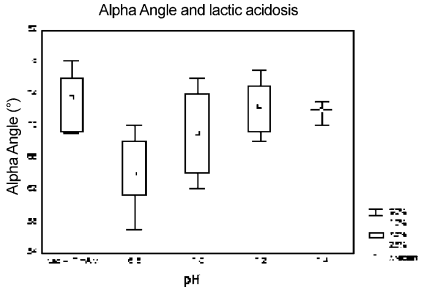
INTRODUCTION. Lactic acidosis is a common complication in patients suffering from coagulopathic haemorrhage after trauma. It has not been studied whether it is a causal relationship between the lactic acidosis and the coagulopathy or if the two are just coincident. To study a potential causal relationship, we performed an in vitro study using rotational thromboelastometry (ROTEM).

METHODS. 5 Blood samples was drawn from each of 6 healthy volunteers. Lactic acid was added to 3 blood samples in vitro in order to study effects at pH levels of 7.4 7.2, 7.0 and 6.8. The fifth sample was analysed after additon of lactate to a pH level of 6.8 and addition of the buffer THAM to normalise the pH again. The samples were then analysed with ROTEM.

RESULTS. We found a strong correlation between the degree of lactic acidosis and an impairment of the clot formation time (CFT) on the ROTEM analysis ($p<0.0001$) (Figure 1). Other parameters were not affected.



CONCLUSION. We found lactic acidosis to cause an impairment of the coagulation system. The impairment at pH 6.9 was similar to the impairment caused by hypothermia at 32°C. CFT primarily reflects the fibrinogen to fibrin conversion and the platelet activity. This may be a factor that should be attended to during resuscitation of bleeding patients.

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SCREENING OF BLUNT ABDOMINAL INJURY IN THE ADULT: THE ROLE OF ELEVATED LIVER TRANSAMINASE LEVELS

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INTRODUCTION. Serum glutamic oxaloacetic transaminase (SGOT) and serum glutamic pyruvic transaminase (SGPT) are adequate as a screening method, but their role in the screening of blunt abdominal injury in the adult has not been adequately studied. The present study tries to determine a SGOT's and SGPT's level useful in clinical practice to predict hepatic injuries due to blunt abdominal trauma in the adult.

METHODS. The medical records of the patients who underwent abdominal CT (computed tomography) at their admission in the hospital (Division of Trauma and Emergency) were retrospectively evaluated. We reviewed the medical records during a period of three years and ten months. The patients with penetrating abdominal trauma or who needed urgent surgery because of their instability were excluded. Of each selected patient, age, sex, mechanism of injury, ISS (Injury Severity Score), blood pressure, heart rate, mechanical ventilation at admission, previous high transaminase levels, SGOT and SGPT at admission, abdominal CTs and surgery findings, and ICU (Intensive Care Unit) mortality, were evaluated. Statistical analyses were performed by Statistical Package for Social Sciences (SPSS) software (version 11.0 for Windows).

RESULTS. A total of 149 patients were included, with a median ISS of 31 (confidence interval 95% -CI 95%- between 29 and 33). There were pathological findings in the liver in 28 abdominal CTs. The SGOT median was 336 (CI 95%: 251 - 422) in patients with abnormal CT, versus 101 (CI 95%: 83 - 119) in those with normal CT. The SGPT median was 346 (CI 95%: 257- 436) if there was any hepatic damage in the CT, versus 81 (CI 95%: 66 -97) if there wasn't. The proof's global accuracy obtained from ROC curves is 0.86 for SGOT and 0.88 for SGPT. In the study, an SGOT of 151 (sensitivity and specificity of 79%) and SGPT of 134 (sensitivity and specificity of 82%) were the best in predicting hepatic injury in blunt abdominal trauma.

CONCLUSION. 1. Elevated liver transaminase levels are a prognostic tool of hepatic damage in a patient with blunt abdominal trauma. 2. This study suggests that SGOT > 151 and/or SGPT > 134 are indicators of hepatic damage with high sensitivity, but the real value which indicates the need to follow up the study to rule out hepatic injuries must be established in prospective analyses.

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MULTIMODALITY NEUROMONITORING OF PATIENTS WITH SEVERE HEAD TRAUMA

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INTRODUCTION. Neuroprotection for avoiding secondary brain insults is very important in patients with severe head trauma. Neuromonitoring is essential for neuroprotection. We present our recent experience from the use of multimodality neuromonitoring (Intracranial Pressure, Brain Tissue Oxymetry and Microdialysis) in 17 patients with severe head trauma in order to evaluate the possible clinical value of the method compared to historical cohort studies.

METHODS. 17 ICU pts (13 male, 4 female, 38.5 yrs average) with severe brain injury (GCS 8 or less at admission) underheld monitoring of intracranial pressure (ICP) and brain tissue oxygenation (PtiO2). 15 of them underheld brain biochemical monitoring (microdialysis) as well. The neuromonitoring catheters were placed in the ICU ward via a 5.3 mm burrhole using a three – lumen cranial bolt. Catheters' tips were guided 12 to 35 mm inside the white matter preferably at the penubra of an haemorrhagic lesion. Neurointensive therapy protocol was focused on preservation of CPP over 70 mm Hg ("CPP targeted therapy"), together with preservation of PtiO2 over 20 mm Hg and of lactate/pyruvate (L/P) ratio under 25.

RESULTS. There were no complications caused by catheterization and monitoring procedures. Short – term outcome (modified GOS) was : 1 (death) for 4 pts (23.5%), 2 for 2 patients (11.8%), 3 for 1 patient (5.9%), 4 for 1 patient (5.9%) and 5 for 9 pts (52.9%). ICP-CPP, PtiO2 and L/P levels seem to be correlated one each other and all together with short-term outcome, compared to results of historical cohort studies.

CONCLUSION. 1) Multimodality neuromonitoring using modern techniques is safe, practical and reliable. 2) Catheterization using a three-lumen cranial bolt can be safely performed in the ICU ward. 3) Proper neurointensive therapeutic decisions based on multimodality neuromonitoring can improve outcome helping avoid secondary brain lesions in patients with severe head trauma.

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FUNCTIONAL CAPACITY TO WORK ACCORDING TO GLASGOW OUTCOMES SCORE AFTER TRAUMATIC BRAIN INJURY (TBI)

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INTRODUCTION. The medical care of the critically ill neurological patients has changed dramatically over the past two decades. There is a growing trend to include general severity of disease scoring systems such as APACHE II in neurological outcome predictive models. The advantage of such an approach is the inclusion of underlying medical co-morbidities, and other transfer and emergency room (ER) parameters of patients that may influence their final outcomes (2) Aim: The aim of this study was to measure the risk of unable to work according to GOS (score 5) in patients who were affected by TBI since 2003.

METHODS. We did a prospective observational research study and seventy one critical ill patients admitted to the hospitals. Information was obtained from a telephone interview. Investigated risk factors included age, blood gases values, TAT (Trauma-Arrive-Time), GCS and shock at ER admitting. Statistics: Analysis of data (mean and standard deviation, ± 2) were performed and odds ratio were calculated using multivariate logistic regression analysis, with work capacity as the dependent variable and ER parameters as the independent variables. The *p* value for the Wald test is given. SPSS 10 package was used, and p<0.05 was considered significant.

RESULTS. Work capacity (GOS 5 score) was the outcome variable that was studied. Out of 71 patients, 90.1% were male and 9.9% were female. Their average age was 32.3±14.1 years. The overall UCI mortality rate was 32.4% (23/71), and including home mortality 36.6% (26/71). Total work capacity was only 21.7% (10/46). Age and Glasgow at ER remained as a significant independent risk factor for unable to work. (Table 1).

TABLE 1.

Relation between unable to work and ER parameters

	Mean	*p*	Log OR*	Wald 95% CI
Age	32.3±14.1	0.034	1.13	1-1.26
Glasgow	7.74±2.9	0.042	0.54	0.29-0.97
Systolic pressure	118.2±22.1	0.122	0.89	0.78-1.03
MAP	67.6±16.4	0.179	1.14	0.93-1.40
PaO2	144±66.6	0.57	1	0.98-1.02
PaCO2	35.6±10.2	0.76	1	0.59-2.03
BE	-5.9±5.5	0.54	0.75	0.23-2.17
TAT	9.26 h±18	0.96	1	0.99-1

**Hosmer Lemeshow goodness of fit test: 4.54, p = 0.71*

CONCLUSION. In South America is important to get data about the functional status of the patients and their quality of life due to every patient who leave the ICU must work to live. Therefore, it is important to know any modifiable risk factor for the period of treatment. Our study demonstrates that low GCS and old patients are independent risk factors for unable to work after TBI. The effort should be focus on prevention and look for risk factors that affect GCS before arriving ER.

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1098

VOLUVEN (HES 130/0.4), 10% NACL AND 40% GLUCOSE INFLUENCE ON THE ERYTHROCYTE MORPHOLOGY

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INTRODUCTION. Infusion solutions can alter erythrocyte structure and therefore deteriorate capillary perfusion and tissue oxygenation. It's a very important problem in patients with severe traumatic brain injuries (TBI), because such patients require large infusion volumes and hypertonic solutions for intracranial hypertension treatment.

METHODS. We investigated 35 patients with severe TBI (age (M±δ) 48±2, Glasgo Coma Scale 5 – 9) on the 3-7 day after admission to the ICU. Solutions investigated were infused during 40 minutes: 10% NaCl 200 ml (n =10), 6% Voluven 500 ml (n=10) and the mixture (1:1) of 10% NaCl with 40% glucose, 140 ml (n=15). Venous blood probes were taken before infusion, immediately after it and 60 minutes later. Blood probes of practically healthy donors were used for the estimation of normal erythrocyte morphology (n=5). Erythrocyte morphometry was investigated by the computer system of image analysis "MEKOS-C". The amount of normal erythrocytes (normocytes) was analyzed in each probe.

RESULTS. Normocytes amount was (M±m) 95.7±1.4% in healthy donors and 82±1.1% in patients with severe TBI (p<0.05). Voluven infusion didn't change erythrocytes morphology. Normocytes amount was 89±1.7% before infusion, 87±1.7% after it and 88±1.3% 60 minutes later. 10% NaCl infusion was followed by normocytes amount decreasing from 72.3±1.3% to 54.4±1.2% (p<0.05). This picture remained invariable 60 minutes later (55.6±1.2%). Hypertonic saline and 40% glucose mix infusion was followed by notmocytes amount increasing from 87±1.5% to 93±1.1% (p<0.05). One hour after the end of infusion, normocytes amount was 91±1%.

CONCLUSION. 1) Erythrocytes structure is markedly altered in patients with severe TBI.
2) Voluven (HES 130/0.4) has no influence on the erythrocytes morphology.
3) Hypertonic saline infusion considerably reduces normocytes amount.
4) In order to eliminate the negative effects of 10% NaCl on the erythrocytes morphology it can be combined with 40% glucose solution.

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ALBUMIN IN SEVERE HEAD TRAUMA

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INTRODUCTION. High dose of human serum albumin (HSA) has been shown to dramatically decrease brain edema in experimental ischemia-reperfusion, and to restore brain metabolism in head trauma. It improves outcome in both models. The aim of this pilot study was to explore the clinical tolerance and impact of HSA on cerebral hemodynamics, after severe traumatic brain injury in man.

METHODS. After close relative informed consent, 24 patients (18-60 years) with severe closed traumatic head injury were randomly assigned either to standard treatment (CPP management)(Group S) or to standard treatment plus a unique 10 ml/kg dose of 20% HSA (Group A) infused in 15 min, as soon as possible within the 36 hours after injury. Cerebral and systemic hemodynamic data (radial catheter plus Swan Ganz) were continuously monitored. Arterial and venous blood samples were obtained at regular intervals.

RESULTS. Patients did not differ by group in terms of age, sex ratio, initial GCS, ISS. Before HSA, the median value of ICP, MAP, CPP, PaCO2, PaO2, serum osmolality and oncotic pressure (Ponc) were identical. HSA raised pulmonary capillary wedge pressure from 5±2 mm Hg to 15±3 mmHg, and increased Ponc from 19±3 to 29±4 mmHg (p< 0.001). Ponc subsequently decreased to 21±2 mmHg at day 3 (p< 0.05). The percentual time over three days during which ICP was greater than 20 mm Hg was 33% lower in group A than in group S (not significant). Two way ANOVA did not show significant differences in median ICP, MAP and CPP between groups. Daily quantities of thiopental, hypertonic mannitol and noradrenalin did not significantly differ. Time course of osmolality, PaCO2, PaO2 were similar between groups. ICU mortality was 8% in both groups, one patient of group A disclosed acute pulmonary edema after albumin, resolving within an hour after furosemid administration. Statistical analysis shows that 200 patients by group should be necessary to demonstrate the trend observed: a lower ICP in group A (with alpha = 5% and beta = 80%).

CONCLUSION. Our data support a fair systemic and cerebral hemodynamic tolerance of HSA in these patients. The finding of a trend to an ICP decrease after HSA warrants the need for a large scale phase III study with the same methodology.

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SEVERE TRAUMATIC BRAIN INJURY IN SWITZERLAND - PILOT STUDY

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INTRODUCTION. To pilot a population-based cohort study in patients with severe traumatic brain injury (TBI) in Switzerland.

METHODS. From January to June 2005 we enrolled patients with severe TBI (lowest GCS without sedation <9 in first 24 hrs. and AIS>3) identified by 3 Swiss tertiary hospitals. We collected comprehensive data on accident, care by out-of-hospital emergency medical services (OHEMS), in-hospital and rehabilitation care and patient-relevant outcomes from time of accident up to 6 months. Primary endpoint was functional status (Extended Glasgow Outcome Scale, GOSE) after 6 months. Secondary endpoints included Functional Independence Measure (FIM) and quality of life (SF-12).

RESULTS. Of 101 enrolled patients 41 (41%) died on accident scene; 60 (59%) were first rescued by an OHEMS team. In 25 of 60 (42%) a physician specialized in emergency medicine or anesthesia was on the OHEMS team. 10 (17%) patients were indirectly admitted, i.e. first carried to a peripheral hospital (5 with initial GCS<9). Delay from emergency call until decision on neurosurgery was 95 min (median, range 54 to 198) for direct admissions and was 213 min (127 to 388) for indirect admissions. 23 (38%) patients died within first 48 hours, 30 (50%) patients died until day 14, and 31 (52%) until 6 months. Median GOSE of all hospital-admitted patients was 1 (1 to 8). In 6-month survivors median GOSE was 6 (2 to 8), median FIM 125 (18 to 126), median SF-12 physical and mental scores were 45.6 (25.0 to 55.3) and 54.5 (31.5 to 64.8).

CONCLUSION. We proved the feasibility to collect valid data of patients with severe TBI. The high mortality in our pilot sample is a strong argument for the nationwide main study.

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HYPERGLYCAEMIA AFTER TRAUMA IS ASSOCIATED WITH INCREASED MORTALITY

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INTRODUCTION. Strict glycemic control has been shown to be beneficial to surgical patients and medical patients receiving intensive care. Although hyperglycaemia has been described in trauma patients, we lack knowledge on the time of onset and possible association to mortality. The purpose of this study was to determine the development and impact of hyperglycaemia developed during the first 24 posttraumatic hours on 30-day mortality.

METHODS. Prospective, descriptive cohort study including 265 consecutive adult trauma patients, admitted directly from the accident scene during an 18-month period to a Level 1 trauma centre. Blood glucose was measured upon arrival and at 6, 12, and 24 hours intervals after admittance. We defined hyperglycaemia as blood glucose > 9.4 mmol/L. Multiple logistic regression was used to identify independent risk factors for death. Follow-up on mortality was done at 1-year. The local Ethics Committee approved the study and written informed consent was obtained from the patients or next of kin.

RESULTS. The cohort had a median age of 38.1 years (IQR, 26.2 - 55.4) and the median Injury Severity Score (ISS) was 9.5 (IQR, 4.7 - 20.3). Blood glucose levels were significantly higher in all measurements for non survivors than in survivors (median 10.4 (SE, 0.6) mmol/L vs. 6.8 (0.1) on arrival, 10.7 (1.2) vs. 6.7 (0.1) at 6 h post arrival, 10.0 (1.0) vs. 6.6 (0.1) at 12 h, 9.6 (1.2) vs. 6.8 (0.1) at 24 h; ANOVA p<0.001; Pair-wise comparisons p<0.001 (Bonferroni). Hyperglycaemia (>9.4 mmol/L) measured at any time point during the first 24 h, revealed an association with increased mortality (35.0% vs. 3.8%; unadjusted OR 13.7; 95% CI 7.9 - 23.8). This significant association was moreover present at all four measuring points. Hyperglycaemia was an independent risk factor for mortality (adjusted OR 7.2; 95% CI 3.7–14.1) after adjustment for ISS, significant head injury, transfusion of > 10 units of red blood cells in 24 hours, time from injury to blood glucose measurement, gender, and age. The same significant association was retrieved at both lower and higher levels of hyperglycaemia.

CONCLUSION. Hyperglycaemia is developed early post trauma and is associated with increased mortality as an independent risk factor for death within 30-days. Blood glucose should be monitored and strict glycemic control in injured patients should be investigated in a randomized controlled trial.

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SPECIALIST NEUROCRITICAL CARE: SEVERITY GRADE AND OUTCOME AFTER ANEURYSMAL SUBARACHNOID HEMORRHAGE

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INTRODUCTION. To evaluate the impact of specialized neurocritical care on the population admitted to a neurovascular center and on the outcome of patients with severe aneurysmal subarachnoid hemorrhage (aSAH).

METHODS. After exclusion of patients treated with endovascular techniques, between 1999 and 2003 198 patients with aSAH treated with early aneurysm clipping were analysed. In 1999 a new standardized protocol for intensive care treatment was established in the Department of Neurosurgery, University Hospital Zuerich. The results were compared to the former time period immediately after introduction of early aneurysm clipping from 1993 to 1994.

RESULTS. Among 198 patients with aSAH 90 patients (45.5%) suffered from mild aSAH WFNS grade 1 and 2, 41 (27.3%) from aSAH WFNS grade 3, 36 (18.2%) from grade 4 and 57 (28.8%) from grade 5. From 1999 to 2003 significantly more patients with severe aSAH WFNS grade 4 and 5 were treated on (93 from 198 patients; 47.0%) compared to the former time period after introduction of early surgery (23 from 150 patients; 15.3%) (p<0.0001). In the early series 10 of 23 patients (43.5%) with WFNS 4 recovered with good outcome GOS 4 and 5, whereas in the later series 23 of 36 (63.9%) with WFNS grade 4 survived in a good functional state. Before 1999 all patients with WFNS grade 5 died or survived vegetatively. From 1999 to 2003 20 of 57 patients (35.1%) with aSAH WFNS grade 5 survived with good outcome.

CONCLUSION. The availability of extended specialized neurocritical care seems to induce a change of the patient population towards a higher severity grade. Patients with high-grade aSAH might benefit most from highly specialized neurocritical care treatment.

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GLUTATHIONE METABOLISM IN PLASMA, WHOLE BLOOD AND MUSCLE AFTER AN ENDOTOXIN CHALLENGE

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INTRODUCTION. Glutathione is quantitatively the main antioxidant in humans. Patients with septic shock have high plasma glutathione concentration, while intracellular concentrations in erythrocytes and muscle are low. Here we investigated the temporal pattern of glutathione status and glutathione kinetics in healthy volunteers during the initial phase of sepsis using an endotoxin model.

