PREVALENCE OF SEVERE HYPOXEMIA IN THE GENERAL ICU SLEEPING EFFICACY OF TWO TREATMENT STRATEGIES

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INTRODUCTION. Severe hypoxemia is a frequent finding in the ICU. Hypoxemia may be multifactorial, involving respiratory and hemodynamic factors. Different ventilatory techniques or changing position have been proposed for its treatment. We managed severe hypoxemia using two lung recruitment strategies, according to a multimodal approach of the underlying pathophysiology.

METHODS. We recorded the prevalence of severe hypoxemia (PaO2/FiO2 ratio <200) in one hundred consecutive admissions. Each patient with severe hypoxemia was allocated to one of two lung recruitment groups according to the auscultatory, chest x-ray, Thoracic Echo (TE) and Cardiac Echo (CE) findings. Patients with hemodynamic instability had cardiac output optimization according to their CE findings. Patients with bilateral lung findings were allocated to the ventilatory recruitment group (VRG). Patients with unilateral lung findings were allocated to the changing position group (CPG). In the VRG we progressively increase plateau pressure and PEEP in the pressure control mode up to a level of 35 cmH2O without exceeding a tidal volume of 12ml/kg. In the CPG we turn the patient in the lateral decubitus position with the normal lung down without changing the ventilatory settings. Patients non-improving their hypoxemia were shifted from their initial group to the other. t-test and Fisher exact test were used for statistical analysis.

RESULTS. One hundred patients (68M, 32F) with a mean age 66±9 and an APACHE score of 17±6 were included in the study. Among these patients, 31 were hypoxic on admission and 14 developed hypoxemia during their hospitalization after a mean time of 3 days. 28 were allocated to the VRG and 16 to the CPG. Mean PaO2/FiO2 ratio increased from 193±248 to 252±144 mmHg in the VRG and from 155±233 to 254±221 mmHg in the CPG (p=0.011). No statistical difference was found in the extent of hypoxemia improvement between groups, but tidal volume was significantly higher in the VRG 91±666 ml vs 67±160 ml and plateau pressure was lower in the CPG 22±5 cmH2O vs 29±8 cmH2O. Six patients were non-responders in the VRG and 2 in the CPG. None of them became responder when shifted to the other group.

CONCLUSION. When dealing with severe hypoxemia a multimodal approach should be considered to treat hypoxemia, which should be as efficient as ventilatory recruitment with the advantage of lower intratracheal pressures.

EFFICACY OF TWO TREATMENT STRATEGIES

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INTRODUCTION. To study effectiveness of the prone position for the patients with ARDS on CMV and determine its optimal application algorithm.

METHODS. The study included 58 adult patients (38 males, 20 females, average age 42 years), having ARDS for different reasons. The patients were randomized in two groups. Since the first day on respirator some patient were treated using prone position (group A, n=29), the others using traditional volume controlled CMV in accordance to safe CMV concept (group B, n=30). All patients had the same starting level of general severity and lung injury, and were on the same standard intensive care protocol. We compared changes of pulmonary gas exchange, pulmonary biomechanics, severity of lung injury, long stay on CMV and mortality between patients in group A and group B. Statistical analysis was performed using the Student’s-t test, data are given as mean, 95% confidence interval.

RESULTS. In group A, after patient 2 hours in prone position we get evident (in compare with starting data) increase of blood oxygenation and decrease of PaCO2 (p<0.005). Maximal gas exchange improvement took place over 4 hours CMV in prone position. Over 3-6 hours in prone position we watched decrease of blood oxygenation and increase of PaCO2. After turn back in initial supine position gas exchange worsening (decrease of blood oxygenation and increase of PaCO2) resumed over 5 hours. Group A patients since 6 study day had evidently higher average PaO2/FiO2 and compliance levels then those in group B; airway pressure and minute volume required for normocapnia maintenance and severity of lung injury (assessed by Murray scale) were evidently lower, then those in group B (p<0.005). Long stay on respiratory support in group A was evidently shorter (140 hours in average) then in B. No evident mortality differences has been discovered.