METHODS. Descriptive pilot study where glutathione status and kinetics were determined in healthy male volunteers (n = 8) during 4 hours before and 4 hours after an endotoxin challenge. The glutathione status was determined in plasma and whole blood at baseline and hourly for 4 hours after intravenous endotoxin injection and in skeletal muscle the glutathione status was determined at baseline and at 2 and 4 hours after endotoxin injection. In whole blood and muscle, both total and reduced glutathione was determined. The oxidized fraction and redox status was calculated from these values. In plasma only total glutathione concentration was measured.

RESULTS. In plasma the concentration of total glutathione decreased by 24% ($p < 0.05$) at 3 hours after endotoxin injection and by 32% ($p < 0.001$) at 4 hours. In whole blood and skeletal muscle, the concentration of both reduced and total glutathione as well as the redox status remained unaltered after endotoxin challenge. The fractional synthesis rate (FSR) of glutathione in whole blood increased in 6 out of 8 patients and was 0.38 ± 0.2 before and 0.59 ± 0.22 after the endotoxin challenge ($p = 0.088$).

CONCLUSION. This study demonstrates that plasma concentration of total glutathione decreases in healthy volunteers exposed to intravenous endotoxin, while glutathione status in skeletal muscle and whole blood remains unaltered. This contrast to what is seen in septic ICU patients where plasma glutathione concentration is increased and decreased in whole blood and skeletal muscle.

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EVALUATION OF DIFFERENT ADRENAL FAILURE CRITERIA IN SEPTIC SHOCK PATIENTS

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INTRODUCTION. Adrenal failure (AF) increases mortality in septic shock, but there is no agreement on the best diagnostic criteria in this setting. Our objectives were: to compare the incidence of AF considering different baseline cortisol cut-offs and Deltamax after low (1μg) and high (249μg) dose of corticotropin stimulation tests; to analyze the impact of serum albumin on AF incidence and to correlate laboratorial AF with norepinephrine removal.

METHODS. Prospective observational study in an ICU at a tertiary hospital from May 2002 to May 2005. Septic shock patients over 18 and without previous use of steroids were selected. After measurement of serum albumin and baseline cortisol, they were submitted to 1μg and 249μg corticotrophin test with a 60 min interval between doses. Cortisol levels were drawn 60 min after each test (cortisol 60 and cortisol 120). The differences between cortisol 60 or cortisol 120 minus baseline were called $Deltamax^{1}$ or $Deltamax^{249}$. AF was defined as $Deltamax^{249} \leq 9$ or baseline cortisol ≤ 10. Other baseline cortisol cut-offs (≤ 15, 20, 25 and 34μg/dl) were considered for comparison with the standard AF criteria and for the serum albumin influence. Norepinephrine removal on the 5th study day was compared with baseline cortisol. We considered $p<0.05$ as significant.

RESULTS. We enrolled 102 patients (43 male). AF was diagnosed in 22.5%. Patients with albumin ≤ 2.5g/dl presented lower baseline cortisol and higher incidence of AF than albumin >2.5 (15.5 vs 22.4μg/dl, p=0.04; 84% vs 58.3%, p=0.05), however $Deltamax^{249}$ and $Deltamax^{249} \leq 9$ were not affected by albumin (14.5 vs 18.8μg/dl, p=0.48 and 24% vs 25%, p=1.0). Compared with $Deltamax^{249} \leq 9$, the higher baseline cortisol cut-offs showed a higher sensitivity (St) and a lower specificity (Sp) (St 82%, Sp 5.1%, cut-off 34) while the opposite occurred with the lower baseline cortisol cut-off (St 17.4%, Sp 75.9% cut-off 10). $Deltamax^{1} \leq 9$ was the best test which corresponded to $Deltamax^{249} \leq 9$ (OR 2.29[CI95%, 1.74-3]). Baseline cortisol <23.6μg/dl was the most accurate diagnostic threshold to determine norepinephrine removal according to ROC curve.

CONCLUSION. AF was identified in 22.5%. $Deltamax^{249} \leq 9$ was the best criteria for AF as it was not affected by albumin levels. The higher the baseline cortisol cut-off for AF, the higher the sensitivity and the lower the specificity. Baseline cortisol <23.6μg/dl was the most accurate diagnostic threshold for determination of norepinephrine removal.

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RELATIONSHIP BETWEEN IRON METABOLISM AND INFLAMMATORY STATUS IN CRITICALLY ILL PATIENTS

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INTRODUCTION. Anemia is a common pathology in intensive care unit (ICU) patients (1). The pathophysiology of anemia includes altered iron metabolism with decreased erythropoiesis (2). We compared the iron metabolism of septic and non-septic patients when they were admitted in the ICU.

METHODS. Fifty-one patients (30 non-septic and 21 septic) were enrolled in the study. Their stay in other units before their admission in the ICU was less than or equal to 2 days. On their first day in the ICU, the following parameters of iron metabolism were measured: hemogram, serum iron (Fe), ferritin (Ft), transferrin (Tf), soluble receptor of transferrin (sTfR) concentrations, and Tf saturation (Sat). Measured inflammatory parameters were: white blood cell count (WBC) and serum CRP concentration. Data were expressed as mean ± SD or median [percentiles 25-75] and were compared by the T-test or the Mann–Whitney test. Correlations were obtained by the Spearman test.

RESULTS. Despite comparable hemograms at ICU admission (RBCs: 3.8 ± 0.4 vs 3.9 ± 0.4 $106/mm^3$), septic patients showed alterations in iron metabolism compared to non-septic patients (iron: 20 [16-32] vs 40 [28-78] μg/dL; Ft: 461 [215-973] vs 204 [69-404] ng/mL; Tf: 167 ± 53 vs 215 ± 57 mg/dL; all $p < 0.05$). No difference was observed for sTfR: 0.3 [0.21-0.4] vs 0.28 [0.2-0.37] mg/dL and Sat: 11 [7-13] vs 14 [9-39]%. For all patients, CRP was correlated with Ft ($r = 0.55$; $p < 0.001$) and inversely correlated with Tf ($r = -0.49$; $p = 0.003$).

CONCLUSION. Iron metabolism is already altered in septic patients at ICU admission and this alteration correlates with the inflammatory status.

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THE CHOLESTEROL AND APO-A1 CHANGES IN SEPTIC POLYTRAUMA ICU PATIENTS

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INTRODUCTION. Little is known about lipoproteins in sepsis. We tried to realize if the changes seen in Cholesterol and apolipoprotein A1 (Apo- A1) levels seen in severely septic polytrauma ICU patient, are characteristic of the pts outcome and could serve as prognostic factors.

METHODS. Thirty five polytrauma patients under mechanical ventilation were studied. Mean age was 45±15yrs, APACHE score 12 ±4, ISS 20 ±10, mean ICU stay was 24 ±8 days. The pts were divided in 3 groups: Group A was the pts with sepsis who died. Group B was the pts with sepsis who survived and Group C was the pts without sepsis (control group). Blood samples were drawn the 1st, 7th and 15th day and cholesterol, HDL, LDL, and Apo-A1 were measured. The data were analysed by Pearson's correlation coefficient and t-student tests.

RESULTS. In Group A there was: 1) a statistically significant reduction of the Apo-A1 levels the 7th and 15th day ($p<0.05$). 2) a positive correlation statistically significant between Apo-A1 and cholesterol ($r = 0.83$, $p< 0.001$) and between Apo-A1 *και* HDL ($r = 0.76$, $p<0.001$). 3) The 7th day there was a statistically significant negative correlation between Apo-A1 and cholesterol ($r = -0.74$, $p< 0.01$) and between Apo-A1 and HDL ($r = - 0.65$, $p< 0.05$).
In Group B Apo-A1 was reduced only the 7th day ($p<0.05$) and returned back to previous levels towards the 15th day.
In Group C Apo-A1 levels were stable between the 1st and 15th days and a statistically significant positive correlation between Apo-A1 and HDL ($r= 0.67$, $p< 0.001$).

TABLE 1.

Apo-A1 levels and septic pts

Sepsis	1st day	7th day	15th day
Dead (Group A)	96±23	50±18*	29±15*
Alive (Group B)	81±21	64±4*	80±9
No sepsis (Group C)	88±16	87±22	83±2

**p<0.05*

CONCLUSION. Apo-A1 changes seem to have a prognostic value of the patient outcome, but for safer results more studies must be done.

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CHOLESTEROL AND ELASTIC PROPERTIES OF ARTERIAL WALL IN PATIENTS WITH SEVERE MULTIPLE TRAUMA

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INTRODUCTION. The aim: to study lipid metabolism and elastic properties of arterial wall in patients with severe multiple trauma (SMT).

METHODS. The group of the SMT pts consisted of 13 (9 men, 4 women, 28.4 ± 9.1 years). None of the patients had a history of a brain injury. The APACHE II score was 20.1±0.7. The patients were examined on the 2 stage: I - 15-30 days, II – 1-5 years after the trauma. Triglycerides, total cholesterol, cholesterol of HDL, AST, ALT, alkaline phosphatase levels were measured in serum using biochemical analyzer. Cholesterol of LDL was calculated. The central hemodynamic parameters were measured by oscillographic analyzer.

RESULTS. The activity of AST (59.9±34.9 U/l) and ALT (35.9±34.4 U/l) in SMT pts was elevated on the 15-30 days. This may indicate hypoxic damage of the tissues leading to the disintegration of the cell membrane. The activity of alkaline phosphotase (144.0±142.7 U/l) was also increased at this period. Total cholesterol (3.9±1.5 mmol/l) was unaltered, but triglycerides (1.6±0.5 mmol/l) reached upper level of the normal indices. There was the significant decrease of cholesterol of HDL (0.53±0.47 mmol/l), whereas the cholesterol of LDL was normal (2.7±1.3 mmol/l). These findings indicate the dislipidemia during the first month after trauma. The activity of AST (23.1±9.8 U/l) and ALT (25.5±7.2 U/l) was normal in the late period after SMT. The probable reason for it is complete reparation of the cell membrane. The level of alkaline phosphotase (144.8±44.9 U/l) persisted increased. Total cholesterol (5.3±1.4 mmol/l) increased on 26.5% and reached the upper level of normal indices, triglycerides were unaltered (1.4±1.0 mmol/l). Cholesterol of LDL (3.6±1.2 mmol/l) was normal, but there was the increase on 33.3% in compare with data on the 15-30 days. Cholesterol of HDL (0.75±0.44 mmol/l) remained decreased, but there was increase on 33.9% in compare with the first month after SMT. The central hemodynamic parameters indicate that ductility of the arterial wall was subnormal (0.05±0.01 mm/mm Hg), whereas velocity of the pulse wave was increased (902±380 cm/sec).

CONCLUSION. 1. Dynamics in cholesterol metabolism and biochemical indices indicate the their gradual improvement in pts suffered from SMT; 2. SMT conduce the development rigidity of arterial wall in the late period after trauma.

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CAN WE PREDICT FREE CORTISOL IN CRITICALLY ILL PATIENTS? A COMPARISON OF TWO APPROACHES

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INTRODUCTION. Coolen's equation has been used to calculate free cortisol (FC) in critical-illness but this does not include plasma albumin concentration (which has a high cortisol-binding capacity.) Vermeulen (1999) developed a formula to predict free-testosterone that included albumin plus sex-hormone binding globulin (SHBG); we have modified this for FC calculation, replacing SHBG with cortisol binding globulin (CBG) and compared the two approaches.

METHODS. Control subjects, and patients with septic shock, underwent a 1μg short synacthen test. Those with known adrenal failure: steroid, oestrogen or etomidate use: or pituitary disease were excluded. CBG was analysed by RIA (Biosource). Serum total cortisol was measured by an automated chemiluminesence assay (Bayer Centaur). Serum FC concentration was measured by steady-state gel filtration. Coolen's equation was compared to that of Vermeulen, modified for FC, whereby $FC = ([TC] - (N \times [FC])) / (Kt\{CBG - [TC]\})$. $N = Ka\ Ca + 1$ where Ka is the association constant for albumin and Ca is the albumin concentration. From Andersen (2002) we have taken the Kt for CBG as 76×10^6 / M and for albumin as 0.003×10^6 / M. Inter-group comparisons were performed by unpaired Student's t test. Correlation analysis was determined by Pearson's correlation coefficient.

RESULTS. 9 patients (M6, F3, age 67.1±4.1yrs, APACHE 2 score 23.0±2.8) and 10 age-matched controls (M5, F5, age 63.3±1.9yrs) were studied. There was no difference in TC at zero, 30 or 60 mins between patients and controls (437.4±37.7 *vs* 492.3 ±63.4; 805±43.6 *vs* 829.3±139.7; 738.2±52.6 *vs* 814.6 ±176.2nmol/L.) Both CBG (26.6±3.8 *vs* 53.2±6.3μg/ml, P=0.001) and albumin (14.4±1.9 *vs* 42.3±0.6g/L; P<0.001) were significantly lower in patients than in controls. The FC was significantly higher in patients at zero minutes (207.5±44.9 *vs* 42.2±5.3nmol/L, P=0.003), 30 minutes (370.4 ±59.1 *vs* 136.5±10.7, P=0.002) and 60 minutes (335.5±48.6 *vs* 104.3±9.1, P<0.001) compared to controls. In the patient group, Coolen's equation correlated to measured FC (r^2 0.57, P=0.007) but there was a much closer correlation using the modified Vermeulen equation (r^2 0.89, P<0.001).

CONCLUSION. The modified Vermeulen formula (that includes albumin measurement) may provide a closer approximation of FC, in critically ill patients, than Coolen's equation.

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UTILITY THE MELD SCORE FOR SHORT-TERM OUTCOME PREDICTION IN A INTENSIVE CARE UNIT

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INTRODUCTION. The model for end-stage liver disease (MELD) has been used to replace Child-Turcotte-Pugh (CTP) score in predicting survival for patients awaiting liver transplantion. However, there is debate as whether it is better in other settings of cirrhosis. In this study, we assessed the utility of the MELD score as a predictor of short-term mortality in non-transplant patients who admitted to a medical intensive care unit (ICU).

METHODS. From Jan 2004 to Dec 2005, 109 patients who had liver cirrhosis and admitted to our ICU were prospectively evaluated and their medical profiles were retrospectively analyzed in this study. Patients with CTP score of 7 or more fulfill the minimal criteria for MELD were enrolled. We assessed the utility of the MELD score and compared it with the CTP score as a predictor of mortality.

RESULTS. The 7-day, 15-day and 30-day mortality rate was 41%, 73% and 86% respectively. There was a significant correlation between the MELD and CTP score (ρ=0.66, $p < 0.01$). The area under the Receiver Operator Characteristic (ROC) curve for the MELD score was 0.73 ($p< 0.001$) compare with 0.66 for CTP score at 7-day mortality; the area was 0.54 and 0.58 respectively ($p = 0.53$) at 15-day mortality. However, the area was 0.63 and 0.71 respectively ($p = 0.11$) at 30-day mortality. The risk ratio for MELD score was 1.10, 1.0 and 1.02 at 7 days (p=0.002). 15 days ($p = 0.26$) and 30 days (p=0.20) respectively.

CONCLUSION. Decompensated liver cirrhosis remains a high mortality in the Medical ICU. The MELD score correlation well with CTP score but not better than CTP score except predicting 7 -day mortality in a medical ICU.

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INTRA-ABDOMINAL HYPERTENSION AND GASTROINTESTINAL SYMPTOMS IN PREDICTION OF ICU OUTCOME

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INTRODUCTION. Intra-abdominal hypertension (IAH) is associated with increased ICU mortality. We investigated if the combination of IAH with other gastrointestinal symptoms would increase its predictive power on ICU outcome.

METHODS. 330 adult emergency surgical and medical ICU patients were prospectively studied. IAH was defined as intra-abdominal pressure >12mmHg for at least one day. Gastrointestinal failure (GIF) was defined as daily occurrence of at least two of the following symptoms: absence of bowel peristaltics, bowel distension, and gastrointestinal bleeding.

RESULTS. Poor GI function was associated with significantly higher ICU mortality (Table 1). IAH and GIF were identified as highly predictive parameters for ICU mortality. IAH and GIF, when occurred simultaneously (IAH+GIF), but not alone, were independent risk factors for ICU mortality. Mean SOFA during the first week in ICU was identified as the most powerful predictor of ICU mortality. As the best model, SOFA and IAH+GIF predicted 74.7% of true-positive and 96.2% of true-negative cases (overall 90.8%).

TABLE 1.
Incidence and ICU outcome of IAH and GIF

	No of pt. dead/alive (mortality, %)	P-value
Total study population (n=330)	84 / 246 (25.5)	
IAH yes (n=80)	27 / 53 (35.1)	
IAH no (n=250)	52 / 198 (21.8)	0.016
GIF yes (n=80)	35 / 45 (45.5)	
GIF no (n=250)	44 / 206 (18.4)	<0.001
IAH+GIF yes (n=48)	21 / 27 (45.7)	
IAH+GIF no (n=282)	58 / 224 (20.6)	0.001

CONCLUSION. Gastrointestinal failure is associated with high ICU mortality. Combining of IAH with clinical GI symptoms allows more exact prediction of ICU outcome than IAH alone.

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A NURSE-DRIVEN COMPUTERIZED PROTOCOL IMPROVES POTASSIUM CONTROL

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INTRODUCTION. Nurse-driven protocols are known to lead to more efficient glucose control in the intensive care unit than doctors' decisions. Potassium regulation has important similarities with glucose control: potassium can be measured in the same blood sample and on the same machine as glucose, potassium can also be delivered by syringe pump and potassium administration may need multiple readjustments over the day. Therefore, we integrated potassium control into an automated computer program, which had already been successfully implemented for glucose control [1].

METHODS. Potassion and glucose were measured in arterial blood samples on an ABL 700 point-of-care analyzer. Insulin (50 units in 50 ml) was delivered intravenously; potassium (50 mmol in 50 ml) was delivered either by central venous catheter or by gastric, duodenal or jejunal tube. Only continuous delivery without boluses was used for both insulin and potassium administration. The GRIP system [1] advises both on the rates of insulin and potassium pumps as well as on the timing of glucose and potassium measurements. GRIP's advice can always be overruled or adjusted by the nurses; such instances are automatically recorded. We analyzed potassium values before and after the addition of GRIP-potassium regulation at our surgical intensive care unit.

RESULTS. 872 patients were analyzed; 725 before the implementation of potassium regulation by GRIP and 147 after. Mean potassium-levels were similar in both periods (median 4.12 vs. 4.19 mmol/L). The mean fraction of time within the normal range (3.6-4.8 mmol/L) changed from 84% to 93% ($p<0.001$, hypokalemia decreased from 7 to 4% and hyperkalemia from 9 to 3%). The fraction of patients who spent more than 10% of their stay outside the normal range decreased from 38 to 23% ($p < 0.001$). Nurses followed recommended pump rates 18% of time in the first week of implementation. In subsequent weeks, compliance rates were 19%, 49%, 91% and above 95% from then on.

CONCLUSION. In the intensive care unit, potassium regulation was successfully integrated with glucose-insulin regulation, which led to reduced incidence of hypo- and hyperkalemia.

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SUCCINYLCHOLINE INDUCED HYPERKALEMIA IN HYPERTHERMIC RATS: A BIOCHEMICAL AND ULTRASTRUCTURAL STUDY

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INTRODUCTION. Succinyicholine (SCH) is frequently used to facilitate endotracheal intubation in the intensive care unit (ICU). SCH induced hyperkalemia is generally a self-limited and benign condition. Several conditions such as intraabdominal infections, burns, and trauma have been reported to cause an exaggerated potassium release and potentially life-threatening hyperkalemia after SCH administration. Fever is a common problem in the intensive care unit patients and it is not clear whether this condition exaggerates the SCH induced potassium release.
This study was conducted to evaluate SCH induced potassium release and skeletal muscle changes in hyperthermic rats.