CONCLUSION. Patients with ARDS on CMV having maximal pulmonary gas exchange improvement after 4 hours stay in prone position. After 5 hours since turn back in supine position pulmonary gas exchange worsening resume. Patient with ARDS on CMV turned from supine to prone and vice versa every 4-5 hours during all respiratory support period having better pulmonary gas exchange and shorter respiratory support time required. In spite of some technical difficulties, prone position with CMV is ready available, clinically tested and not expensive technique for pulmonary gas exchange improvement in ARDS patients.
OPTIMIZING MONITORING IN NON CONVENTIONAL MECHANICAL VENTILATION IN ACUTE LUNG INJURY

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INTRODUCTION. Mechanical ventilation (NCMV) using extra-trachéal continuous gas insufflation (ETCGI) has been used for patients with ALI. The purpose of this study was to determine the best monitoring technique for patients undergoing ETCGI.

METHODS. Patients with ALI receiving volume (VCV) and pressure controlled ventilation (PCV) on high levels of PEEP and FiO2 100% were eligible. PEEP was reduced to 0.61±1.5 and ETCGI was applied using 3 different flow levels. Patients were kept PCV. Intratracheal pressures were measured using an intratracheal catheter located 6 cm beyond the gas flow and were compared with the ventilator-measured pressures.

RESULTS. 21 patients were studied (Mean APACHE II 21.6±3.45). 62% were males. Mean age 58±17.8 yrs. Baseline mean lung injury score (Liwsa) 3.45. Mean PaO2/FiO2 ratio was 75.36±15.1 torr; mean Pco2 52.31±10.18 torr. Calculated compliance was 19.47±4.62 mL/cm H2O. 6.28 samples/p.t.

Flow/difference between ventilator readouts and tracheal readouts

| ETCGI Flow (l/min) | Insp. Pressure (cm H2O) | Trach. Pressure (cm H2O) | p value | Difference % |
|-------------------|-------------------------|--------------------------|---------|--------------|
| 5                 | 36±1.82                 | 34±1.06                  | NS      | 5.2          |
| 10                | 36.6±2.05               | 34±1.67                  | NS      | 5            |
| 12                | 37±2.08                 | 35±1.83                  | NS      | 4.8          |

Ventilation and oxygenation parameters

| PCV or VCV | TGI (mmHg) | p value | PCV or VCV | TGI (mmHg) | p value | ETCO2 | p value |
|------------|------------|---------|------------|------------|---------|-------|---------|
| PaO2       | 75.36±15.1 | <0.001  | 113.57±15.25 | <0.001    | 4.99±0.68 | <0.001 |
| pCO2       | 52.31±10.18| <0.01   | 43.57±6.56  | <0.01     | 4.8±0.08  | <0.001 |

CONCLUSION. Monitoring of patients undergoing ETCGI correlated well among different measuring techniques. In addition, in our study population, the use of ETCGI improved oxygenation and ventilation parameters in patients with ALI.

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SDRA VENTILATED WITH PROTOCOL SDRANET AND TRACHEAL GAS INSUFFLATION (TGI)

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INTRODUCTION. To quantify the reduction of the space dead (Vd/Vt) and the control of the respiratory acidosis on having applied TGI during the phase inspiratory in patients diagnosed of SDRA ventilated with strategy of pulmonary protection (SDRANet).

METHODS. Ther are included in the study 8 patients, diagnosed of SDRA with respiratory acidosis on having limited the volume tidal to support the pressure plateau (Ppl) around 30±2 cm H2O in spite of the increase of the respiratory frequency. Ther had to present the six hours before the beginning of the study stability haemodynamic, without dysfunction of the left ventricle, without hypotension with adequate response to vasoactive drugs.

RESULTS. Were included 8 patients, 7 male, average age 59 years. The APACHE II middle 25 and the Score Murray middle 3. They all present a reduction PPl/FiO2 <100. To haemodynamic level there are no big changes in needs of fluid not vasoactive drugs. The average of the obtained results were (see table 1)

| TGI flow | baseline | 3 lpm | 6 lpm | 9 lpm |
|----------|----------|-------|-------|-------|
| CO (l/m) | 7.5±1.777| 6.92±1.46| 6.76±1.35| 6.54±1.53|
| TAM (mmHg)| 76±11.9 | 80.2±6.67| 82.5±5.43| 77±5.589|
| Vd/Vt (%)| 71±9    | 65.5±6.7| 62±8   | 55.2±8 |
| PCO2 (mmHg) | 75±7.61 | 65.6±3.96| 58.5±4.04| 46.8±3.36|
| pH | 7.20±0.08| 7.26±0.06| 7.32±0.08| 7.35±0.08|

CONCLUSION. Our study demonstrated a progressive decrease of the Vd/Vt and the normalization of the ph and pCO2 in direct relation with the TGI flows used maintaining a PPl<30cmH2O.

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Grant acknowledgement: Partially Supported by Red-GIRI G03/063. Instituto de Salud Carlos II - Ministerio de Sanidad

PULMONARY AND EXTRAPULMONARY ARDS INFLUENCE ON SURVIVORS RECOVERY AND QUALITY OF LIFE

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INTRODUCTION. There is little information about the potential influence of the ARDS origin on functional recovery and quality of life in survivors after distress.

METHODS. ARDS-survivors prospective analysis 6 months after distress. We performed thoracic CT-scan and pulmonary function test. Simultaneously, we measured the quality of life (HRQOL) with the Nottingham Health Profile (1). The questionnaire evaluates 6 dimensions: energy, pain, emotional reaction, sleep, social privacy and physical mobility. We also calculated the global HRQL. We used the Wilcoxon and Mann-Whitney tests. Values are presented as mean ± SEM.

RESULTS. N=35 (1998-2000). The 92% of the total: 48±14 yrs, 51% F; APACHE II 20±1; LIS 2±9±0.07; ventilation length 25±2 d. 62% were intra-pulmonary (IP) and 38% extra-pulmonary (EP). Comparing subgroups, the population was similar in age, LIS, days of hypoxemia, ventilation and ICU. Nevertheless IP ARDS presented organ failure (MOF) in 45% vs 85% in EP group (p=0.03). In all studied patients, we found a moderate-severe restrictive pattern in the PFT after the first month that conditioned a decrease in the exercise capacity, improving 6 m later in a mild to moderate restriction. The radiological findings with the CT-scan were important reticular morphological sequelae, as well as small airway alt. and ground glass opacif. after the 1st m. that also improved with time. In the analysed subgroups, although there was a difference in MOF %, we did not detect any other differences between both groups. Nevertheless, in relation with HRQL, patients with an extrapulmonary ARDS presented at short-term a poor general quality of life (49 vs 33), that improved with time in both subgroups (28 vs 23), but still presenting differences with the reference population (general value=15).

CONCLUSION. In summary, ARDS survivors present the same morpho-functional characteristics and poor general quality of life 6 months after distress, with no differences depending on the direct or indirect etiology of the lung injury.

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GRANT ACKNOWLEDGEMENT: Partially Supported by Red-GIRI G03/063. Instituto de Salud Carlos II - Ministerio de Sanidad

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IN ARDS, CO2 ELIMINATION DEPENDS ON TIME FOR DISTRIBUTION OF INSPIRED GAS

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INTRODUCTION. Inspired gas is transported to the alveolar zone, where distribution by diffusion requires time. Mean distribution time (MDT), the available time for that, depends on insufflation time, post-inspiratory pause (PIP) and the ratio tidal volume to airway dead space (VDaw). In pigs, a short MDT increases VDaw and decreases CO2 elimination. We studied how MDT affects VdCO2 and CO2 elimination in patients with ARDS.

METHODS. Under volume controlled ventilation, 6 patients with ARDS were studied, 4 of them at two levels of PEEP. Flow and CO2 signals from a ServoVentilator 900 with a CO2 Analyzer 930 were recorded. By varying PIP, MDT was changed, for one breath at a time so as not to change the physiological status. VDaw and MDT were calculated (1). During following expiration, expired volume of CO2 (VECO2) was determined.

RESULTS. A long PIP led to increased VECO2 and decreased VDaw as closely described by the logarithmic equations VECO2=7.4±0.96MDT and VDaw=233.24±84MDT. Compared to a MDT of 0.5 s, VECO2 increased by 6% and fell by 12% when MDT was 0.8 and 0.2 s, respectively. Changes VECO2 in reflected opposite changes in VDaw.