METHODS. Forty adult Wistar rats were randomly allocated into four equal groups: (1) SCH + normothermia, (2) SCH + hyperthermia, (3) normothermia, and (4) hyperthermia. Hyperthermia was induced by a radiant heater to a core temperature of 39.5-40.0°C. All animals were tracheatomized and mechanically ventilated for 60 minutes. Blood samples were obtained at the 0 (T0), 10 (T10), and 60 minutes (T60) of the experiment to measure blood levels of aspartate aminotransferase (AST), creatine phosphokinase (CPK), myoglobin, and potassium. At the end of the experiment the animals were sacrificed and diaphragm and masseter muscle samples were preserved for electron microscopic examination.

RESULTS. Groups had similar blood CPK, AST, and myoglobin levels at all measurement time points. Mean blood potassium levels were significantly higher in groups 1 (6.0 ± 0.4 mmol/l) and 2 (6.6 ± 0.8 mmol/l) than the groups 3 (4.6 ± 0.7 mmol/l) and 4 (5.0 ± 0.4 mmol/l) at T10 (ANOVA $p<0.005$ for all comparisons). Similarly, at T60 groups 1 (6.4 ± 1.0 mmol/l) and 2 (7.9 ± 1.6 mmol/l) had significantly higher mean blood potassium levels than groups 3 (4.9 ± 0.6 mmol/l) and 4 (5.0 ± 0.5 mmol/l) ($p<0.03$ for all comparisons). In addition, mean blood potassium level was significantly higher in Group 2 than group 1 at T60 (p=0.008). Electron microscopy revealed significant skeletal muscle changes in group 2 characterized by intense degeneration, centralized nuclei, and disrupted Z-lines.

CONCLUSION. Our findings demonstrated that hyperthermia exaggerated the SCH induced potassium release and skeletal muscle changes in this rat model. Further investigations are required to evaluate the clinical implications and importance of these findings.

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REGULATION OF TISSUE TYROID HORMONE LEVELS IN PROLONGED CRITICAL ILLNESS

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INTRODUCTION. Prolonged critical illness is invariably characterized by a suppressed function of the thyroid axis bringing about the low T3 syndrome. Apart from low plasma T3 levels, critical ill patients also reveal a striking reduction in liver and kidney T3 and T4 concentrations (1). Regulation of tissue thyroid hormone levels during critical illness hitherto remains unknown. We investigated the effects of T4, T3, T4+T3 and TRH infusion on tissue thyroid hormone concentrations in prolonged critically ill rabbits.

METHODS. Burn-injured, parenterally fed, New Zealand White rabbits were randomized to receive 4-d infusion of saline, T4 (9 μg/kg/d), T3 (5 μg/kg/d), T4+T3 (9+5 μg/kg/d) or TRH (60 μg/kg/h), started on d4 of the illness. Plasma, liver and kidney thyroid hormone concentrations as well as iodothyronine deiodinase type 1 (D1) and D3 activity in snap-frozen liver and kidney were quantified.

RESULTS. Compared with infusion of saline, liver T4 decreased with T3 (P=0.03) and increased with T4 and T4+T3 treatment (P<0.03). Liver T3 increased with infusion of T4, T3 and T4+T3 (P<0.01). Infusion of TRH tended to increase liver T4 and T3 (P=0.1). No differences in liver rT3 were found among the groups.
Kidney T4 decreased with T3 (P=0.008), tended to increase with T4 (P=0.06) and was not significantly altered by T4+T3 or TRH treatment. Kidney T3 was increased in T4, T3 and T4+T3-treated rabbits (P<0.02), with a trend for TRH (P=0.1). Kidney rT3 was only increased with infusion of T4 (P=0.002), but was not different from saline in all other intervention groups.
Plasma T4, T3 and rT3 levels correlated with the respective hormone concentrations in liver (R=0.86, P<0.0001; R=0.94, P<0.0001; R=0.39, P0.01) and kidney (R=0.59, P<0.0001; R=0.88, P<0.0001; R=0.66, P<0.0001). Liver D1 correlated positively (R=0.86, P<0.0001) and liver D3 correlated negatively (R=-0.67, P<0.0001) with liver T3, but not with T4 or rT3, levels. In kidney, only D1 correlated with levels of tissue T3 (R=0.68, P<0.0001).

CONCLUSION. (1) Tissue specific mechanisms are involved in the regulation of tissue thyroid hormone levels during critical illness.
(2) Liver and kidney thyroid hormone levels during critical illness depend mainly on plasma thyroid hormone levels.

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ESSENCIAL FATTY ACIDS STATUS IN PATIENS RECIEVING HOME PARENTERAL NUTRITION

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INTRODUCTION. Deficiency of essential fatty acids (EFA) is frequent in patiens receiving long term parenteral nutriton (PN) due to intenstinal insuffiency.

METHODS. The plasma profile ane erythrocyte membrane concentrationa of 17 different fatty acids (FA) were measured by liguid-gaz chromatography in 43 patients receiving PN, compared to 28 healthy subjects. Patients were subsequently divided into 4 groups regarding the lengh of the parenteral therapy, and the type of intestinal insufficiency (acute/chronic). Data were analysed by one-way ANOVA.

RESULTS. The plasma concentration (% by weight of total FA) of 18:2-6 was 30.1% and 15.7% (p< 0.001) whereas 18:3n-3 was 0.11% and 0.28% (p= 0.63) in controls and patiens with present chronic intestinal insufficicency. There was no significant difference in plasma concentrations of n-3 FA between patients and controls. There was significant increase in concentration of n-6 fatty acids (except 18:2-6) in patients parenteraly fed compared to controls. There was no difference in concentration of arachidonic acid in both groups. A significant decrease was present in erytrocyte membrane FA concentration in 18:2-6 and 22:5-3. In contrary, concentrations of 18:3-6, 22:5-6, and 20:3-9 were increased significantly. The Holman index predicting the EFA deficiency (EFAD) was elevated in 10 of total 33 patients treated with long-term parenteral nutrition; EFAD of controls was less than 0.2.
There was a significant increase in concentration of medium chain fatty acids in both examined compartements.

CONCLUSION. Patients receiving long-term PN with fat emulsion are in greater risk of developing essential fatty acids deficiency. Deficiency of the main substrate of n-6 fatty acids (18:2-6) and the increase of concentration of 20:3-9 (mead acid) is confirmed by changes in erytrocyte membrane when EFAD occurs. It was proved that differences in the phospholipid composition of the cell membrane have effect on the its physiological characteristics.

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COMPLICATIONS AND OUTCOME IN CONSERVATIVE MANAGEMENT OF ACUTE PANCREATITIS

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INTRODUCTION. Objective: Acute pancreatitis (AP) remains a potentially life-threatening disease and despite international accepted treatment guidelines, the management of AP differs among hospitals.

METHODS. Design and Methods: This retrospective study analyzes all the complications for 254 patients hospitalized in our Department for AP in the last 10 years (1995-2004).

RESULTS. The analysis included 245 patients (55% men, age 57± 10 yrs). The aetiology of AP was alcoholic in 19.5% and biliary in 58.9% of patients (other causes, 21.6%). Ten patients died of septic multiorgan failure (mortality, 10/245; 4.1%). Severe complications occurred in 53 patients (21.6%) including acute renal failure in 4, ileus in 19, respiratory or cardiac failure in 13 patients. Eight patients needed emergency surgery. Sepsis occurred in 9 patients. Other complications were : pneumonia, delirium, cholecystitis, diabetes mellitus, gastric or duodenal ulcers, and pericardial effusion. Of 245 patients, 156 (63.7%) had at least one complication. Mechanical ventilation, hemoperfusion, or hemodialysis were rarely necessary. Computed tomography (CT) was performed in 206 of 245 patients (84.1%) and showed pancreatic necrosis in 47 (22.8%). C-reactive protein during the first 48-72 hours and CT findings proved useful in predicting the outcome in multivariate statistical analyses. By logistic regression, however, complication rates were associated with Ranson score, but not with CT findings, C-reactive protein, sex, age, etiology, or serum enzymes.

CONCLUSION. A conservative management of acute pancreatitis results in a low rate of complications and mortality. Clinical assessment (Ranson score) is sufficient to predict the severity of pancreatitis in most patients. None of our patients with AP need any special treatment and the cost-effective care is sufficient in hospitals when following conservative guidelines.

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COMPARISON OF A NURSE-RUN INSULIN PROTOCOL: SLIDING SCALE VERSUS DYNAMIC SCALE

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INTRODUCTION. Evidence is increasing that tight glycemic control is a main goal in the therapy of the critically ill patient. Many attempts have been made to achieve such a strict glycemic control without the occurrence of severe hypoglycemic episodes. A detailed clinical follow-up was required to safeguard and improve patients glycemic control achieved with insulin/glucose algorithm using sliding or dynamic scales.

METHODS. In a preliminary report, 2 groups of patients were retrospectively investigated in whom the intravenous dose of insulin was adjusted according to whole blood glucose (BG) levels measured at one-to-four-hour intervals in arterial whole blood (Radiometer ABL 700) or in earlobe capillary whole blood (AscensiaR ContourR). Glycaemic control was achieved during the first period using a sliding scale protocol (SCP) and during a second period using a dynamic scale protocol (SDP) run by nurses. For each patient, we focused daily on the following elements: (A) median BG for the day; (B) lowest BG for the day; (C) highest BG for the day; (D) insulin requirements for the day.

RESULTS. The results are shown in the table as median and range.

TABLE 1.

	SCP n = 73	SDP n = 56
BG mmol.l-1	8.4 (5.9 – 13.5)	7.9 (6.0-16.1)
Lowest BG mmol.l-1	5.8 (2.6 – 9.9)	6.0 (3.7-16.1)
Highest BG mmol.l-1	12.3 (7.4 – 27.4)	10.3 (7.0 – 17.2)
Insulin requirements IE	25 (4 – 190)	31 (2 -160)

CONCLUSION. The use of a dynamic scale protocol run by nurses may yield to a better glycaemic control without increasing the number of hypoglycemic events. However, a prevalent fear of hypoglycemia among critical care nurses might hinder the achievement of strict glycemic control.

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INCIDENCE AND PROGNOSIS OF ACUTE COR PULMONALE IN ACUTE RESPIRATORY DISTRESS SYNDROME

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INTRODUCTION. The potential role of Acute Cor Pulmonale (ACP) in mortality of Acute Respiratory Distress Syndrome (ARDS) patients has been previously reported when mechanical ventilation (MV) with high tidal volumes (TV) was used. The aim of that study was to determine the incidence and prognosis of ACP in ARDS patients ventilated with lower TV.

METHODS. Between 1999 and 2001, the French Pulmonary Artery Catheter (PAC) Study Group has conducted a randomized multicenter clinical trial to determine the effect of the use of a PAC on the outcome of 676 shock and/or ARDS patients. A PAC was randomly allocated to 145 patients with ARDS which have been included in this study. ACP was defined by the following association: 1) MPAP > 25 mmHg, 2) CVP > PAOP, 3) SVI < 30 mL.m-2.

RESULTS. ACP was observed in 14 patients (9.6%). There was no significant difference in terms of SAPS II, PaO2/FiO2 and PaCO2 between patients with (ACP+) and without (ACP-) ACP. Overall mortality was 57% and 67% at 28 and 90-day with no between group difference. The MV parameters differed between groups: TV and I/E were significantly higher in ACP+ (respectively 9.7 ± 2.8 vs 8.6 ± 1.8 ml/cmH20 and 0.7 ± 0.5 vs 0.5 ± 0.2 ml/cmH20) while PEEPtot was not different. The plateau pressure tends to be higher in ACP+ (28 ± 6 vs 25 ± 6 cmH2O). In multivariate analysis ACP was not independently associated with mortality. By contrast, PaO2/FiO2, PaCO2, Compliance and SvO2 were independently associated with mortality.

CONCLUSION. Around 10 percent of ARDS patients developed ACP, which has no influence on outcome. The heart-lung interactions induced by MV could explain the onset of ACP. In patients suffering from ARDS and hemodynamic disorders, SvO2 monitoring could be recommended to adapt MV modalities. It is likely that MV induced ACP will totally disappear in a brief future with the widely use of low TV strategy.

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LEFT VENTRICULAR MORPHOLOGICAL AND FUNCTIONAL CHANGES DURING SEPTIC SHOCK: ECHOCARDIOGRAPHIC STUDY

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INTRODUCTION. We prospectively evaluated LV systolic and diastolic properties using echocardiography Doppler in ventilated patients with septic shock.

METHODS. Patients underwent a transesophageal echocardiography (TEE) within 12 h of admission (Day 0), after fluid loading (mean volume: 5.4±2.6L). All patients had stable hemodynamics under vasopressors and none of them had predictive criteria of fluid responsiveness at the time of TEE. TEE was also performed when vasopressors were stopped (Day n: 7±4). Following echocardiographic parameters were measured (mean of 3 end-expiratory measurements): LV end-diastolic (LVEDV) and end-systolic (LVESV) volumes by Simpson's rule (S) and area-length method (A-L), stroke volume (SV) by Doppler, early diastolic blood flow propagation velocity with color M-mode (Vp), and early tissue Doppler imaging (TDI) velocities (Ea) of the mitral ring. Inter- and intra-observer variability in measured parameters was 1 to 13% and 2 to 7%, respectively.

RESULTS. 35 patients were studied (mean age: 55±14 years; SAPS II: 54±12; SOFA score: 9±2) and 6 of them died under vasopressors (no TEE on day n). Among 16 patients (46%) with a depressed LV systolic function at Day 0 (range; LVEF: 7-49%; SV: 22-48 mL), 12 had normal LV pump function at Day n, and the remaining 4 patients fully recovered at Day 28. Only 4 patients had a true LV dilatation (range, LVEDV: 122-148 mL) at Day 0, and none at Day n. Vp could not be measured in 9 patients (26%). At Day 0, Vp and DTI identified LV diastolic dysfunction in 18 patients (51%) and 7 patients (20%), respectively (table; *: P<0.05).

TABLE 1.

	LVEF S (%)	LVEF A-L (%)	SV (mL)	LVEDV S (mL)	LVEDV A-L (mL)	Vp (ms)	Ea (ms)
Day 0 n=35	48±20	49±22	55±20	97±25	100±26	41±10	12.6±4.4
Day n n=29	57±14*	58±14*	67±27*	75±20*	78±21*	47±7	12.5±4.5

CONCLUSION. This study showed that (1) LV systolic dysfunction is frequent (46%) at the acute phase of septic shock in fluid loaded patients under vasopressors, (2) initial true LV dilatation is uncommon, and (3) LV diastolic dysfunction seems to be frequent. Importantly, all these changes regressed in survivors, regardless of their severity.

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INFLUENCE OF ACUTE CHANGES IN VASCULAR RESISTANCE ON CENTRAL BLOOD VOLUMES

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INTRODUCTION. The transpulmonary thermodilution enables to measure several hemodynamic parameters, such as cardiac index (CI), intrathoracic blood volume index (ITBVI), global end-diastolic volume index (GEDVI) and extravascular lung water index (EVLWI). The aim was to investigate the effects of an acute change in systemic vascular resistance (SVR) on the measurements by the transpulmonary thermodilution.

METHODS. We studied 22 critically ill patients, mechanically ventilated and continuously receiving norepinephrine, who underwent extended hemodynamic monitoring by the transpulmonary thermodilution technique (PiCCO plusR, Pulsion Medical Systems, Munich, Germany). Measurements of hemodynamic variables were made before, after increasing mean arterial pressure (MAP) by changing norepinephrine dosage and after return to baseline levels. Fluid status and ventilator adjustments were kept unchanged throughout the study. At each of the three time points (M1-3), 15cc of 0.9% saline (<8°C) were injected central venously in triplicate. Statistical analysis was done using ANOVA.

RESULTS. Heart rate (HR), CI, EVLWI and central venous pressure (CVP) remained unchanged. However, GEDVI and ITBVI showed a significant increase during increased SVR [dyn*s*cm^{-5}].

TABLE 1.

	M1	M2	M3
HR [l/min]	94±19 (99)	92±18 (92)	93±19 (90)
SVR	542±106 (525)	748±93 (759)*	562±143 (520)
MAP [mmHg]	67±10 (66)	94±9 (94)	69±10 (66)
CVP [mmHg]	12±5 (13)	13±6 (13)	12±5 (13)
CI [l/min/m^2]	3.6±0.9 (3.4)	3.7±0.9 (3.6)	3.5±0.9 (3.3)
GEDVI [ml/m^2]	712±166 (712)	757±164(768)*	706±161 (710)
ITBVI [ml/m^2]	836±193 (852)	889±188(936)*	831±196 (870)
EVLWI [ml/kg]	7.6±2.8 (7.0)	7.7±2.9(7.0)	7.7±3.0(7.0)

*Values are means ± SD (median).*p<0.05 (M2 vs. M1, M2 vs. M3)*

CONCLUSION. An acute increase in systemic vascular resistance was associated with a reversable increase in central blood volumes (ITBVI, GEDVI). Further studies are needed to confirm the accuracy of the measurement.

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ADJUVANT ETHYL PYRUVATE INHIBITS HEPATIC HSP72 EXPRESSION IN HEMORRHAGIC SHOCK

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INTRODUCTION. Transcription of heat shock protein Hsp72 is rapidly triggered by disturbances in de novo protein synthesis during altered cellular homeostasis as occurs in ischemia reperfusion. Induction of Hsp72 in liver is positively correlated with the degree of hepatic injury (1). We hypothesized, that ethyl pyruvate inhibits heat shock response in fluid resuscitated hemorrhagic shock.

METHODS. Anesthetized, mechanically ventilated pigs were bled over 20 min to mean arterial blood pressure of 40 mm Hg. This pressure was maintained until no spontaneous compensation occurred. Prior to full fluid resuscitation for 4 hours, the pigs received a bolus of either EP (40 mg/kg/10 min, n=6) or the Ringer's acetate vehicle (V, n=6), followed by infusion of EP 40 mg/kg/hr or V (randomized, blinded). Liver tissue samples were harvested and cytosolic Hsp72 expression was measured by Western blotting followed by densitometry. Even loading was confirmed by parallel β-Actin measurement. The data: mean±SD. Statistical analysis: Mann-Whitney, between the intervention groups.

RESULTS. The expression of Hsp72 was increased by hemorrhage with conventional resuscitation alone in liver while adjuvant ethyl pyruvate inhibited Hsp72 induction [102±11 vs. 83±14 arbitrary units of density (p=0.04) in V and EP, respectively].

CONCLUSION. Even though Hsp72 acts as a cellular chaperon in long term (>2days), the acute induction of Hsp72 is associated with noxious stimuli. Our data further support the notion that ethyl puryvate adjuvant therapy protects various tissues in ischemia reperfusion injury.

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EFFECT OF BLOOD PRESSURE ON PLASMA FLUID LOSS AT A STATE OF HIGH MICROVASCULAR PERMEABILITY

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INTRODUCTION. Increase in microvascular permeability in patients with SIRS and sepsis leads to decrease in circulating plasma volume. Fluid therapy is therefore the first-line treatment in the correction of circulatory failure. Because of a low systemic vascular resistance, vasopressors are used to maintain an adequate mean systemic arterial pressure. The present study evaluated the effect of blood pressure on the volume expanding capacity of 5% albumin solution at the condition with increased capillary permeability. The arterial pressure is altered either by an infusion of noradrenalin or metoprolol/clonidin mixture.

METHODS. Permeability was increased in the rat by inducing anaphylaxis with an i.v. injection of 0.5ml dextran 70. 5% albumin solution was given in a volume of 15 ml/kg under 30 min 1 h after dextran injection. Noradrenalin (0.01-1 microg/kg/min) or metoprolol (0.6 mg/kg/h)/clonidin (1 microg/kg/h) infusion was started directly after the albumin infusion. No infusion was given in the control group. The infusion rate of noradrenalin was adjusted to maintain the mean arterial pressure towards normal, while the rate of metoprolol/clonidin infusion was fixed. Plasma volume was determined by 125I-albumin tracer technique before the volume substitution and 2.5 h later.

RESULTS. Plasma volume measured 1 h after the dextrane injection was 32.6±3.5 ml/kg (n=33) to be compared with normal plasma volume for rat 38-42 ml/kg (1). At the end of the experiment 2.5 h after the 15 ml/kg albumin infusion, the increase in plasma volume was 11.6±4.3 ml/kg in the control group (n=11), 1.6±7.1 ml/kg in the noradrenalin group (n=11), and 12.5±4.7 ml/kg in the metoprolol/clonidin group (n=11). The increase in plasma volume was smaller in the noradrenalin group than in control or metoprolol/clonidin groups (p=0.002, Man-Whitney Rank Sum Test).

CONCLUSION. As an increase in systemic arterial pressure was associated with a higher transcapillary loss of plasma fluid, at least at a state of increased permeability, the plasma volume expanding capacity of an albumin infusion depends on systemic arterial pressure.

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1122

DOES SYMPATHETIC INNERVATION OF VASCULAR FLAPS CONFOUND ISCHEMIA DETECTION BY MD-GLYCEROL?

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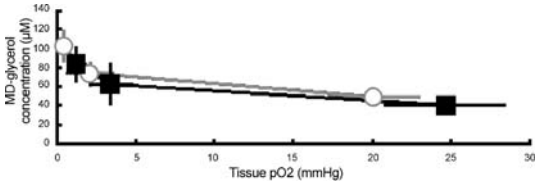
INTRODUCTION. Previously, glycerol has been used as a surrogate for (ischemic) tissue damage and cell membrane breakdown despite that lipolysis and associated glycerol release can be induced by sympathetic stress alone. Hypothesis: glycerol concentration in an ischemic vascular flap is confounded by intact innervation per se.

METHODS. In 12 pigs, two identical musculocutaneal microvascular flaps were prepared under propofol anesthesia. In the A-flaps the adventitia of the supplying artery and accompanying innervation was carefully stripped, while in B-flaps it was left untouched. Ischemia was induced by clamping supplying vessels for 60 minutes. We measured muscle tissue pO2 (Licox) and muscle microdialysate glycerol concentrations every 30 minutes (CMA600). The data are presented as mean±SEM. We used Mann-Whitney-U test.

RESULTS. Glycerol concentrations were comparable between the two ischemia groups at 60 minutes (p=0.089).



CONCLUSION. Opposing our hypothesis, intact innervation of the flap does not confound glycerol as a surrogate for tissue ischemia and indicates therefore ischemic injury regardless of whether the microvascular flap is denervated or not.

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1123

DEXMEDETOMIDINE DOES NOT RISK TISSUE VIABILITY IN AN EXPERIMENTAL MODEL OF MICROVASCULAR FLAP

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INTRODUCTION. Sedation is necessary after major reconstructive plastic surgery in the face and neck regions to allow optimal oxygenation and perfusion in the transplanted musculocutaneous flap (s). Dexmedetomidine is a new alpha$_2$-agonist with peripheral and central effects. Centrally it produces sedation and reduction of sympathetic outflow and catecholamine concentration and an augmentation of cardiac-vagal activity. In awake subjects dexmedetomidine has induced vasodilation whereas in denervated vascular beds it has produced vasoconstriction (1). We hypothesized that dexmedetomidine induces vasoconstriction in denervated flaps and thus increases the risk of tissue necrosis.

METHODS. We studied twelve adult pigs under standardized general anesthesia. Two symmetrical rectus abdominis myocutaneous flaps were raised on each side of the upper abdomen. The sympathetic nerve fibers were stripped from the arteries in one of the flaps (denervated flap), while enervation was kept intact in the remaining flap (enervated flap). After 60 minutes of stabilization, 60 minutes of global ischemia and 60 minutes of reperfusion followed. After this period the animals were randomized to either continue propofol sedation (20mg/kg/h) or to receive dexmedetomidine sedation (20µg/kg/h) in a blinded manner. Flap tissue metabolism was monitored by microdialysis (six catheters: two in the flap dermal layers, two in the flap muscles, one dermal control and one control muscle) and tissue-oxygen partial pressure (PtiO2)(three intramuscular probes, two in the flaps and one control). Glucose, lactate and pyruvate concentrations were analyzed from the dialysate every thirty minutes for 4 hours. Lactate/pyruvate (L/P) and lactate/glucose (L/G) ratios were calculated for each data-point. Non-parametrical statistical tests were used for analysis. P<0.05 was considered significant.

RESULTS. Mean arterial pressure was higher in the dexmedetomidine group (p=0.036). Flap tissue metabolism remained stable throughout the experiment as estimated by L/P and L/G ratios in both flaps with either sedation regimen.

CONCLUSION. Our data suggest that dexmedetomidine does not have deleterious effects on local perfusion or tissue metabolism in denervated musculocutaneous flaps.

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Grant acknowledgement. Supported by Institutional Research Grant program (EVO).

1124

INCREASING CARDIAC OUTPUT BY EPINEPHRINE: EFFECTS ON SPLANCHNIC BLOOD FLOW AND GASTRIC TONOMETRY

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INTRODUCTION. In cardiac surgical patients, inotropic support is often necessary for optimizing cardiac output postoperatively. We tested whether increasing cardiac output by epinephrine leads to an improved regional, i.e. hepato-splanchnic, blood flow and function.

METHODS. After approval by our ethics committee we studied 12 patients (mean age 71 ± 8 years) after elective coronary artery bypass grafting (n=2) or valve replacement (n= 10). All patients had a reduced left ventricular function and underwent extended hemodynamic monitoring by a pulmonary artery catheter. Microcirculation within the splanchnic area was assessed by gastric tonometry, liver blood flow and function non-invasively by transcutaneous measurement of ICG-PDR. Since fluid loading led to no increase in cardiac output, patients were considered non-fluid responsive. Measurements were made on ICU admission and after one hour of epinephrine treatment. Mean epinephrine dosage was changed from 0.02 to 0.08 µg kg–1 min-1. All patients were on pressure-controlled mechanical ventilation and respirator settings remained unchanged throughout the study period. Data are mean ± standard deviation. A p< 0.05 was considered as statistically significant.

RESULTS. Heart rate significantly increased from 97 ± 11 to 106 ± 12 min-1. Central venous (10 ± 3 vs. 10 ± 4 mmHg) and left atrial (10 ± 5 vs. 11 ± 5 mmHg) pressure were unchanged. Cardiac index and stroke volume index significantly increased from 2.7 ± 0.5 to 3.2 ± 0.5 l min-1 m-2 and from 28 ± 6 to 31 ± 5 ml m-2. Although systemic O2-delivery and O2-consumption significantly increased, ICG-PDR did not change significantly, i.e. from 18.0 ± 5.6 to 19.5 ± 6.4% min-1. Gastric mucosal PCO2 and PCO2-gap (difference between regional and end-tidal PCO2) significantly increased from 5.4 ± 1.0 to 5.9 ± 1.1 kPa and from 1.2 ± 0.8 to 1.5 ± 0.7 kPa, respectively.

CONCLUSION. Increasing cardiac output by epinephrine was associated with no change in ICG-PDR but a deterioration in gastric mucosal blood flow.

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1125

EFFECTS OF ACTIVATED PROTEIN C ON THE MICROVASCULAR RESPONSE TO REACTIVE HYPEREMIA IN PATIENTS WITH SEPTIC SHOCK

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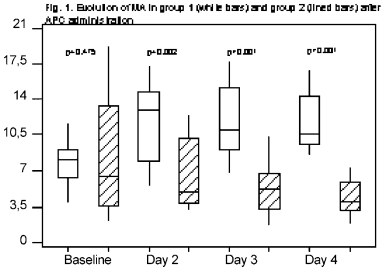
INTRODUCTION. Microvascular alterations are characteristic of sepsis and may be related to outcome. Recent studies have suggested thatadministration of drotrecogin alfa activated (activated protein C orAPC) may improve the microcirculation in sepsis.

METHODS. We analyzed the microvascular response during reactive hyperemia using near-infrared spectroscopy (NIRS), in 23 patients with septic shock. Patients were separated into those who could receive APC (Group 1, N=13) and in those in whom it was contraindicated (Group 2, N=10). Tissue oxygen saturation (StiO2) was measured using NIRS (InSpectra325, Hutchinson Tech Inc, Hutchinson, MN) in the thenar eminence for three minutes after arterial occlusion. Vasoreactivity was assessed by calculation of the slope of the increase in StiO2 during the first 17.5 seconds after release of the arterial occlusion. Measurements were made daily for four days and also before and 4 hours after the administration of APC in Group 1.

RESULTS. The slope was similar between both groups at baseline (p=0.475), however it was higher (Fig.1) in Group 1 on days 2, 3, and 4 (p=0.002, p<0.001, p<0.001, respectively). In Group 1, the slope increased significantly after 4 hours of APC administration (p=0.021) and this difference was maintained during the 4 days of infusion.



CONCLUSION. These observations suggest that the administration of APC improves microvascular reactivity in septic shock patients.

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MUSCLE OXYGEN CONSUMPTION IS DECREASED IN SEPTIC PATIENTS

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INTRODUCTION. Microcirculatory and cellular metabolic alterations have been described in sepsis. In this context, we tested the hypothesis that muscle oxygen consumption (MVO2) is decreased in septic patients compared to non-septic ICU patients (ICU control) and healthy volunteers (HV).

METHODS. Patients and participants: Consecutive patients admitted in the ICU with septic shock (n = 36), severe sepsis (n = 16), and without infection (n = 12) and healthy volunteers (n = 18).
Measurements : Thenar muscle oxygen saturation (StO2) was measured continuously by near-infrared spectroscopy (InSpectraTM Model 325, Hutchinson Technology Inc, Hutchinson, MN) before and during upper limb ischemia induced by a rapid pneumatic cuff inflation around the upper arm. The rate of StO2 decrease (StO2 dec, %/min) during stagnant ischemia is supposed to reflect MVO2.

RESULTS. The StO2 dec during stagnant ischemia was slower in patients with septic shock or severe sepsis than in ICU control patients and HV (+p < 0.05) (Table 1). The blood hemoglobin concentrations were similar in the three groups of patients, and the levels of analgo-sedation were comparable in patients with severe sepsis and in ICU control patients. In 32 of the septic patients, StO2 dec was also measured every 24 hours for the first two days after diagnosis. In these patients, StO2 dec increased in survivors (n = 19) but remained slow in nonsurvivors (n = 13) (*p < 0.05 vs nonsurvivors ; $p< 0.05 vs baseline) (Table 2). Data are presented as medians (25th,75th percentiles).

TABLE 1.
Table 1

	Septic shock	Severe sepsis	ICU control	HV
StO2 dec (%/min)	-20 (-16,-24)+	-20 (-15,-26) +	-28 (-23,-32)	-32 (-30,-34)

TABLE 2.
Table 2

	Baseline	24hrs	48hrs
StO2 dec (%/min) in survivors	-18 (-16,-25)	-25 (-22,-30)*	-34 (-30,-40)*$
StO2 dec (%/min) in nonsurvivors	-18 (-13,-22)	-15 (-13,-19)	-11 (-10,-16)

CONCLUSION. MVO2 is decreased in septic patients. Persistence of a decreased MVO2 during the first two days is associated with a worse outcome.

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CUTANEOUS VASCULAR REACTIVITY AND FLOW MOTION RESPONSE TO VASOPRESSIN IN ADVANCED VASODILATORY SHOCK AND SEVERE POSTOPERATIVE MULTIPLE ORGAN DYSFUNCTION SYNDROME

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INTRODUCTION. Disturbances of microcirculatory homeostasis have been hypothesized to play a key role in the pathophysiology of multiple organ dysfunction syndrome and vasopressor-associated ischemic skin lesions. The effects of a supplementary arginine-vasopressin (AVP) infusion on microcirculation in vasodilatory shock and postoperative multiple organ dysfunction syndrome are unknown. This clinical study prospectively evaluates the cutaneous microcirculatory response to a combined infusion of AVP and norepinephrine (NE) when compared to infusion of NE alone using laser Doppler flowmetry in patients with advanced vasodilatory shock and severe postoperative multiple organ dysfunction syndrome.

METHODS. Eighteen patients after cardiac or major surgery with mean arterial blood pressure <65 mmHg, despite norepinephrine (NE) >0.5 µg/kg/min, were included into the study. Patients were randomized to receive a combined infusion of AVP/NE, or NE alone. Demographic and clinical data were recorded at study entry and after one hour. A laser Doppler flowmeter was used to measure the cutaneous microcirculatory response at randomization, and after one hour. Reactive hyperemia and oscillatory changes of the Doppler signal were measured during three minutes before and after a five minutes period of forearm ischemia.

RESULTS. AVP/NE patients had a significantly higher mean arterial pressure (p=0.047) and higher milirinone requirements (p=0.025) than NE patients at baseline. Mean arterial blood pressure significantly increased (p<0.001) and NE requirements significantly decreased (p<0.001) in the AVP/NE group. AVP/NE patients exhibited a significantly higher oscillation frequency of the Doppler signal before ischemia, and during reperfusion at randomization. During the study period, there were no differences in either cutaneous reactive hyperemia or the oscillatory pattern of vascular tone between groups.

CONCLUSION. Supplementary AVP infusion in patients with advanced vasodilatory shock and severe postoperative multiple organ dysfunction syndrome did not compromise cutaneous reactive hyperemia and flowmotion when compared to NE infusion alone.

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MUSCLE OXYGENATION IN LOW FLOW STATE AND SEPSIS: CORRELATION TO HEMODYNAMICS AND OUTCOME

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INTRODUCTION. It was previously shown that thenar muscle tissue oxygen saturation during stagnant ischemia decreases slower in septic shock patients compared to patients with severe sepsis, localized infection and healthy volunteers (1). Aim of study was to determine skeletal muscle oxygen kinetics in a group of patients with low cardiac output and to relate it to their central haemodynamics and outcome.

METHODS. Thenar muscle tissue saturation (StO2) was measured by near infrared spectroscopy before and during upper arm ischemia-reperfusion test (UIRT) in patients with primary heart disease and circulatory failure, and in healthy volunteers. Muscle oxygen consumption (mVO2Nirs) was estimated with StO2 decrease during UIRT (ΔdownStO2) or calculated using following formula: mVO2Nirs =ΔdownStO2*Tissue Hemoglobin Index.

RESULTS. In patients with preserved muscle oxygen extraction ratio (mOER) basal StO2 positively correlated to central venous hemoglobin saturation (ScvO2) (r=0.696, p=0.002); basalStO2 underestimated ScvO2 (bias: 9.0, precision: 4.6, 95% CI limits of agreement: -0.2, + 18.2%). Survivors had higher muscle oxygen consumption compared to non-survivors (128±49 vs. 67±40, p=0.001). ΔdownStO2 (exp (B): 0.777; CI 95%: 0.639, 0.945; p=0.012) and Sequential Organ Failure Score (exp (B): 0.292; CI 95%: 0.133, 0.639; p=0.002) were the only independent predictors of survival. In low flow state clinical important difference was found between ScvO2 and mixed venous hemoglobin saturation (SvO2) (bias: 10.8%, precision: 8.75%, 95%CI: -6.7%, + 28.3%).

CONCLUSION. Basal StO2, mOER and muscle oxygen consumption allow prediction of muscle tissue behavior in low flow states due to combined cardiogenic and septic circulatory failure. Low muscle oxygen consumption predicts worst outcome. Low basal StO2 could estimate ScvO2 in patients with preserved mOER. High discrepancy between ScvO2 and SvO2 is present in low flow state.

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EFFECTS OF CLONIDINE ON MICROCIRCULATORY MUCOSAL PERFUSION COMPARED TO SYSTEMIC AND SKIN PERFUSION

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INTRODUCTION. Clonidine is increasingly used in intensive care medicine as sedative and antihypertensive agent. Maintenance of microcirculatory perfusion of barrier-tissues (i.e., skin and digestive tract mucosa) is crucial for intact barrier-function [1], increasingly regarded important in intensive care medicine. Since microcirculatory effects of clonidine may differ between distinct barrier-tissues, we studied microcirculatory effects of clonidine on skin and enoral mucosa, respectively. Furthermore, since the type of baseline sedation may modulate the effects of clonidine, we studied microcirculatory effects of clonidine during propofol- and sevoflurane-sedation, respectively.

METHODS. Chronically instrumented dogs (25-35kg bodyweight, n=6 per group) were sedated (randomly: propofol 15 mg/kg/h or sevoflurane 1.5 MAC), intubated and mechanically ventilated. The animals were instrumented for measurements of systemic hemodynamics and regional microcirculatory perfusion (laser Doppler fluxmeters: probes at the skin (leg) and enoral mucosa). After baseline measurements, clonidine (2.0 μg/kg) was infused within 1 min. Data are mean±SEM; Statistics: Fisher PLSD, p<0.05.

RESULTS. Clonidine significantly reduced cardiac output from 75±5 and 75±6 ml/kg/min (under propofol and sevoflurane, respectively) to a minimum of 40±3 and 49±5 ml/kg/min, however with full recovery to baseline already after 30 min (70±4 and 71±6 ml/kg/min). In accordance, clonidine also significantly reduced skin perfusion (by 28±4% and 27±8%), again with full recovery (-7±2% and 3±10%). In contrast, clonidine reduced microcirculatory mucosa perfusion by 44±8% and 54±4%, but herein perfusion remained significantly depressed (by 25±5% and 27±4%).

CONCLUSION. Clonidine markedly depresses systemic and microcirculatory perfusion of skin and mucosa, similarly both during propofol- and sevoflurane-sedation. While rapid recovery of systemic and microcirculatory skin perfusion occurred, the depression of the microcirculatatory mucosa perfusion persisted. Given the crucial role of maintained microcirculatory perfusion for intact mucosal barrier function [1], our data may indicate that clonidine compromises mucosal barrier function.

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1130

LEVOSIMENDAN DECREASES GASTRIC MUCOSAL TO ARTERIAL PCO2 GRADIENT IN A A A SURGERY

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INTRODUCTION. Levosimendan is a calcium-enhancer with inotropic and peripheral vasodilatory effects. In laboratory setting it is superior to milrinone and dobutamine by selectively increasing gastric mucosal oxygenation. The aim of the study was to describe the effects of levosimendan in on systemic and splanchnic circulation during and after aortic surgery for patients with AAA.

METHODS. Twenty abdominal aortic aneurysm (AAA) patients were enrolled after informed consent according to approval by local ethical committee. The patients were randomized to receive either levosimendan (L, n=10) or placebo (P, n=10) in a double-blind manner. Anesthesia and the surgical procedures were performed according to standardized guidelines. Automatic gas tonometry (Tonocap, Datex-Ohmeda, Finland) was used to measure gastric mucosal partial pressure of carbon dioxide. Systemic indocyanine green clearence (ICG-PDR) was used to estimate total splanchnic blood flow (LiMon, Pulsion Medical Systems, Germany). The results are presented as median (interquartile range). Statistically significant difference (p<0.05) between the groups was assessed by non-parametric test, Mann-Whitney-U.