CONCLUSION. The logarithmic relationship between VECO2 and MDT implies that gas exchange may be critically disturbed at MDT values <0.2 s that occurs at high respiratory rates if PIP is not used.

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GRANT ACKNOWLEDGEMENT: INSERM U492 and Swedish Research Council 02872
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A PROSPECTIVE, OBSERVATIONAL STUDY OF ARDS IN A CORPORA T OF PATIENTS IN SCOTTISH INTENSIVE CARE UNITS
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INTRODUCTION. The Scottish Intensive Care Society assessed the incidence of ARDS in its adult ICU population, as well as the treatment regimens and mortality.

METHODS. All patients meeting the American European Consensus Conference diagnostic criteria were identified using our national ICU audit data collection software.

RESULTS. Basic epidemiological data have been reported elsewhere [1]. Respiratory data for the 369 patients are shown in Table 1. Nitric oxide was used in 1.7% of patients. 24.5% required renal replacement therapy. Vasoactive agents were used in 78.7% and a PA catheter sited in 52%. Pneumothoraces occurred in 10.1%, GL bleeds in 12.8%. 24 hours after diagnosis of ARDS, covariates associated with death were: FiO2 (Odds Ratio (OR) 1.83, p < 0.0001), PaO2 (OR 0.73 , P>0.0006), presence of a pulmonary artery catheter (OR 3.56, p < 0.0001), renal replacement therapy (OR 3.11, p < 0.0001) or use of isotropes (OR 2.56, p< 0.0001). PaCO2 was not associated with a different outcome (OR 1.0, p = 0.98). Interal feeding (OR 0.66, P<0.20) demonstrated a non-significant trend towards benefit.

Data for hospital survivors (S): non-survivors (NS).

| Mean Max Value | Mean Min Value | Mean MaxValue |
| SDS | S | NS | SDS | S | NS |
|---|---|---|---|---|---|
| Oxygenation Index | 37.2(3) | 103(88) | 139.7(3) | 227(335) | 75.2(9) | 153(87) |
| PaO2/FiO2 mmHg | 103(30): 82 (31) | 301(99): 179 (99) | 190(44): 124 (50) |
| PEEP cmH2O | 4.52(6): 7.6 (3.1) | 10.1(5.3): 10.7 (3.7) | 7.2(2.1): 8.8 (2.9) |
| Mean Airway Pressure cmH2O | 10.2(4.2): 15.5 (5.7) | 21.1(6.1): 23.8 (6.7) | 15.4(4.4): 19.6 (5.5) |
| Compliance mE cmH2O | 24(16): 22.0 (12.8) | 87(93): 46.5 (39.4) | 42(22): 30.7 (15.2) |
| Tidal Volume ml | 448(123): 519 (175) | 770(558): 743 (188) | 599(155): 630 (151) |

CONCLUSION. Variables reflecting respiratory function differ between survivors and non survivors. Oxygenation index appears to be the most useful discriminator. Patients required a high degree of heart organ support, and invasive cardiovascular monitoring was common.

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MULTIPLE INSPIRATORY-EXPIRATORY PELV LOOPS IN PATIENTS WITH ARDS
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INTRODUCTION. Multiple inspiratory expiratory pressure-volume (PelV) curves recorded from decremental PEEP levels illustrate de-recruitment and recruitment at low and high airway pressures, respectively. Bitzén et al. demonstrated in an ARDS model that an inspiratory-expiratory PelV loop recorded from zero PEEP (ZEEP) describe the envelope curve in which multiple inspiratory curves take place. One loop can indicate for HFOV as a rescue method during conventional ventilation (conv) failure. A group of 28 adults (14 ARDSp group P, 14 ARDSexp group E), average age 57 years (=19) and gender F/M=14/14, was involved. Initial HFOV parameters (SensorMedics 3100B) were: 6–8 Hz, Ti/T=0.5, initial continuous distension pressure CDP=conv. Pmean+0.5 kPa, FiO2 HFOV =FiO2 conv 0.5. Following LRM the aim of the prospective study was to evaluate effect of HFOV in therapy of pulmonary ARDS (ARDSp) and extrapulmonary ARDS (ARDSexp) in adults.