RESULTS. The immediate postoperative recovery (ICU) was uneventful in the two groups. Norepinephrine (NE) was administered to 6/10 vs. 3/10 patients in L and P groups during surgery, respectively. Cumulative dosages of NE were 0.14(0.14-0.49) and 0(0-0.08) mg (p=0.12) in L and P groups. Cardiac index was higher [4(3.8-4.7) vs. 2.6(2.3-3.6)](p=0.001) and gastric mucosal to arterial gradient lower [0.9(0.6-1.2) vs. 1.7(1.2-2.1)(p=0.002) in L group 60 minutes after aortic clamping. However, concomitantly measured surrogate for total splanchnic perfusion, ICG-PDR, was comparable [29(21-29) vs. 20(19-25)] (NS). Arterial lactate concentrations were 1.0(0.6-1.9) and 0.6(0.6-0.8) mM (p=0.37), in L and P. Arterial BE was -3.4(-3.9- -2.4) and -2.4(-3- -1.8)(p=0.6). Mixed venous O2 saturations were 71(68-76) and 72(68-76)% (p=0.96).

CONCLUSION. Levosimendan favours gastric perfusion but does not appear to increase total splanchnic perfusion during aortic cross-clamping in aortic aneurysm surgery. Bearing in mind the limitations of ICG-PDR methodology, this implies that levosimendan has superselective vasodilatory effects within splanchnic circulation.

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1131

COMMUNICATION IN THE ICU

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INTRODUCTION. Patient safety studies show communication failures to be causal factors in many ICU critical incidents. Communication errors can be partially explained by hierarchical factors that affect communication openness between team members, resulting in some team members (e.g. nurses) being reticent to contribute or speak up. Research has also shown that explicit communication amongst ICU caregivers results in higher levels of understanding patient care goals. The current study examines differences in reports of communication openness between groups of ICU team members, and assesses whether higher levels of open communication results in a better understanding of patient care duties.

METHODS. A survey of doctors and nurses using the 'interdisciplinary collaboration tool' was conducted in 4 UK ICUs. Amongst the measures included were ratings of communication openness between and within disciplines, and understanding of patient care goals. Data analysis used t-tests and multiple regression.

RESULTS. Responses totalled 184 questionnaires (47% returns). Between groups comparisons are shown in table 1. The multiple regression showed communication openness within and between disciplines to be significant predictors of understanding patient care goals (adjR2=0.17, p <.001).

TABLE 1.
Between group comparisons

Survey Scale	Comparison groups and scale means				
Communication openness between nurses and doctors	Nurses	**3.51**	Doctors	**3.86**	p<0.01
Communication openness between doctors	Trainee Doctors	**3.59**	Senior Doctors	**4.27**	p<0.01
Understandig patient care goals	Trainee Nurses	**3.99**	Senior Nurses	**4.35**	p<0.05
Understandig patient care goals	Trainee Doctors	**3.85**	Senior Doctors	**4.55**	p<0.001

CONCLUSION. The results show that doctors and nurses, and trainee and senior doctors, have differing perceptions of communication openness. This can result in inaccurate expectations for the communication behaviours of other team members, with senior doctors expecting higher levels of communication openness from nurses and trainee doctors. The results also show that open communication amongst caregivers may be an important factor for determining the understanding of patient care goals by ICU staff.

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1132

CUBIS. AN INSTRUMENT TO ASSESS ICU PATIENTS AND THEIR FAMILIES

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INTRODUCTION. Changes in perceived quality of life are very frequent in patients discharged from ICUs, but there is not too much evidence (in our knowledge and in our country, not even in Europe) a validated tool for describing the psychological repercussion of ICU stay. Our aim was to design such instrument and use it systematically in our patients.

METHODS. By Delphi type techniques it was proceed to define the text of the items and to decide the more appropriate timing for running the questionnaire (nursing administration) what we called CUBIS (from the Spanish of psychological well being questionnaire). Informed consent from patients (or their representatives) was obtained before the first time. The questionnaire was passed for evaluating psychological situation before admission, 48 hours after admission or after being extubated, one week after ICU transfer and 6 months after hospital discharge. before admission (after personal contact, this phase was runned by phone or even via mail). CUBIS results were correlated with the ones obtained from Barthel test.

RESULTS. During 2005, 1069 patients were admitted to our ICU. Out of them, 531 remained more than 48 hours. We got informed consent from 105 of them, fully followed 6 months after discharge. CUBIS lower score (highest psychological disturbance) was registered during ICU stay and coincides with family and nursing perception of the patient' situation. Recovery began after ICU discharge, but 6 months after hospital discharge, patient's mood had not recover to the pre – admission levels. This profile is quite similar to the one offered by Barthel evaluation.

CONCLUSION. Our study shows that psychological derangement linked to the perception og the health situation of ICU patients, could interfere with the recovery of a quality of life alike to the one registered previously to admission.

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PSYCHOLOGICAL DISTURBANCES IN PATIENTS ADMITTED TO ICU AND THEIR RELATIVES

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INTRODUCTION. There is some evidence about the psychological disturbances found in patients admitted to ICUs and their families. Our aim is to analyze what is the degree and importance of such disturbances, and what is the effectiveness of short psychological interventions in this setting.

METHODS. The study was ruled in a multidisciplinary ICU on a sample 15 patients (67% males, mean age 48 ± 14 years) and 12 relatives (25% males, mean age 48 ± 14 years and 75% of medium – low study level). The used psychological evaluation instruments were HAD scale for anxiety and depression, BDI questionnaire for depression, Affective State Scale and Adaptation Scale. A pretest–postest design was used before and after the psychological intervention aimed to detection of main problems related with the impact of the illness situation and emotional problems that could interfere with coping with it, training in strategies for facing the ICU and post ICU stays and for ease the expression of negative emotions.

RESULTS. In spite of detecting serious psychological disturbances both in patients and in families, the intensity of it is higher in relatives (anxiety, $p<0.01$; depression by HAD, $p<0.05$; depression by BDI, p: 0,113; subjective distress, $p<0.01$; and depressed mood, $p<0.001$). After the psychological intervention, anxiety, depression and distress levels decreased significantly in patients ($p < 0.05$) and similar results were found for families ($p < 0.05$).

CONCLUSION. 1) An important psychological disturbance is found in ICU patients and their families, mainly expressed by anxiety, depression, subjective distress and alterations of living usual patterns. 2) Those disturbances are more intense in families than in patients. 3) A short psychological intervention is highly effective in this setting.

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THE 7TH JULY 2005 LONDON SUICIDE BOMBINGS: A STUDY OF TRIAGE AND TRANSFER TIMES

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INTRODUCTION. On July 7th 2005 four suicide bombers attacked Central London killing 55 and injuring over 700. University College London (UCLH), St Mary's (SMH) and the Royal London (RLH) were the closest hospitals and received the bulk of the casualties. Our aim was to study the time taken to transfer the crtically injured casualties to a receiving definitive care facility and to link these data to the triage category assigned upon hospital arrival.

METHODS. A retrospective review of the case notes from patients arriving at the accident and emergency departments of the above hospitals. Point of origin, time of arrival and triage category were recorded.

RESULTS. A complete dataset was available for the SMH cohort. At RLH and UCLH data were incomplete with the required information only available for Priority 1 (P1) casualties. There were twenty, critically injured, P1 casualties in total. For these the mean number of minutes from time of injury to time of arrival at hospital was 110.94 min (SD 35.44). Reverse triage was observed at UCLH with 24 Priority 3 casualties arriving before the first P1 casualty. At SMH there was no significant difference between the mean arrival times of P1 casualties (115.17 minutes) and P2 casualties (118.53).

CONCLUSION. The long intervals between injury and hospital arrival observed on July 7th 2005 were a result of necessarily prolonged extrication. During urban terrorist events the crtically injured may spend a long period of time in the pre-hospital setting and rarely arrive in the first wave. This reverse triage of casualties highlights a need for accurate, rolling programmes of triage at receiving hospitals during major incidents to ensure resources are appropriately assigned - Many items of desired data were unobtainable. The reasons include failure by clinicians to record essential data items, physical loss of notes and their sequestration by various agencies for investigative efforts. Major Incidents offer a rare opportunity to assess the adequacy of a health system's contingency planning. If we are to learn the lessons that can be learnt it is essential that these data are accurately recorded, preserved and appropriately disseminated.

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THE ELEMENTS THAT CAN INFLUENCE QUALITY OF LIFE AFTER AN ICU STAY

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INTRODUCTION. Staying in an Intensive Care Unit (ICU) is a distressing event that can influence quality of life (QOL). We compared the QOL of patients one month before hospitalization and 6 months later.

METHODS. The study included adult patients who stayed for more than24 hours in a mixed, 31-bed, medico-surgical ICU of a university hospital,between June and November, 2004. During their ICU stay, we questioned patients or their relatives about their QOL (EuroQOL-5D) one month before the hospital admission. Six months later, we questioned the surviving patients again, by telephone or by letter, about their QOL at that time and their memories about the ICU stay.

RESULTS. The study included 405 patients. Six months after ICU discharge, 218 patients (68% of respondents) perceived the general state of their health to be the same as or better than before hospitalization. The global EuroQOL-5D 6 months after ICU discharge was somewhat lower (i.e., QOL somewhat better) than before hospitalization. Each component of the EuroQOL-5D was the same as or better after ICU discharge than before hospitalization in the majority of the respondents. Surgical patients had better mobility, greater autonomy, less pain and less anxiety; those who spent more time in the ICU had lower autonomy and less return to usual activities, more pain and anxiety; neurological patients had worse autonomy and more anxiety; and younger age was associated with better autonomy. Interestingly, patients who had had sepsis in the ICU had worse mobility and autonomy than before hospitalization, but those with more organ failure were associated with less pain and better mobility, and those submitted to mechanical ventilation had better mobility, autonomy, more return to usual activities and less anxiety. If necessary, 92% of patients said they would return to the ICU,5% would not return and 3% did not know. The most common disturbing memory was loss of orientation in time (36%) and the item perceived as most important was fear of dying, with a grade of 8 on a scale from 0 to 10.

CONCLUSION. The majority of patients were feeling the same as or better, after than before the ICU hospitalization. The surgical patients are almost always better, the neurological patients almost always worse. Sepsis in the ICU results in a lower QOL, but organ failure and mechanical ventilation are usually associated with better QOL. Most patients would agree to be readmitted to the ICU if necessary. Loss of orientation in time and fear of dying were the main perceived memories.

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POSTTRAUMATIC STRESS DISORDER-RELATED SYMPTOMS AND HEALTH-RELATED QUALITY OF LIFE AFTER ICU

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INTRODUCTION. Post-traumatic stress disorder (PTSD) and impairments in health-related quality of life (HRQOL) happen after intensive care. We studied PTSD and HRQOL in the context of a multicentric study in Portuguese ICU. It is our objective to estimate the frequency of posttraumatic stress disorder-related symptoms (PTSS), evaluate the differences in PTSS between patients with and without community acquired sepsis (CAS) and the association between PTSS and HRQOL.

METHODS. Applied questionnaires (6months):EQ-5D (generic HRQOL instrument includes report of problems in five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression) and a visual analogue scale - EQ VAS) and PTSS 14 (4 items were added to PTSS-10 to cover all the symptom groups for the PTSD diagnosis). 1178 patients from the SACIUCI study admitted in 9 Portuguese ICUs from January to June 2005. Excluded patients younger than 18 years old and with ICU stay less than 48 h. From the 935 included patients, 276 (30%) were admitted in the ICU for CAS.

RESULTS. Patients with CAS exhibit a significantly higher SAPS II, longer ICU stay, a higher ICU and Hospital mortality. Ninety-one survivors (58%) from the CAS group and 222 survivors (50%) from the non sepsis group completed the questionnaires. There were no significant differences in EQ-5D and PTSS between survivors from the CAS group and those from the non sepsis group. 17% of patients were at risk of developing PTSD (PTSS 14 Global Score > 49). Remembering one or more adverse experiences from the ICU was significantly associated with the risk of developing PTSS and exhibit a significant worse HRQOL. In multivariate linear regression we found that Anxiety/Depression dimension (moderate symptoms–b=12.7;95%CI=6.8-8.6 and severe symptoms–b=19.0; 95%CI=8.6-29.3) and total EQ-5D index (b=-0.15; 95%CI=-0.3-0.02) were the factors most associated with PTSS.

CONCLUSION. CAS was not associated with worse HRQOL or higher risk for PTSS. Patients at risk of developing PTSS exhibit a worse HRQOL.

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HIGH PREVALENCE OF DEPRESSION TWO YEARS AFTER SURVIVING SEPSIS

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INTRODUCTION. Recently, we have shown that prevalence of chronic pain syndromes in sepsis survivors is substantially increased compared to healthy subjects (1). Thus, in a second survey we searched for further variables which might contribute to chronic pain syndromes.

METHODS. 63 patients who survived severe sepsis or septic shock (ACCP/SCCM) on our ICU received questionnaires screening for depressions (ADS), PTSD (IESR questionnaire). Data are presented as mean +/-SD.

RESULTS. 36 subjects (25 males) being discharged from ICU 2.3 $\pm$1.0 years ago responded. Mean age was 63 $\pm$16 years. ADS: Patients scored with 19 $\pm$ 10 on the ADS. Half of the patients achieved scores above 16 points indicating at least a moderate depression. IESR: The most traumatising experiences during ICU stay were nightmares, helplessness, dependence from staff, and pain. Subjects were asked to answer the IESR with regard to these events. According to their scoring, 20% of the patients were likely to suffer from PTSD. Neither age nor gender had an impact on ADS and IESR, respectively.

CONCLUSION. No specific data on neuropsychological consequences in specific forms of critical illness are available until today (2). Our results show for the first time that even two years after having survived sepsis, serious neuropsychological impairments like depressions and PTSD may occur. It remains unclear whether the subjects were afflicted with these symptoms already before their admission to ICU. However, the IESR was filled in with regard to the events during the ICU stay, therefore a causal relationship between ICU and PTSD symptoms can be concluded. It is possible that depression and PTSD might have also contributed to the high prevalence of chronic pain syndromes we have observed after sepsis (1).
Prospective studies including septic as well as non-septic critical care patients could differentiate between disease-specific and unspecific reasons for depression, PTSD, and pain. Further research should address prophylactic interventions.

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CONSCIOUS SEDATION DURING CRITICAL ILLNESS

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INTRODUCTION. The main target of sedation is to provide comfort and minimize pain, but side effects of sedative agents are noteworthy: haemodynamic impairment, need for higher ventilatory support, longer length of stay in ICU, etc. Even if guidelines propose different protocols of sedation, its optimal end point is still debated. We evaluated if a score of 2 of the Ramsay scale (i.e. awake, cooperative, oriented, tranquil patient) is suitable for an invasive therapeutic approach.

METHODS. This prospective interventional cohort study was done in a mixed medical and surgical ICU. Forty-two patients with mechanical ventilation and sedation for at least 4 days were enrolled. The end-point of sedation was decided each morning on clinical grounds and monitored three times a day. A Ramsay score of 2 was the preferred end-point whenever possible. Patients were followed until ventilated or discharged from the ICU.

RESULTS. Once a day the nurse in charge defined the level of sedation as "adequate", "insufficient", or "excessive" according to the patient compliance to procedures, mechanical ventilation and ICU environment. Days were excluded from analysis even if just one single evaluation of the Ramsay score was 1. Each day was defined as "awake" if at least two measurements rated 2 and the third not higher than 3. A multilevel analysis for repeated measures was used.
Overall, 264/582 days (45.4%) were classified as "conscious". Open abdominal treatment, presence of shock, hypoxia ($SpO2 \leq 94\%$) and <48 hours since admission influenced the observed level of sedation.
Sedation was judged as adequate in 93.9% of "conscious" days, compared to 81.7% of the days with a higher Ramsay score (p=0.000). In conscious days, a higher SAPSII score and male gender were the only variables related to inadequacy of sedation.

CONCLUSION. These data show that in a population of severe ICU patients "conscious" sedation is feasible and effective. Due to the lack of control group, we can only suggest that the positive implications of this sedation strategy may be highly relevant.

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EMERGENCY MEDICAL NEEDS OF INPATIENTS:MET OR UNMET?

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INTRODUCTION. Emergencies in wards are not infrequent and can result in significant morbidity and mortality if there is delayed care. MET comprising of a critical care unit (CCU) consultant, a CCU nurse and a CCU technician was formed in our hospital in September 2004 and available 24/7 to attend to emergency needs of inpatients. Criteria based on clinical status of the patient were established and staff were trained and encouraged to call MET through a dedicated hotline whenever help was needed. After a year of existence, the awareness about MET and perceptions of its usefulness among health care workers in our hospital is currently being evaluated.

METHODS. A questionnaire comprising of eleven questions was prepared and distributed among nurses and doctors. Questions in the survey related to awareness of team comprising MET, calling criteria and how to call, response time of MET and perceived value. Participants included nurses, junior doctors and senior consultants. The responses were analyzed and compared using basic statistical methods.

RESULTS. 60 health care workers (40 nurses, 10 junior doctors and 10 senior doctors) have so far participated in our ongoing survey. Awareness was rated for a maximum score of 7. Junior doctors rated high on their awareness and knowledge (5.15 $\pm$ 0.92) followed by nurses (4.95 $\pm$ 0.59) and senior consultants (4.72 $\pm$ 1.71). 75% of nurses and 60% of junior doctors had activated MET at least once during the past year, whereas only 20% of senior consultants had directly triggered a MET call. 75% participants felt that MET response time was appropriate (<5 minutes), while 25% felt that response time was delayed (>5 minutes). Majority of the participants felt that availability of MET has added value to the care of inpatients, while all were of the opinion that the service should be continued.

CONCLUSION. Based on limited data from our ongoing survey, it appears that MET has been perceived as a value added service from the Critical Care Unit. We note that participants' knowledge on MET needs to be improved and will implement systems to promote further awareness and provide periodic training.

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PTSD PREVALENCE

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INTRODUCTION. Prevalence of PTSD after critical care treatment varies considerably (1,2). Self-report questionnaires were favoured in studies reviewed, but may result in elevated prevalence rates (3,4). The use of CAPS (5), a structured clinical interview may be more reliable in diagnosing PTSD in this population. The aim of the study was to investigate prevalence rate for PTSD and determine if the use of stringent scoring rules appropriately identified individuals who would benefit from intervention

METHODS. PTSD Assessments were carried out at 2 weeks,1 month,3 months and 6 months in 90 consecutive discharges.

RESULTS. Nine patients (10%) were found to have PTSD at 4 weeks post critical care discharge using lenient scoring rules, compared to only 1 patient (1.2%) when using more stringent scoring rules. (Further scoring rule comparisons will be given at presentation). Spontaneous reductions in symptom frequency and intensity were observed over time, using this method of assessment.

CONCLUSION. Prevalence rate of PTSD is lower than previously reported. The application of more stringent scoring rules appropriately identified individuals who later required treatment for PTSD.

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STUDY OF ANXIETY AND DEPRESSION IN PATIENTS THAT HAVE BEEN HOSPITALIZED IN INTENSIVE CARE UNIT

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INTRODUCTION. Anxiety and depression in patients that have been hospitalized in an Intensive Care Unit (I.C.U.) are common disorders. We evaluated the levels and the severity of anxiety and depression in these patients and investigated any correlation with their Apache II score on admission.

METHODS. Twenty consecutive patients under 65 years old hospitalized in ICU, participated in the study. On admission, the severity of illness was evaluated with Apache II scale. Upon their release, their demographics were registered. Levels of anxiety and depression examined by filling up the Beck Depression Inventory (BDI, 1) and the Spielberger Anxiety Scale (2). Their psychiatric background was investigated, also the use of alcohol and substances, as well as emotional traumas in childhood. Previous physical illness or previous hospitalization was recorded too. Data were analyzed by using SPSS for Windows (version 11.0).