METHODS. Adults fulfilling ARDS criteria (PaO2/FiO2<200 Torr, X-ray, PCWP<18 Torr) were indicated for HFOV as a rescue method during conventional ventilation (conv) failure. A group of 28 adults (14 ARDSp group P, 14 ARDSexp group E), average age 57 years (=19) and gender F/M=14/14, was involved. Initial HFOV parameters (SensorMedics 3100B) were: 6–8 Hz, Ti/T=0.5, initial continuous distension pressure CDP=conv. Pmean+0.5 kPa, FiO2 HFOV =FiO2 conv 0.5. The hypothesis that extrapulmonary ARDS patients in comparison with pulmonary ARDS patients. Therefore HFOV is more efficient in ARDSexp. Suitable initial setting of CDP in comparison with Pmean during conventional ventilation is significantly higher in ARDSexp patients.

Grant acknowledgement: AstraZeneca

16th Annual Congress – Amsterdam, Netherlands – 5–8 October 2003
CONVENTIONAL VENTILATION AND HIGH FREQUENCY VENTILATION - UNDERSTANDING THE DIFFERENT EFFECTS

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INTRODUCTION. Conventional ventilation (CV) and high frequency ventilation (HFV) has different effects not well understood yet. Unpredictable differences can be observed in the clinical practice. The study tries to describe the different effects of both the ventilatory techniques using a mathematical model of lungs created according to the exact anatomical structure of the respiratory system.

METHODS. A mathematical model of the respiratory system has been developed as an electro-acoustic analogy of the respiratory system. All individual airways are represented by short acoustic wave-guides with parameters computed using published morphometry measurements [1]. Alveoli are represented by acoustic compositions computed from their dimensions and overall lung compliance. The final model employs 67 108 859 individual components. A special method has been developed so that such a complicated model could be used for simulations. Distribution of tidal volume VT and pressure amplitude DeltaP among generations of bronchial tree, total lung impedance and other variables are studied under various conditions by modelling.

RESULTS. Results of the modelling confirms the theoretical presumptions, that alveolar DeltaP is less than 10 % of proximal DeltaP during HFV, whereas both the amplitudes are approx. equal during CV. ARDS affects the alveolar DeltaP during HFV resulting in its increase several times, while the alveolar DeltaP during CV with ARDS is not significantly different from that in healthy condition. Changes of alveolar compliance have significant effect on total lung impedance (TLI) during CV while TLI changes during HFV are not essential. Contribution of airway resistance changes is significant mainly during HFV. TLI is essential parameter for efficiency of pressure controlled ventilatory modes. Distribution of VT among individual bronchial generations is more or less independent on ventilatory frequency and mechanical parameters of the respiratory system.

CONCLUSION. Modelling of the respiratory system according to its anatomical structure allows explanation of differences between CV and HFV observed in the clinical practice.

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Grant acknowledgement: Supported by grant MSMT CR No. VZ.304/98.21000012 and GA CR 505/00/651.

BEST-PEEP CHOICE GUIDED BY PA02/FIO2 (P/F) AFTER ALVEOLAR RECRUITMENT IN ARDS: A BEDSIDE MANEUVER

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INTRODUCTION. Ventilation with low tidal volumes and low distending pressures in ARDS is now standard of care but use of high PEEP and recruitment maneuvers is controversial. We propose to evaluate oxygenation, lung mechanics and morbidity in patients with ARDS submitted to recruiting maneuvers and high PEEP based on best oxygenation