RESULTS. The mean age was 45.3 years (SD: ±13.5) while the mean duration of hospitalization in the I.C.U. was 33.8 (SD: ±34.5) days. The Apache II mean score was 23.87 (±12.6). The mean BDI score was 14.00 (SD: ±6). Finally, the Spielberger's Anxiety Scale score was 43.8 (SD: ±9.24). More than 40% manifested increased depressive symptomatology. Females presented higher levels of anxiety and depression than males (t-test $p<0.05$) while there was no major difference as far as the time of hospitalization, the age and Apache II scale score (t-test $p>0.05$). Positive correlation was observed between anxiety and depression levels and between depression and Apache II score (spearman test $p>0.05$). No correlation was observed between duration of hospitalization and the remaining factors.

CONCLUSION. The patients that have been hospitalized in the I.C.U present higher incidence of depression. It is possible that the severity of patient's condition on admission as well as anxiety symptoms during hospitalization in ICU participate both in the development of depression.

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DEATH DUE TO INTOXICATION BY PESTICIDES AND CARBAMATES

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INTRODUCTION. Through this work, we report a retrospective epidemiological contribution concerning 93 cases of death due to intoxication by pesticides, during a period of six years: from January, 2000 till October, 2005 at the University Hospital. Sousse Tunisia.

METHODS. Data was obtained from all autopsy reports, compiled by the department of Forensic Medicine, toxicology and emergency department.

RESULTS. Pesticides were implicated in 47.3% of cases carbamates in 35.5%. The most common substance used was methomyl. The death was due to the suicide in 66, 7% of cases 15 - 30 year old group was most commonly affected. 60.2% are women, unemployed in 54, 8%, coming from rural areas (80, 7%) who used pesticides for suicidal reason.

CONCLUSION. In the light of these data and according to our experience, we are confronted and made sensitive in this problem of voluntary suicides which surprises by an important incidence, it seemed to us that pesticides poisons are the most reliable to illustrate this phenomenon, seen the frequency and the gravity.
This approach allowed among others to raise the typical portrait of the poisoned and to clarify the characteristics of this plague to target better the prevention.

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XIGRIS: DIFFUSION FROM CLINICAL TRIALS TO CLINICAL PRACTICE

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INTRODUCTION. In the UK, Xigris was recommended by the National Institute for Clinical Excellence (NICE) for use in patients with severe sepsis and multiple organ failure in 2004. However, the ADDRESS trial indicated that certain patients may not benefit from its use1. Concerns about possible adverse effects has led to calls for formal reappraisal of the drug's role. The aim of this audit was to review the clinical impact of Xigris in the five largest users in England.

METHODS. This audit was a retrospective review of ICU charts and medical records of patients who had received activated Protein C outside a clinical trial. The patients' demographic details at ICU admission and vital status at hospital discharge were recorded. The severity of illness was assessed by the APACHE II score (using first 24 hrs admission data) and the number of organ dysfunctions2. Adverse incidents were recorded and any sequence effect explored.

RESULTS. 351 patients received Xigris. 201 (57.2%) were male, and 177 (50.4%) were admitted after recent surgery. The patients' average age was 61.8 years. The mean admission APACHE II score was 23.3 and the average number of dysfunctional organs on admission was 3.3. The hospital mortality was 46.7% (164 deaths). The expected number of deaths calculated by using the APACHE II risk of death was 173 (49.3%) and by number of sepsis induced organ failures 210 (59.7%). Overall there were 33 (9.4%) adverse incidents (5 serious bleeds, 9 gastrointestinal haemorrhages, 2 intracranial bleeds, 1 pulmonary haemorrhage, 1 haemothorax and 15 more minor incidents). Cumulative mortality became stable at 46% after treating 50 patients).

CONCLUSION. 1) Although APACHE scores were similar, this group of septic patients had more organ dysfunction and higher mortality than patients in the PROWESS and ENHANCE trials. 2) Expected mortality from both the APACHE II and organ dysfunctions suggests that Xigris does reduce mortality. 3) Serious adverse incidents occurred in 5.1%; however the direct contributing effect of Xigris cannot be established from this type of audit. 4) About 50 patients need to be treated before the cumulative mortality becomes stable.

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CHECKING AND MEASUREMENT OF NURSING ERRORS IN ICU

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INTRODUCTION. Critical-care nurses search for the quality of nursing assistance through the improvement of their work. The processes carried out by the stuff must be monitored and measured in order to offer subsidies for assistance improvement. The objective of this study is to measure and quantify the errors made by nursing staff of a 24-bed hospital school

METHODS. The data collection was carried out from September 2004 to January 2005. A total of 400 patients were enrolled and 514 mistakes evaluations were performed, totalizing 550 errors related to medications and nursing procedures.

RESULTS. Out of these, 41.94% of occurrences took place in the morning, 40% at night, and 44% in the afternoon. Medication errors were related to unedifying drugs (43.47%); the prescribed and not undertaken medications (23.18%); schedules errors (17.39%), and drug administration (2.17%). As for the procedures not undertaken in the investigated period, 33.98% of the errors were related to unedifying serum catheters; 21.35% to the incorrect fluid balance; 15.29% to the vesical probes without attachment, and 10.92% to past due serum catheters that have not been changed.

CONCLUSION. It is very important to recognize errors that might happen, so that interventions and permanent education could be considered in order to ensure quality.

Poster Sessions
Perioperative abdominal failure and miscellaneous 1145-1156

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CORRELATIONS OF SCVO2 AND CLINICAL SCORING SYSTEM IN PATIENTS FILLOWING THE MAJOR ABDOMINAL SURGERY

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INTRODUCTION. Central venous oxygen saturation (ScVO2) has been used as estimation of cardiac index in critically ill patients. ScVO2 reflects the balance between oxygen delivery and consumption and can decrease when oxygen delivery falls in relation to the oxygen requirements of the tissues. The aim of this study was to assess correlation among ScVO2, clinical scoring system APACHE II, MODS, POSSUM and SIRS in surgical patients.

METHODS. In 80 patients presented in our ICU after major abdominal surgery, ScVO2 was assessed from blood samples drawn from central jugular or subclavian vein. All patients were scored with clinical scoring system APACHE II, MODS, SIRS and POSSUM as well as ASA status, cardiac index was performed via PICCO haemodynamic monitoring.

RESULTS. The Spearman Rank Order Correlation was used to estimate a connection between ScVO2 in abdominal surgical patients and clinical scoring systems, ASA status and duration of operation. There were 17% patients ASA II, 28% ASA III and 40% ASA IV. The clinical scoring APACHE II median 13 (range 3-43), MODS median 3 (range 0-13), SIRS median 1 (range 0-4), POSSUM median 54% (range 0.7-99). We found no statistically significant correlation among the following parameters: ScVO2 vs. APACHE II r=-0.03 (p=0.48), ScVO2 vs. MODS r=-0.02 (p=0.83), ScVO2 vs. SIRS r=-0.05 (p=0.47) and vs. POSSUM r= -0.09, p=0.38.

CONCLUSION. Central venous blood oxygen saturation does not have statistically significant correlation with clinical scoring system.
Despite the fact that the ScVO2 is sometimes referred to be the parameter as valid as CI (cardiac index) our data indicate that the clinical scoring systems are better tools to estimate patients condition.

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PRESSURE CONTROLLED VENTILATION PROVIDES BETTER TIDAL VOLUMES DURING LAPAROSCOPY

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INTRODUCTION. New anesthesia ventilators are equipped with volume (VCM) and pressure (PCM) controlled modes. Both modes have been extensively used for mechanical ventilation of critically ill patients. Intraoperative indications for PCM, remain unclear. We have previously shown that PCM delivers larger tidal volumes than VCM when peak airway pressure is held constant and endotracheal tube (ETT) obstruction exists (1). Tidal volumes, may be larger with PCM even without ETT obstruction. To determine the effect of PCM and VCM on tidal volume, we studied tidal volume delivery in patients undergoing laparoscopy.

METHODS. After IRB approval, Ohmeda Aestiva 5 anesthesia machine was used to ventilate 12 patients undergoing laparoscopic prostatectomy and intubated with an 8.0 ETT. The ventilator was set to a tidal volume of 6 cc/kg, RR of 10, PEEP of 5 cm H20, and I:E ratio of 1:2. Tidal volumes, peak, and mean airway pressures were recorded, the ventilator was changed to PCM at the same peak airway pressure, and measurements again obtained. The procedure was repeated at a tidal volume of 8cc/kg. Statistical analysis was performed using an unpaired t-test.

RESULTS. Tidal volume in PCM was significantly greater than in VCM ($p<0.05$), with average difference 0.123 L, range 0.044-0.287 L. Peak airway pressures were identical, but the mean airway pressure in PCM was higher than in VCM ($p<0.05$). The increase in tidal volume with PCM was consistent for all patients, including those with normal and decreased lung compliance.

CONCLUSION. We found significantly greater tidal volumes with PCM in patients undergoing laparoscopic surgery. One possible explanation is that greater mean airway pressures in PCM reduce anesthetic-induced atelectasis, improving lung compliance. PCM should be considered when high airway pressures complicate intraoperative mechanical ventilation.

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SEVERITY SCORES IN PATIENTS WITH ABDOMINAL TRAUMA

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INTRODUCTION. Abdominal injuries contribute to excess mortality and morbidity in trauma patients. The lethal triad of coagulopathy, hypothermia and acidosis is a physiological criterion for selecting injured patients for damage control surgery [1]. Injuries and their functional repercussion can be evaluated by severity scores useful for management decision and prognosis. Our aim was to assess severity and evolution of surgical traumatic abdominal injuries, admitted to our ICU.

METHODS. Non-concurrent cohort study, in a university hospital general ICU. We collected data from consecutive trauma pts during a 5.5 years period. We included adult pts who had at least one abdominal injury with AIS ≥ 3 (Abbreviated Injury Score-1990) submitted surgery. Injury Severity Score (ISS)(using Trauma Audit and Research Network Outcome Prediction Model-Pm(04)-TARN) and Simplified Acute Physiology Score II (SAPS II) were used to calculate severity and predicted mortality.

RESULTS. In 50 pts with abdominal trauma 26(52%) were submitted to abdominal surgery, mean age 37 ± 15.75 ys. Most were politrauma victims of road accidents (80.8%), mean ISS of 34(16-50) and abdominal AIS=3 in 53.8%, AIS=4 in 30.7% and AIS=5 (4 pts). Mean time between hospital admission and surgery was 2h (15min to 6 days). ICU mortality was 19.2% (due to brain injury, sepsis and fat embolism), with no further hospital or 30-day deaths. Expected hospital mortality based on SAPS II was 24.7% (mean SAPS II - 40) and 27% based on Pm(04) TARN. Twelve pts presented with lethal triad. Compared to pts without lethal triad they had higher ISS (40 vs 34, $p<0.05$) and SAPS II (50 vs 40, $p<0.05$), needed significantly more blood products and mean time from admission to surgery was 1.3h ($p<0.05$). ICU mortality was higher (42%, $p<0.05$), as predicted by SAPS and Pm(04) TARN.

CONCLUSION. Surgical abdominal injury is not very frequent in our politrauma pts. It is associated with other injuries and with high probability of death. Our group had a high level of injury (ISS-34) and important organic dysfunction (SAPSII-40). With a multidisciplinary approach (surgeon and intensivist) we had fewer deaths than predicted by the scores in the general group, and no difference in the lethal triad group.

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EPIDURAL ANALGESIA FOR ELEVATED INTRAABDOMINAL PRESSURE

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INTRODUCTION. Surgical decompression being life saving in severe intraabdominal hypertension (IAH) also involves subsequent management of an open abdomen. Therefore, it cannot be recommended for all cases of IAH. This dictates the need of alternatives to surgical decompression. Abdominal pain relief may hypothetically decrease secondary muscle spasm and increase the compliance of anterior abdominal wall hence decreasing intraabdominal pressure (IAP). To check this hypothesis we investigated effect of epidural analgesia upon IAP in surgical patients with moderate IAH. To our knowledge this is the first report of such a treatment.

METHODS. In a prospective double blinded study we investigated 26 postoperative critically ill surgical patients with IAH, who received postoperative epidural analgesia. IAH defined as IAP>12mmHg or abdominal perfusion pressure (APP)<60mmHg recorded by a minimum of 3 measurements conducted 6 hours apart. Exclusion criteria included common contraindications to epidural analgesia. Epidural catheterization was performed at Th8- Th10. After test dose of 60 mg lidocaine with 15 mcg epinephrine and correct positioning of the catheter patients received ropivacaine 0.2%10 ml, which was followed by its continuous infusion at 5 ml/h for maximum 96 hours. IAP was measured transvesically after instillation of 50 ml saline every 6 hours during the whole ICU stay and immediately before and 1 hour after initiation of epidural analgesia. Mean arterial pressure (MAP) was measured invasively. APP was calculated for each IAP measurement as APP=MAP-IAP.

RESULTS. Dates presented as Mean±SD. Repeated measures ANOVA showed significant within subject differences in repeated measurements of IAP ($p<0.0001$) and APP ($p=0.005$) for the whole period of epidural analgesia, but failed to show significant differences for repeated measurements of MAP ($p=0.154$). Banferoni multiple comparison procedure showed following significant differences:IAP0>IAP1h>IAP1d>IAP2d ($17.40\pm2.36 > 12.20\pm1.68 > 10.80\pm1.03 > 7.20\pm2.44$; $p<0.005$ for all); MAP1h<MAP1d ($p=0.002$); APP1h<APP1d ($p=0.002$). All other comparisons revealed insignificant results. Indexes 0.1h, 1d and 2d indicate values measured immediately before and 1 hour, 1day, 2days after epidural analgesia has started.

CONCLUSION. Continuous thoracic epidural analgesia decreases IAP without hemodynamic compromise which can increase APP in critically ill postoperative patients with IAH.

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INCIDENCE AND EPIDEMIOLOGY OF INTRA-ABDOMINAL HYPERTENSION IN HIGH-RISK ICU PATIENTS

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INTRODUCTION. Intra-Abdominal Hypertension is an important and very common entity that affects ICU patients, mainly pos-abdominal surgical and trauma patients. Its presence generate worse prognosis due to respiratory complications, cardiac depression and gut ischemia. OBJECTIVES: To study the incidence and epidemiological aspects of Intra-Abdominal Hypertension (IAH) in the first 72 hours of admission of high-risk patients in a general ICU.

METHODS. Intra-Abdominal Pressure (IAP) was measured by intra-vesical (bladder) pressure. IAP was measured 6 times a day during 72 hours or until to patient discharge or death. It was defined as high-risk patients: Politrauma (with or without abdominal trauma) (PT), Acute Abdomen (AA) and Post - intra-abdominal operations (PO). This was a cohort study made at general ICU of the University Hospital during three months. It was made analysis with descriptive statistics, and comparison with univariated analysis of variance (anova), with T-test.

RESULTS. 22 consecutive high-risk adult patients were studied (54.5% male). Average age was 40.9 years (18-69). Etiologies: 59.1% (13/22) PT, 36.4% (8/22) PO, and 4.5% (1/22) AA. Incidence of IAH (IAP > 10 mmHg) was 68.2% (15/22), with 13.3% of these patients (02/15) developing Abdominal Compartimental Syndrome (ACS), defined as IAP > 20 mmHg. Among the groups, incidence of IAH was 69.5% in PT, 100% in AA and 62.5% in PO. There was no difference in APACHE II (16.8 x 15.0, p=0.48). Mortality was 53.3% x 28.5% of non-IAH (p=0.26, RR=1.87). Mortality of ACS patients was 100%, versus 40% of remainder group (p=0.19 ; RR=2.5).

CONCLUSION. Incidence of IAH at high-risk ICU patients is extremely high, with a high mortality (mainly when there is ACS), and it may be routinely investigated to detection and management.

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BENEFIT OF AGGRESSIVE ICU INTERVENTION IN THE OUTCOME OF SEVERE SEPSIS IN SECUNDARY PERITONITIS

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INTRODUCTION. Generalized peritonitis resulting from intra-abdominal infections remains associated with an unacceptable high mortality, particularly when severe Sepsis (sS) develops. The aim of this study was to evaluate Mannheim peritonitis index (MPI) and Simplified acute physiology score II (SAPS II) in ICU pts with sS following secondary peritonitis (2ndP), and to relate their predicted hospital mortalities (pM) with ICU and hospital outcomes.

METHODS. Twenty-three consecutive pts (14 M, 9 F; median age 70 [24 – 85]) who presented to the ICU with 2ndP and sS, from January 1st 04 to June 30th 05 were included in this prospective analytical study. MPI and SAPS II (at 24h) were used to calculate a prognostic score for each pt, and pts were divided into two categories of severity as GI = 21<MPI<29 (high risk) and GII = MPI>29 (very high risk). Fisher's Exact test was used to assess any significant association between scores and outcomes.

RESULTS. GI: n=7 (5M, 2F), median age – 62 [31-75]; ICU stay – 7 [5-14] days; septic shock – 6/7; use of vasopressors – 36h [24h-192h]; multiple organ dysfunction syndrome – 7/7; 2ndP >24h – 4/7. GII: n=16 (9M, 7F), median age – 74 [24-85]; ICU stay – 9 [1-17]; septic shock – 12/16; use of vasopressors – 79h [8h-336h]; multiple organ dysfunction syndrome – 16/16; 2ndP >24h – 15/16. Global hospital mortality rate for GII was 56.3%, similar to the predicted one by medium MPI (57.3%), while for GI it was 0. Medium SAPS II predicted mortalities were higher in both groups: GI – 57.5%; GII – 82.6%. Fisher's Exact test didn't show a significant association between mortality and increasing MPI score (p=0.052) according to ICU/hospital lower mortality and, considering SAPS II>56 (pM>60%) it showed a significant association (p=0.018) (α=5%).

CONCLUSION. 1) MPI score seems to be an objective way to predict the outcome of pts with 2ndP and sS, particularly in the very high-risk pts. 2) ICU multidisciplinary aggressive approach to these high and very high risk subsets of 2ndP pts with sS is strongly recommended as it can decrease other systems' repercussions and ICU and hospital mortality. 3) Sample increase is needed to confirm these data.

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1151

INTRAABDOMINAL PRESSURE IN ACUTE PANCREATITIS: A DETERMINANT FACTOR IN THE THERAPEUTIC MANAGEMENT?

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INTRODUCTION. Our aim is to evaluate if high intraabdominal pressure (HIP) in patients with severe acute pancreatitis (SAP) admitted to the Intensive Care Unit (ICU), could determine an early therapeutic approach which might contribute to improve survival rates in these patients.

METHODS. A retrospective and descriptive study was carried out between January 2003 and March 2004 on patients diagnosed of HIP who were admitted to our unit within the first 72 hours. We considered the necessary admittance to the ICU as any organ malfunction according to Sequential Organ Failure Assessment (SOFA) criteria. Daily evaluations of the intraabdominal pressure were carried out on all patients (intrabladder pressure method). When this value exceeded 25 cm H2O, besides one or more organ failure, we proceeded to a decompressive laparatomy (DL), following the evolution and prognosis of these patients according to this new variable.