METHODS. Prospective study at a tertiary hospital ICU from February to November 2002. Patients with acute respiratory failure in mechanical ventilation were submitted to a trial period of 20 min volume control ventilation (VCV) with SERVO 300 ventilator set tidal volume (VT)=5 ml/kg, PEEP 5 cm H2O and FIO2 0.80. Those who presented P/F<200 mmHg were submitted to alveolar recruitment with CPAP 40 cmH2O for 40 sec (CPAP40/40) and ventilated with VCV for 2 min. VT=5 ml/kg, PEEP 25 cm H2O, RR 15-20 bpm without autoPEEP on flow-time curve and FIO2 100%. Patients who did not achieve P/F>200 were recruited with CPAP50 cmH2O for 40 sec (CPAP40/40). Those who still failed were recruited with pressure control ventilation (PCV), plateau pressure(P) 60 cm H2O, PEEP 50 cm H2O, RR 50 bpm and I:E 1:1 - 1:5 for 60 sec (PCV=60/50). When P/F >300 mmHg we reduced PEEP by 2cmH2O with concomitant P/F determination every 2 min, searching for best P/F and corresponding Best PEEP. Finally, patients were set in PCV mode using Best PEEP. Recruitment success and rate of improvement on oxygenation and mechanics were analysed.

RESULTS. Twenty-eight patients (18 female) were enrolled-Ages from 26 to 85 years (mean 64.8) and mean APACHEII 16.7. Fifteen (53.5%) were identified as having primary ARDS and 8 had secondary ARDS. Twelve patients were recruited successfully with CPAP40/40, seven needed CPAP50/50 and 8 PCV60/60. In only 1 recruitment was unsuccessful. The maximum airway pressure for ventilation after recruitment averaged 35.4 cm H2O. The P/F rose significantly from a median of 137 before procedure to 323.5 twenty four hours later (p<0.05). Static compliance immediately after the procedure rose non-significantly (p=0.08) from median 43.6 to 44.2 measured 24 hours later. Neither time in ventilation before diagnosis of ARDS nor primary ARDS were related to the need for higher pressure for recruitment success. We recorded a mortality of 60.7%.

CONCLUSION. The use of recruitment maneuvers combined with use of high PEEP chosen based on best oxygenation was easily performed, with no serious complication and resulted in sustained improvement of P/F.

SHORT TERM EFFECT OF A LOW TIDAL VOLUME VENTILATION STRATEGY

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INTRODUCTION. To evaluate in ARDS/ALI patients, ventilated with a low tidal volume strategy according to the NIBI network trial protocol (1), the short term effects on end expiratory chest wall volume, respiratory mechanics and gas exchange.

METHODS. 6 ARDS/ALI sedated and paralyzed patients (4 primary ARDS, age 63±20 y, BMI 22.7±1.1 Kg/m2, PaO2/FIO2 214±71.6 mmHg) were studied for two hours. The chest wall volume was measured at the end expiration using the optoelectronic plethysmography technique (2). The static respiratory system (Cst, rs), chest wall (Cst, cw) and lung (Cst, L) compliance were computed using the rapid occlusion technique. The arterial blood gases, blood and central venous pressure were measured. All the measurements were performed at the beginning and at the end of the study.

RESULTS. In table the results are expressed as mean±SD

| Time | Cst (cmH2O/L) | Cst (cmH2O/L) |
|------|---------------|---------------|
| 0    | 27±5±2        | 39±6±5.2      |
| 120  | 27±3±5        | 33±7±10       |

CONCLUSION. These data suggest that during a short term low tidal volume ventilation strategy there is a reduction in respiratory and lung static compliance without any difference in arterial gas exchange.

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INFLAMMATORY EFFECTS OF CONVENTIONAL AND LOWER TIDAL VOLUME VENTILATION AFTER CARDIAC SURGERY

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INTRODUCTION. Ventilation with lower tidal volumes (VT) resulted in less pulmonary and systemic inflammation in acute lung injury [1-3], whereas no differences were seen in patients with healthy lungs [4]. We hypothesized that lower VT ventilation will diminish an inflammatory response to cardio-pulmonary bypass surgery, and that these effects are dependent on smoking history.

METHODS. 44 patients (22 smokers and 22 non-smokers) were randomly assigned to receive mechanical ventilation with either VT=12 ml/kg ideal body weight or VT=6 ml/kg ideal body weight for six hours immediately after elective cardio-pulmonary bypass surgery. Serum levels of TNF in BAL fluid were higher with higher VT compared to lower VT (50 ±111 pg/ml versus 1.7±10 pg/ml, p<0.01). Same trend was observed for IL-6 (987±1942 pg/ml versus 128±306 pg/ml, p=0.078), but not for IL-8. Ventilatory strategy did not modify serum mediators and no effect of smoking was observed. However, subgroup analysis of patients with TNF<50 pg/ml at Entry revealed a faster decrease in serum TNF with lower VT.