RESULTS. From a total of 120 patients admitted to our hospital with acute pancreatitis, 12 patients (11 males and 1 female), aged between 16 and 81, had to be taken into our unit. Admittance criteria were hypoxemia in 9 patients (75%), olyguria in 7 (58%), haemodynamic instability in 5 patients (41.5%), conciousness level alterations in 2 (16.5%). Eight patients (67%) had MODS and ten (83%) had HIP. Two patients died before the DL, while from the group of ten remaining patients, 3 died within 30 days after the surgery. All of them had some type of decompressive device. Seven of the twelve patients (58%) admitted to the ICU with SAP survived and the survival rate for those who underwent a DL was 70%.

CONCLUSION. According to our series, patients with SAP admitted to the ICU with some type of organ failure and HIP (values above 25 cm H2O) would be benefitted by decompressive laparatomy whether pancreatic tissue might be infected or not.

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REMIFENTANIL OR MORPHINE IN CRITICAL CARE UNIT WITH PREVENTION OF NARCOTIC INDUCED HYPERALGESIA

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INTRODUCTION. The author hypothesized that efficacity of a Remifentanil-based regimen (R) with prevention of Narcotic Induced Hyperalgesia (NIH) by Magnesium Sulphate (MS), Ketamine (K) or Clonidine (C) was greater than that of a morphine- based regimen (M) in a Critical Care Unit (CCU).

METHODS. One hundred critically ill patients (Simplified Acute Physiology Score :18+/-8) were randomly allocated to receive a blinded infusion of either R at a rate of 0.15 μ/kg/min (+/- 0.10 μ/kg/min) (G1:n=50) or M at a rate of 0.01 mg/kg/h (+/- 0.06 mg/kg/h) (G2:n=50). The opioid infusion was titrated to achieve optimal sedation as defined by a Sedation Agitation Scale (SAS) of 4 (1). NIH in G1 was realised by infusion of MS (0.008mg/kg/h), K (0 to 8 μ/kg/min) or C (0 to 0.01 μ/kg/min) depending on hemodynamic stability. A tramadol open-label infusion (T= 0.25 mg/kg/h) was started if additional analgesia was required to keep the Analogic Visual Scale (AVC) <4. Sedation was performed in all patients with a propofol infusion (0 to 6 mg/kg/min). For statistical analysis a Shapiro-Wilk test, Wilcox and a Student T-test were used.

RESULTS. The mean percentage hours of sedation wasn't significantly longer in G1 (76.8 +/- 22.2 min = 3.2 days) than in G2 (72.5 +/- 14.5min). The mean durations of mechanical ventilation were comparable in both groups (76 +/- 14 h). Extubation time were significantly longer in G2 (10.1 +/- 2.4 h) than in G1 (0.9 +/- 0.6 h) (p<0.001). Total mean hospitalisation time in CCU was reduced by 30+/-6 hours in G1 compare to G2 (p<0.005). R mean infusion rate was 0.12 +/- 0.9 μ/kg/min, whereas M mean infusion rate was 0.05 +/- 0.01 mg/kg/h. 42 subjects in G2 versus 10 of 50 in G1 required T (p<0.001). AVS at the end of CCU stay was for G1:1+/-1 and for G2 :2+/-1 (p<0.05). The incidence of vomiting was significantly higher in G2 (38%) than in G1 (5%) (p<0.001). Ileus occurred in 58% in G2 compared to 19% in G1 (p<0.001) with an enteral feeding delay in G2 of 1.5+/-0.5 days instead of 0.6+/-0.4 days in G1 (p<0.002).

CONCLUSION. Remifentanyl-based regimen with NIH prevention allowed a more rapid emergence from sedation, less ileus, earlier extubation with enteral feeding possibilities and reduction in narcotics demands diminishing sofar CCU stay and cost.

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ROLE OF GABAPENTIN IN BURN PATIENTS

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INTRODUCTION. Gabapentin is an anticonvulsant drug proven to be effective in neuropathic pain. Experimental and clinical studies demonstrate antihyperalgesic effects of gabapentin in models involving peripheral and central sensitization which apperars in burned patients. This study examines the changes in opioid use after the initiation of gabapentin therapy in burned patients.

METHODS. Case-control study
We analysed data from 2 statistically comparable patients groups, admitted at our institution in a 2 years period, 2003- 2004. Group I represents the patients with standard pain treatment, whereas group II is represented by the patients with gabapentin added as adjuvant pain killer. A gabapentin starting dose of 400 mg tid was administred, up to a highest dose of 800 mg tid as needed by the 83 patients representing group II.
We compared the 2 groups in terms of total morphine or narcotic equivalent use, the total dose of adjuvants and the total dose of sedative medication per day for obtaining the same pain report at rest and movement on VAS. Opioid adverse reactions like GI dysfunction and urinary retention were also monitored. Appearance and intensity of neuropatic pain was also in our attention.

RESULTS. There is an evident reduction of 45% in opioid use once the gabapentin was initiated, consistent with the decrease in the pain numbers on VAS. The vomiting events and urinary retention were reduced with gabapentin. The chronic neuropatic pain seems to be less intense.

CONCLUSION. This is an initial description of the role of gabapentin as a very good adjuvant in the treatment of acute and chronic pain experienced by the burned patients.

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DUNBAR SYNDROME. A CASE REPORT

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INTRODUCTION. Median arcuate ligament syndrome is a rare cause of chronic mesenteric ischemia. First description of this syndrome was in 1965 by Dunbar. Although medical technology advanced in last years, this syndrome's diagnosis represents a challenge and little is known about better therapeutic modalities.

METHODS. Descriptive report of a Dunbar Syndrome case, with chronic abdominal pain over six years.

RESULTS. 64 years old man with abdominal pain over six years. The pain was epigastric, irradiated to dorsum. It appears over 20 minutes after meals, accompanied by vomit and dizziness. Weight loss was reported over symptoms period. Previous history of hypercholesterolemia, tobacco use and chronic gastritis. Previously submitted to cholecystectomy. No regular medication was taken. Abdominal arterial Doppler was normal. Patient was submitted to an aortography which showed critical stenosis of celiac trunk. It was indicated laparotomy, that evidenced extrinsic compression of celiac trunk by median arcuate ligament in an anomalous position. It was made section of ligament, followed by balloon angioplasty of celiac trunk. After these, normal pulsatility of celiac trunk was achieved. In post-operative period patient presented two episodes of abdominal distension, which spontaneously reverted. This abdominal distension was attributed to be caused by gut reperfusion. Another arteriography was done and showed normal patency of celiac trunk. Hospital discharge occurred at day 8 after surgery, with total symptoms remission.

CONCLUSION. This syndrome is very rare, but with systemic commitment, and potentially deleterious. In experienced surgery team hands it is easily corrected. This syndrome always must be thought in a patient with symptoms of chronic mesenteric angina, without main risk factors to atherosclerosis.

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PATIENT POSITIONING; DOES IT AFFECT INTRA-ABDOMINAL PRESSURE MEASUREMENTS IN CHILDREN?

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INTRODUCTION. The bladder method has been validated as an accurate measure for intra-abdominal pressure (IAP) monitoring. Routine patient care factors such as positioning may potentially affect the accuracy of measurement but have not been systematically studied. We compared the IAP when nursing a patient with the head of the bed elevated at zero to ten degrees compared with measurements taken at 30 degrees. We hypothesized that IAPs would be higher at 30 degrees compared to 0-10 degrees.

METHODS. Pediatric patients admitted to a pediatric intensive care unit who were mechanically ventilated and had urethral catheters were consented and enrolled in this IRB approved study. We excluded patients with abdominal distention, abdominal surgery or any suspicion of abdominal compartment syndrome. Mean optimal volumes for each individual were instilled in the bladder for IAP measurements. Measurements were taken with the head of the bed at 0-10 degrees and at 30 degrees every 6 hours over a 24-hour period or until the patient was extubated. Mean, standard deviation and paired t-tests were used for statistical analysis.

RESULTS. 64 patients (32 females, 32 males) with a median age of 2 years (range 4 days - 18 years) were studied. 237 paired observations were analyzed.

TABLE 1.
IAP measured with the head of the bed at 0-10 degrees compared to 30 degrees

	IAP (mmHg) at 0-10° (Mean ± std dev.)	IAP (mmHg) at 30° (Mean ± std dev.)	Diff. in IAP (mmHg) (Mean ± std dev.)	P-value
1st readings	8.2 ± 5.7	10.3 ± 5.7	2.1 ± 2.6	<0.001
2nd readings	8.9 ± 5.9	10.7 ± 5.1	1.8 ± 2.3	<0.001
3rd readings	8.6 ± 4.6	11.1 ± 4.8	2.5 ± 1.8	<0.001
4th readings	8.6 ± 5.3	10.7 ± 5.7	2.1 ± 2.5	<0.001

CONCLUSION. IAP measurements taken with the head of the bed at 30 degrees are greater by 2.1 ± 2.3 mmHg than those taken at 0-10 degrees. It is important to note that the position of the patient may affect IAP measurements and should be taken into consideration when interpreting elevations in IAP.

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A STANDARD VOLUME PROVIDES ACCURATE INTRA-ABDOMINAL PRESSURE MEASUREMENTS IN CHILDREN

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INTRODUCTION. Current standards for measuring intra-abdominal pressure (IAP) by the vesical method in adults uses 50mL of 0.9% normal saline instilled in the bladder. In children only one study determined that using 1ml/kg in children <10kg will give accurate values and normal IAP values are not known. We sought to determine the optimal volumes for IAP measurements in children of varying sizes and the normal IAP in critically ill children. We hypothesized that volumes for accurate IAP measurements by the vesical method in children are less than 50mL.

METHODS. We studied 70 children (<18yr) admitted to a pediatric intensive care unit on mechanical ventilation. Patients with recent abdominal surgery, or suspicion of abdominal compartment syndrome were excluded. Graduated volumes of 0.9% normal saline in increments of 3mL up to 50mL were instilled in the bladder. IAP measurements were taken with each instillation. A pressure–volume curve was generated and the mean volume of the pressure plateau was taken as the mean optimal volume and the volume at the beginning of the plateau was taken as the minimal optimal volume for each patient. The data was analyzed by stratification of patients (groups A-E) according to weights 0-10kg (group A), >10-20kg (group B), >20-30kg (group C), >30-40kg (group D) and >40kg (group E). Mean and standard deviation was used for statistical analysis.

RESULTS. As shown in table 1.

TABLE 1.

	n	Weight (kg)	Mean IAP (mmHg)	Mean Optimal Vol (mL)	Min Optimal Vol (mL)
A (0 -10kg)	28	5.9 ± 2.3	6.6 ± 2.7	13.1 ± 4.8	4.6 ± 3.1
B (>10 - 20kg)	21	13.9 ± 2.6	6.8 ± 5.1	20.7 ± 5.0	3.7 ± 2.0
C (>20 - 30kg)	9	25.6 ± 3.9	7.5 ± 2.5	22.4 ± 7.9	5.7 ± 3.3
D (>30 - 40kg)	9	34.5 ± 3.6	9.8 ± 6.5	21.5 ± 5.8	4.1 ± 2.8
E (>40kg)	3	53 ± 14.8	8.4 ± 5.4	24.3 ± 2.0	2.0 ± 1.7

CONCLUSION. Mean optimal volumes needed for accurate IAP measurements were consistently less than 50mL but varied with patient weight. As little as 4-6 mL provided accurate readings irrespective of patient weight. We therefore recommend a standard volume of 5mL be used in all children.

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OPEN-HEART SURGERY FOR CHILDREN WITH SINGLE KIDNEY AND CONGENITAL HEART DISEASE: RISKS AND OUTCOME

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INTRODUCTION. Acute renal failure is a frequently reported complication after open heart surgery in children which affects their postoperative morbidity and mortality. However in the presence of single kidney, the incidence, risk of acute renal failure and outcome of cardiac surgery, are not known. In this study we aim to investigate the outcome of children with single functioning kidney requiring open-heart surgery to repair congenital heart disease.

METHODS. Eight children with single functioning kidney underwent open-heart surgery from January 2003 to December 2005. Demographic data, pre-operative, operative and postoperative data that reflects renal function as well as intensive care management were documented. The diagnosis of single kidney was established in all patients by ultrasound, and in addition by scintigraphy with Tc-99m dimercaptosuccinic acid (DMSA) in three patients. We evaluated preoperative and postoperative renal function parameters (Blood urea nitrogen (BUN), creatinine, & urine output).

RESULTS. The range and median age and weight were 0.3-95.5 month (5.35 m) and 1.9-24 kg (3.4 kg). Pre-operatively, average BUN and creatinine levels were (4.1 mmol/l ± 1.9 SD) and (58 umol/l ± 8.9 SD) respectively, with average urine output of (3.9 cc/kg/h ± 2.2). The mean total bypass time and cross clamp time were (77.1 minutes) and (47.2 minutes) respectively. On the other hand, postoperatively the peak average levels of BUN and creatinine were (8.9 mmol/l ± 4.7), and (79 umol/l ± 29.4). Post-operatively two patients (25%) developed acute renal failure, but only one of them (12.5%) required peritoneal dialysis for five days. This patient had the lowest age (9-days) and weight (1.9 kg), and he underwent preoperative cardiac catheterization with angiography for Ballon atrial septostomy. The mean ICU stay duration was (14-days), with mean total hospital stay of (19-days).

CONCLUSION. 1) Open cardiac surgery on bypass can be performed safely for patients with single kidney in the presence of normal kidney function. 2) Most patients do well with conservative management. 3) Renal replacement therapy may be needed to support kidney function temporarily after bypass surgery in small number of cases.

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Grant acknowledgement. Cardiac Sciences Department, King Fahad National Guard Hospital

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GRAM NEGATIVE RODS AND HOSPITAL-ACQUIRED SYSTEMIC INFECTIONS IN A PEDIATRIC INTENSIVE CARE UNIT

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INTRODUCTION. Gram negative rods are major pathogens of hospital-acquired systemic infections in developing countries and an important cause of substantial morbidity and mortality. The objective of this study was to determine the participation of Gram negative rods in nosocomial systemic infections in the pediatric intensive care unit (PICU) of the Children's Hospital of Tunis and to describe the epidemiology of systemic infections related to these pathogens.

METHODS. From january 2004 to december 2005, a prospective surveillance study of nosocomial systemic infections (bloodstream infection and clinical sepsis) was performed in the PICU. All patients who remained in the PICU for more than 48 h were included. Centers for Disease Control and Prevention criteria were applied for the diagnosis. Nosocomial systemic infections rates were calculated as a density incidence rate (per 1000 patient-days). Catheter utilisation ratio was defined as central venous catheter days / length of stay at onset date of nosocomial systemic infections.

RESULTS. During the study period, 652 patients (mean age = 5.6 ± 20.6 months), were hospitalized for more than 48 h, representing a total of 5876 patient days with an average length of stay of 9 ± 10.2 days. The patient population included 69.4% neonates. Of all, 46 nosocomial systemic infections occured in 44 patients (8.1/1000 patient days). Twenty patients had a total of 22 nosocomial systemic infections related to Gram negative rods, witch accounted for 47.8% of nosocomial systemic infections in our PICU. Incidence rate was 3.7 per 1000 patient-days. The mean time of onset of these infections was 6.7 ± 2.5 days. The infection rate in neonates was 3.5/1000 patient days and in older children 4.3/1000 patient days. 37% of infected patients had previous fecal colonization by multiple drug–resistant gram-negative bacteria. Twelve infections (54.5%) occured in patients with central intravascular device. Central venous catheter associated infection rate was 6.4 per 1000 catheter days. The most frequently isolated pathogens was extended-spectrum beta-lactamases-producing Klebsiella pneumoniae (36.4%), followed by Pseudomonas aeruginosa (18.2%). The PICU crude mortality rate of infected patients was 55% (versus 6.5% in non infected patients; p<0.0001). A univariate analysis showed that catheter utilisation ratio (p=0.01) was associated with nosocomial Gram negative systemic infections.

CONCLUSION. Nosocomial systemic infections related to Gram negative rods were the major type of nosocomial systemic infections in our unit and had an incidence rate of 3.7 per 1000 patient-days. The majority of them resulted from extended-spectrum beta-lactamases-producing Klebsiella pneumoniae.

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FLUOROSCOPIC JEJUNAL FEEDING TUBE PLACEMENT

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INTRODUCTION. Enteral feeding is generally preferred over parenteral nutrition in critically ill patients. However nutrition by a naso-gastric feeding tube may be hampered by problems like gastric retention and bronchoaspiration. Instead, jejunal tube feeding has been shown to reduce gastric regurgitation and probably the rate of nosocomial pneumonia. Also, it is safe in severe acute pancreatitis, where gastric stimulation needs to be avoided. Blind, endoscopic and fluoroscopic jejunal tube placement techniques have been proposed. We addressed the question whether the fluoroscopic technique at the bedside is feasable and safe.

METHODS. Prospective observational study of jejunal tube placement procedures in critically ill patients. The feeding tubes (Trelumina®, Fresenius) were introduced by the ICU-staff at the bedside under fluoroscopic guidance. No prokinetic drugs were given. The correct jejunal position was documented by the application of a radiopaque contrast medium through the tube. After confirmation of correct position enteral tube feeding was immediately started.

RESULTS. 33 jejunal tubes were inserted in 26 patients (19 male, 7 female; age 58 ± 16.3). The indications were gastroparesis (23), pancreatitis (8) and recurrent aspirations (2). 2/3 of the patients were mechanically ventilated. The duration of the insertion procedure was median 20 minutes (min 6, max 125 min). The time from the decision to place the tube until the start of enteral feeding was median 117 minutes (min 26, max 402 min). The success rate was 94% (31/33). In the 2 unsuccessful cases a gastroenterlogist had to place the tubes endoscopically. The most frequent problem delaying the procedure was a difficult pyloric passage (14/33). There was no association between the specific indication, especially pancreatitis and introduction difficulties (p=0.733, Fisher exact). Further, here was no correlation between time to nutrition start and nursing workload (R=0.14, p=0.49). We observed no adverse events.

CONCLUSION. Fluoroscopic placement of a jejunal feeding tube at the bedside is fast, safe and has a high success rate when performed by well-trained ICU staff. It makes the ICU team more self sufficient when enteral nutrition in critical patients needs to be started and no gastroenterology service is available around the clock.

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CONTINUOUS NON-INVASIVE BLOOD PRESSURE MONITORING IN CRITICALLY ILL CHILDREN

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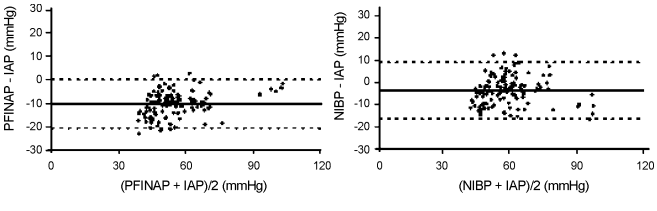
INTRODUCTION. Finapres technology measures blood pressure in a continuous non-invasive way using a finger cuff. This technique has been studied extensively in adults and has proven to be accurate [1]. Recently, cuffs have been developed especially designed for a paediatric population. The aim of this study was to determine the accuracy of this prototype blood pressure monitor (PFINAP) in children with respect to the commonly used oscillometry (NIBP). Therefore we compared them both to intra-arterial blood pressure measurement (IAP).

METHODS. We studied 16 mechanically ventilated children at our paediatric intensive care unit. Median age was 6 months (range 8 days-9 years) and median body weight 4 kg (3-15 kg). We recorded PFINAP and IAP simultaneously for 10 minutes with a 200 Hz sample rate and concurrently performed 2 NIBP measurements on each arm.

RESULTS. 97% of our attempts to obtain PFINAP succeeded and 98% of the NIBP measurements was successful which resulted in 60 paired measurements. The mean value of IAP was 60 mmHg (range 45-104 mmHg) for mean arterial pressure (MAP). The bias between PFINAP and IAP MAP was -10.3 mm Hg (SD 5.3) whereas the bias between NIBP and IAP was ±3.7 mm Hg (SD 6.5). Figure 1 depicts the Bland Altman analysis for the two comparisons.