CONCLUSION. Smoking history did not affect mediator production. Mechanical ventilation with lower VT did not influence the systemic inflammatory response after cardio-pulmonary bypass surgery but resulted in lower pulmonary TNF levels. The finding that patients with elevated TNF levels at Entry showed a faster decrease in TNF plasma levels during lower VT mechanical ventilation supports the two-hit theory.

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Grant acknowledgement: BONFOR (O-117.0006), University of Bonn, and DFG (Uh 88/4-1), Bonn, Germany
308 VENTILATORY STRATEGY IN ACUTE BRAIN INJURED PATIENTS WITH AND WITHOUT ACUTE LUNGE INJURY

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INTRODUCTION. Acute lung injury (ALI) in brain injured patients occurs in 15%, but impairment of respiratory mechanics and radiological features in brain injured patients was not verified. In a prospective multicenter observational study we reported radiological features and compared respiratory mechanics and ventilatory strategy in acute brain injured patients with and without ALI.

METHODS. Glasgow Coma Score (GCS), respiratory mechanics, gas exchange, ventilatory pattern and hemodynamic profile were recorded daily and compared between patients with severe brain injury (GCS<8) with and without ALI in the day with the worst PaO2/FiO2. Chest X ray and lung CT scan (when available) were obtained in patients with ALI.

RESULTS. Among 83 patients enrolled, ALI occurred in 23% of a total of 83 patients after 4±2 days from admission. Age, gender, GCS and PaCO2 were similar in the 2 groups. Lung Injury Score was 13±10.5. Chest X ray score (N quadrant) was 2.3±2.8. The lung CT scan showed only the presence of consolidation in the most dependent lung. Vi±tidal volume; PBW=predicted body weight, PEEP=positive end expiratory pressure. Mean±SD *Unpaired t test; †Fisher exact test

No ALI (n=64) ALI (n=19) P value

Vi/PBW (ml/kg) 7.8±3 11±1 n.s.

PEEP (cmH2O) 4±3 5±4 n.s.

Cstrs (ml/cmH2O) 49±12 47±11 n.s.

PaO2/FiO2 282±84 177±77* <0.0001

Nasal no drugs (min) 36/28 1306* n.s.

CONCLUSION. Patients with severe hypoxemia and bilateral infiltrates on the chest X ray had no reduction in Cstrs and showed only consolidation in the dependent zones on CT scan. Ventilatory and hemodynamic strategies were not different between the 2 groups. This suggest that severe hypoxemia in brain injured patients recognizes pathophysiological features different from those observed in non-brain injured patients with ALI.

Grant acknowledgement: On behalf of Brain IT group supported by the EEC grant QLCT-2002-00116.

309 SIMPLE FRC MONITORING WITH SMALL CHANGE OF FIO2

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INTRODUCTION. In ALI patients opening up and keeping the lungs open are of great importance. However, there is no simple clinical method available for monitoring FRC. We have developed a modified nitrogen washout/in method for FRC. This is based on clinical standard monitors and a change in FIO2 of 10-30% units. We have evaluated this technique in a lung model showing high precision independent of magnitude of change in FIO2. The aim of the present study was to evaluate this method in ventilated patients aiming at minimal FIO2 change.

METHODS. Eleven ventilator patients were studied during steady state conditions. Fin2 and FetCO2 were calculated as 1-FiO2 and 1-Feto2-FetCO2, respectively. Gas and spirometry measurements were made before (T0), 110 and 200 min after injury.

RESULTS. Measurements of FRC were reproducible as indicated by a coefficient of variation as low as 4, 4 and 3% during washout when FIO2 was increased with 10, 20 and 30% units. Corresponding values during washin were 4, 3 and 5% respectively. Values for FRC in the 11 patients obtained after a 10% units change in FIO2 was similar to those obtained using a 30% units change in FIO2, bias ±1% and precision ±7%.