CONCLUSION. The bias of Finapres technology in children is still too large for clinical application. However, precision of PFINAP is smaller than the widely used NIBP. In adults accuracy and precision strongly improved after reconstruction of finger blood pressure [2]. A similar software adjustment for children is under construction and after implementation clinical use could be feasible.

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BACTERIMIA AFTER CARDIAC SURGERY IN INFANTS AND CHILDREN: INCIDENCE AND OUTCOME

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INTRODUCTION. The postoperative course for pediatric cardiac patients is highly affecting their outcome. We aim to determine the incidence, and outcome of bacterimia in our pediatric cardiac intensive care unit (PCICU), and to detect the common organisms causing bacterimia postoperatively.

METHODS. Seven hundred and fifty eight patients underwent cardiac surgery between January 2002 and December 2005. Fourteen (14) patients (1.85%) were identified to have positive blood cultures after cardiac surgery, during their PCICU stay. Demographic, pre-operative, operative and postoperative data that are relevant to bacterimia, as well as intensive care management were collected.

RESULTS. The (14) patients were 8-males and 6-females. The median and range age and weight at time of cardiac surgery was 4 weeks (4-164 w) and 3.05 kg (1.7-12.2 kg) respectively. Ten patients (71.4%) had preoperative PCICU admission. The patients underwent different surgeries, 4 (28.6%) arterial switch, 2 (14.3%) coarctation repair, 2 (14.3%) BT shunt, 1 (7.1%) pulmonary valvotomy, 1 (7.1%) total anomalous pulmonary venous repair, 1 (7.1%) Norwood stage I, 1 (7.1%) VSD repair, and 1 (7.1%) division of origin of left subclavian. The onset of bacterimia was between 4-7 days, 8-15 days, and >15 days postoperatively in 4 (28.6%), 5 (35.7%), and 5 (35.7%) patients respectively. The commonest isolated organisms were staphylococcus species (42.9%), klebsiella pneumoniae (21.4%). Most of the organisms were sensitive either to ceftazidime, gentamycin or vancomycin. Nine patients (64.3%) died, 4/9 die within 1-week of infection, while 5/9 die after more than 3-weeks of infection.

CONCLUSION. The commonest causative organism in our PCICU was staphylococcus species which is usually sensitive to ceftazidime, that is the main emperical antibiotic together with vancomycin which we use when we suspect postoperative infection. Irrespective of that, still baterimia after cardiac surgery carries very high mortality rate especially in young age, low weight and prolonged PCICU stay.

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PERCUTANEOUS DILATATION TRACHEOSTOMY (PDT) IN PEDIATRIC PATIENTS

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INTRODUCTION. The dramatic complications that may accompany the PDT in children, lead to the necessity of the close control (thorough selection) of the indications for the procedure. One of those considered to be the development of the bulbar palsy and swallowing disorders caused by tumors of the brainstem. We hereby present the analysis of the experience we have, carried out PDTs in pediatric population (5-12 years old). Modified Ciaglia technique is described.

METHODS. During the period of 2004-2005 we performed 16 PDTs for the pediatric patients who had swallowing disorders after the removal of the brainstem tumors. PDT was performed on the 17±7 after the neurosurgical procedure.
For the sake of reducing the risk of the surgical complications we used modified version of the standard Ciaglia teqnique (MVCT), proofed to be efficient in adult population. The main features of the MVCT included:1. Bronchoscope - an external D of the bronchoscope should not exceed 4 mm. The endoscopy was performed discretely, no longer than 15-30 sec each time; 2. Endotracheal intubation tube – played a part of an internal frame of the trachea throughout the puncture and insertion of the guide wire; 3. Mild lateral compression of the trachea throughout the puncture – facilitation of the puncture itself, reduced risk of posterior tracheal wall trauma; 4. The negative pressure in the syringe during the whole period of puncture – allows to identify tracheal puncture as earlier as possible.

RESULTS. The duration of the PDT is 1.5-6 min in average. SaO2 and EtCO2 remained within normal range. No early nor late surgical complications were detected. All of the 16 patients were decanulated within 70±30 days after the PDT against a background of functional recovery of an adequate swallowing.

CONCLUSION. The MVCT of the PDT can be performed in the population of pediatric patients starting from the age of 5 years, providing that the minimal inner diameter of the intubation tube is not less than 5-5.5mm. The other two indispensable conditions to support the safety of the procedure are the sufficient experience of the operator and all of the necessary means and capability for the urgent switch to the surgical tracheostomy

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SEVERE RESPIRATORY SYNCYTIAL VIRUS INFECTION IN A TUNISIAN PEDIATRIC INTENSIVE CARE UNIT

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INTRODUCTION. Respiratory syncytial virus (RSV) is the most important cause of acute lower respiratory tract disease in infants and young childrens. The objective of this study was to describe the epidemiology, clinical aspects and evolution of RSV infections admitted in the pediatric intensive care unit (PICU) of Children's Hospital of Tunis.

METHODS. All patients admitted, from January 2000 to december 2005, to the PICU who had RSV infection and required mechanical ventilation (MV) or nasal CPAP were retrospectively analysed. Data recorded included demographic characteristics, birth weight, gestational age at birth, prior disease, clinical manifestations and outcome. Immunofluorescence antigen detection in the nasopharyngeal and tracheal secretions was used for virus identification.

RESULTS. 84 patients (mean age : 66.4 ± 52.5 days), accounting for 3.6 of admissions in the PICU, had a RSV infection. Twenty two of them (26.2%) were under 28 days of age, 12 (14.3%) had a history of premature birth (gestational age < 32 weeks) and 12 (14.3%) developed a respiratory distress at birth. A cardiac or pulmonary coexisting disease was identified in 14 patients (16.7%) (congenital heart disease : 8, bronchopulmonary dysplasia : 3, cystic fibrosis disease : 3). Three types of clinical manifestations were identified: obstructive form (78.6%), acute respiratory distress syndrome (8.3%) and recurrent apnea (13.1%). Eighty three childrens (98.8%) required MV. Eight of them (9.6%) required high frequency oscillation ventilation. One patient was managed with nasal CPAP. Hyponatrémia (<125 mmol/l) was the major complication (48.8%). Multivariate logistic regression analysis, showed that length of MV >7 days (OR = 4.7; 95% CI 1.8 – 12; $p < 0.001$) and a PaCO2 > 70 mmHg (OR = 3.3; 95% CI 1.6 – 4.8; $p < 0.05$) were independent risk factors for occurence of hyponatremia. The others complications observed were pulmonary air leak (4.8%) and cardiac dysrhythmias (1.2%). Survival rate was 91.7%. Average length of MV in the survivors was.

CONCLUSION. RSV infection represents 3.6% of admissions in our PICU. Young postnatal age, premature birth and underlying cardiac or pulmonary disease are risk factors for severity of this infection. Mortality is relatively high.

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OXIGEN THERAPY BETWEEN GOOD AND WORSE AT VERY PREMATURE BABIES

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INTRODUCTION. In the delivery room oxygen represents the main "drug" in neonatal resuscitation. Thereafter, in intensive care unit it remains the principal medication administrated to the newborn. Evaluation of oxigentherapy "s effects at the newborn.

METHODS. Retro-prospective study on premature babies under 32 weeks gestation admitted in NICU at "Cuza-Voda" Maternity Hospital from Iasi, between January 2003- January 2006. There were evaluated different types of oxygen therapy administration, incidence of bronchopulmonary dysplasia and retinopaty of prematurity and antioxidant defense system's potential.

RESULTS. The total births in the specified time were 20 487 babies. More there were admitted from other centers 1020 babies. The study group enrolled 412 cases (2.7% from total live births). CPAP oxigentherapy was administrated for a medium time of 10 days, IPPV with a media of 16 days, followed by a 10 days medium duration for free flow oxygen therapy. Enzymatic systems activity with antioxidant potential (SOD, CAT, GPx, malondialdehida, CAT/SOD ratio) was studied on 50 cases. Incidence of pulmonary bronchodysplasia was 0.58% and retinopathy of prematurity was 13.5% - strongly related with diminished of antioxidant system capacity: SOD significant increased compared with unasphyxiated similar babies that didn't receive oxigentherapy ($p< 0.01$) – depending on duration of this therapy. Also significant increase for GPx (enzyme with even more antioxidant potential than SOD. CAT was increased, correlated also with SOD. CAT/SOD ratio and GPx/SOD were also calculated. MAD as a biochemical marker of peroxidation and free radical presence had increased values than control group, and after oxygen exposure ceased, MAD has a moderate decrease (15%).

CONCLUSION. Most used therapy in neonatal resuscitation is oxygen, but in NICU this therapy can have important risks with proved molecular substrat by dosing the antioxidant defense capacity (increased concentration of oxygen reactive species), in correlation with clinical outcome and development of sequels like BPD and ROP that put the patient at vital risks.

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CONTROLED LUMBAR DRAINAGE IN PEDIATRIC HEAD INJURY

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INTRODUCTION. In Traumatic Brain Injury (TBI) elevation of intracranial pressure (ICP) remains a critical problem. The poor prognosis in survivors with sustained elevation of ICP has been well documented.

METHODS. We report the use of external lumbar drainage in control of elevated ICP in 3 children with TBI. All patients presented with GCS between 4-8/15 after resuscitation. Imaging studies revealed traumatic subarachnoid haemorrhage and in one case intraventricular haemorrhage. They were conservatively treated initially, and within 72 hrs of admission all three developed high intracranial pressure, refractory to maximal medical therapy, including hyperventilation, mannitol, hyperosmotic agents, and barbiturate coma.

RESULTS. Since no space occupying lesion was present and no diffuse oedema was apparent, lumbar drainage was instituted, which controlled the pressure welL - the ICP varying passively with the level of the bag. No signs of herniation were present in any of the patients. All patients made an excellent recovery.

CONCLUSION. Since similar reports exist in the literature, we conclude that controlled external lumbar drainage is a safe alternative useful modality for treatment of ICP elevation after head injury in the paediatric population, when no focal mass lesion is present. This is probably due to rise in ICP because of CSF circulation being hindered by the presence of blood in the basal cisterns.

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PSYCHOLOGICAL FOLLOW-UP RESEARCH IN THE PEDIATRIC INTENSIVE CARE

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INTRODUCTION. Admission to a Pediatric Intensive Care Unit (PICU) is a stressful event associated with both psychological and physical long-term consequences. Posttraumatic Stress Disorder (PTSD) has been frequently mentioned a psychological consequence. The purpose of this study was to examine the prevalence of PTSD in families after an acute PICU admission and to determine the contribution of different medical risk factors to the development of PTSD.

METHODS. From December 2002 through October 2005 we did follow-up research in the Emma's children's hospital, Amsterdam. Families filled out PTSD questionnaires three months after discharge. A total of 143 families participated in this study with 27 children older than 8 years, 140 mothers and 107 fathers.

RESULTS. Data-analysis showed that in total 9 (33.3%) of the 27 children had scores in the clinical range (scores ^{3} 38) meaning further treatment is indicated. From these 9 children 3 (11.1%) met the criteria for severe PTSD (scores ^{3} 47). For parents, the complete triad of PTSD clusters could be diagnosed in 15.0% (n = 21) of the mothers and 9.3% (n = 10) of the fathers. In 6 families PTSD was diagnosed in both parents. Furthermore the analysis showed no associations between the PTSD scores in families and the medical risk factors.

CONCLUSION. An unexpected admission to a PICU is a stressful event associated with a heightened risk for developing PTSD in families. These results underline the importance of systematic psychological follow-up research in the PICU. Further research is necessary to identify risk factors for PTSD in families.

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EFFECTS OF MECHANICAL VENTILATION ON ANP SECRETION FOLLOWING PAEDIATRIC CARDIOPULMONARY BYPASS

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INTRODUCTION. Mechanical ventilation induces alterations on renal function that result in both low natriuresis and urinary output secondary to low ANP secretion in response to atrial distension.
The objectives of this study were to evaluate if intermittent positive airway pressure transmitted to mediastinal structures may cause changes in atrial distension and ANP secretion. To study if airway pressure transmitted to mediastinum is modified by lung compliance.

METHODS. Prospective study on 32 children with congenital cardiac disease receiving mechanical ventilation after cardiopulmonary bypass. ANP plasmatic levels and airway and mediastinic pressures were recorded after successive one hour periods of SIMV with 10 cm H2O PEEP, SIMV with 12 cm H2O pressure support and finally with spontaneous ventilation. Patients were divided into two groups according to their lung compliance (> or< 0.04 ml/cm2 H2O). Transmural pressure was calculated as the difference between mediastinic and atrial pressure.

RESULTS. Statistic significative differences were found in ANP levels during successive periods of ventilation. ANP plasmatic levels showed positive correlation with transmural pressure and negative with mediastinic pressure.

CONCLUSION. The positive airway pressure transmitted to mediastinum caused decreased ANP levels. Those patients with lower lung compliance showed less increase in mediastinic pressure and secondarily less alteration in ANP levels.

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USEFULNESS OF MICRODIALYSIS IN LACTATES MONITORING IN SUBCUTANEOUS TISSUE OF CRITICALLY ILL NEWBORNS

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INTRODUCTION. Monitoring of serum lactates concentrations is a well-established method of evaluation in critically ill newborns, suffering from SIRS (severe inflammatory response syndrome) and severe sepsis. Microdialysis is a potential, method of lactates measuring in subcutaneous (SC) tissue, less invasive than repeated blood sampling. The aim of the study was to compare lactates concentrations in blood and in subcutaneous tissue.

METHODS. 25 newborns with recognized SIRS and severe infections were enrolled into the study. The routine clinical protocol included blood sampling for blood gases, glucose and lactates analyses every three hours during the critical, clinically instable period. Microdialysis catheter was inserted in SC tissue of the upper leg as soon as the SIRS was recognized, and sampling of extracellular fluid was performed every hour followed by measurement in ISCUS Analyser.

RESULTS. Serum lactates concentrations varied in a wide range (0.77 – 27.5 mmol/l), with mean values in three hours intervals varied from 2.56 to 3.79 mmol/l. Lactates assessments in SC tissue varied from 0.5 to 25.0 mmol/l, the mean values of lactates concentrations in SC tissue were higher than in the blood for 0.81 in average. In all analysed time points there were strong, statistically significant, positive correlations between values of lactates in SC extracellular fluid and blood (correlation coefficient 0.51-0.72).

CONCLUSION. 1. Microdialysis technique is efficient for monitoring of lactates concentrations in severely ill neonates and as a less invasive method may replace blood sampling.
2. Higher subcutaneous lactates in comparison to blood levels should be expected in monitoring of this group of patients.

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CLINICAL EFFECTIVENESS OF AMBROXOL IN PREVENTION OF SEVERE LUNG INJURY IN VERY PRETERM INFANTS

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INTRODUCTION. Ambroxol has been shown to exhibit antioxidant and anti-inflammatory properties that could be important in prevention of severe lung injury in preterm newborns. In a randomised clinical study we evaluated the effectiveness of ambroxol administration in very low birth weight infants with RDS treated with conventional mechanical ventilation.

METHODS. Ambroxol was administered for 5 days (30 mg/kg/day) to 25 newborns with confirmed diagnosis of respiratory distress-syndrome (RDS). The treatment protocol of 25 infants with RDS from the control group included only standard methods. The mean (SD) birth weight and gestational age were 1324.41 (250.42) g versus 1340.87 (422.81) g ($p>0.05$) and 30.18 (2.51) wks versus 30.00 (2.32) wks ($p>0.05$), respectively in the infants of treatment and control groups. The severity of lung injury was estimated based on effectiveness of oxygenation and ventilation.

RESULTS. The groups of newborns did not differ in terms of prevalence of perinatal risk factors, initial RDS severity, and the methods of respiratory support. Exogenous surfactant was not used in any case. The clinical course of RDS in the newborns who were treated with ambroxol differed on more rapid achievement of optimal oxygenation and ventilation values. 18 (71%) newborns treated with ambroxol survived versus 7 (26%) infants in the control group ($p<0.05$). In the treatment group there were no cases of pulmonary haemorrhage as compared with 11 (43%) cases in the control group ($p<0.01$), persistent pulmonary hypertension as compared with 8 (30%) cases ($p<0.05$), and patent ductus arteriosus in comparison with 3 (13%) cases in the control group ($p>0.05$). The incidence of bronchopulmonary dysplasia was about 4 times less comparing with the control group (6% versus 26%; $p>0.05$). The incidences of pneumothorax and intraventricular haemorrhage were similar in the both groups. Administration of ambroxol facilitated extubation of larger number of newborns (67% versus 45%; $p>0.05$). Among survived infants the total duration of respiratory support was significantly shorter in neonates treated with ambroxol - 127.9 (42.24) hrs versus 257.02 (98.23) hrs ($p<0.05$).

CONCLUSION. Use of ambroxol in the treatment of preterm newborns with RDS in the absence of exogenous surfactant may reduce the severity of lung injury and allows achieving reliably better clinical outcomes.

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HOW INTENSIVE IS INTENSIVE CARE IN CASES OF ACUTE POISONING IN CHILDREN?

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INTRODUCTION. Incidents of acute poisoning in paediatric population is on the increase. The aim of our study was to establish the requirements for intensive therapy procedures in acute poisoning cases in children and frequency of admissions to intensive care unit (ICU).

METHODS. The study was performed in Lower Silesian Paediatric Centre in Wroclaw, Poland, in years 2000-2003. We analyzed all cases of acute poisoning admissions with respect to exposure, type of poison, severity of symptoms and poisoning management.

RESULTS. We analyzed 799 cases of paediatric poisoning admissions. Out of the total number of admissions for poisoning 47 patients (5.9%) required intensive treatment. The main reasons for admission to ICU were loss of consciousness and need for mechanical ventilation. Toxic agents involved in ICU treated cases were drugs (57.4%), carbon monoxide (10.6%), toxic plants (6.4%), household chemicals (4.3%), alcohol (4.3%). Toxic agent was not established in 17% of ICU admissions. Poisoning Severity Score on admission to ICU was PSS=2 (27.6%) and PSS=3 (70.2%). 18 patients (38.3%) required endotracheal intubation and mean intubation time was 7.9 h ($\pm$ 6.92 h). Mean duration of mechanical ventilation was 5.5 h ($\pm$ 4.7 h). ICU treatment was shorter than 24 hours in 39 patients (83%). Out of this number 25 patients (53%) did not present any signs of poisoning, 16 patients (34.1%) presented mild and 2 patients (4.3%) moderate symptoms after 24 hours of hospitalisation. After 24 hours of ICU treatment severe symptoms of poisoning were observed in 2 (4.3%) patients. We reported 2 deaths (4.3%) in first 24 hours after admission. Intensive treatment for longer than 24 hours was necessary in 8 patients (1% of poisoning cases, 17% treated in ICU). Next 2 patients, who presented severe symptoms after 24 hours of stay in ICU, died eventually due to multiorgan failure. Mean ICU length of stay was 1.95 day ($\pm$ 0.59), and hospitalization lasted 4.40 days ($\pm$ 1.79).

CONCLUSION. Most poisoning cases in children can be safely and efficiently managed without need for long term intensive care. Less than 6% of our patients required specialized monitoring and management in intensive therapy setting. Only 1% was treated in ICU for longer than 24 hours. Development of well equipped emergency departments with staff trained in intensive care can reduce the number of ICU admissions and cut off the costs of hospital treatment of acute poisonings in children.