CONCLUSION. This study uses end-tidal concentrations for calculation of FRC with an N2-washout/in method with standard monitoring equipment. A change in FIO2 of 10% is sufficient to obtain reproducible and accurate values of FRC. The measurement procedure is short (~4 min) and can be performed either as a washout or washin procedure. High FIO2 is therefore no obstacle for FRC measurement in ICU patients.

310 INSPIRATORY FLOW RATE PROMOTES VENTILATOR INDUCED LUNG INJURY IN A REABSORPTION ATELECTASIS MODEL

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INTRODUCTION. The relative contribution of inspiratory flow rate on the development of ventilator induced lung injury (VIDI) is unknown. Our hypothesis was that decelerated flow (DF) with a higher inspiratory flow rate contributes to VILI.

METHODS. Twelve rabbits were ventilated in volume controlled mode (tidal volume) 10 ml/kg, positive-end-expiratory pressure 0 cmH2O, respiratory rate to obtain normocapnia and inspired oxygen fraction (FO2) 0.4 for 3 hours. After 60 minutes ventilated with FO2 of 1 to induce reabsorption atelectasis, animals were randomized to constant (CF) or DF group (pressure controlled mode with peak pressure to maintain previous VT) for 3 hours. Gas exchange and lung mechanics were assessed at baseline, after reabsorption atelectasis induction, and 1 and 3 hours after. Groups were compared with ANOVA for repeated measures.

RESULTS. Data are expressed as mean ± SD.

| Variable | CF | CF 1h | CF 3h | DF | DF 1h | DF 3h |
|----------|----|-------|-------|----|-------|-------|
| PaO2/mmHg | 420.7 ± 55.5 | 422.5 ± 48.0 | 421.4 ± 41.2 | 394 ± 31.7 | 346.3 ± 35.6 | 300.1 ± 72.0 |
| PaCO2/mmHg | 40 ± 2.9 | 40.9 ± 4.3 | 42.6 ± 6.9 | 37.9 ± 2.2 | 43.0 ± 5.5 | 51.3 ± 6.4 |
| VT/mmHg | 11.7 ± 0.8 | 11.9 ± 0.8 | 11.8 ± 0.8 | 10.9 ± 0.5 | 9.5 ± 0.8 | 8.4 ± 1.0 |
| Crs (cmH2O/L) | 2.6 ± 0.1 | 2.7 ± 0.1 | 2.5 ± 0.2 | 2.3 ± 0.3 | 2.4 ± 0.2 | 2.1 ± 0.3 |

CONCLUSION. Under these experimental conditions DF impaired gas exchange and lung mechanics suggesting that DF may contribute to VILI inducing lung collapse.

Grant acknowledgement: Funded by: FIS PI 021820, FIS 01F015, FIS 99/3091, Lilly 2002 grant and Fundación Parc Taulí

311 ASSESSMENT OF EXPIRATORY FLOW LIMITATION IN EXPERIMENTAL ACUTE LUNGE INJURY

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INTRODUCTION. Tidal expiratory flow limitation (FL) was reported in ARDS patients (1). The aim of the present study was to verify whether FL can also be observed in experimental acute lung injury.

METHODS. Eight anesthetised female pigs (35-38 kg) were mechanically ventilated in supine position. Their lungs were injured by either oleic acid (OA) injection (n=4) or tracheal instillation of saline (SL) (n=4) to obtain PaO2=100 mmHg under FO2 of 1. The tidal FL was assessed using NEP test (2). Lung (L) and chest wall (w) mechanical properties were partitioned using rapid airway occlusion technique and oesophageal pressure. Interrupter (Rint) and tissue (DeltaR) resistance, and static elastance (Est) were computed from standard formula. Measurements were made before (T0), 110 and 200 min after injury.

RESULTS. There was no tidal FL in any animal at any time during the investigation. The increase in resistance was mostly due to DeltaR (table 1). The Estw/EstL ratio was less than 1 at T0 and further decreased after injury, specially in the SL model.

| Variable | P<0.05 | T0 AO | T0 SL | T10 AO | T10 SL | T20 AO | T20 SL |
|----------|--------|-------|-------|-------|-------|-------|-------|
| RintL (cmH2O/Ls) | 13.6±3 | 5±1 | 22±7 | 6±1 | 27±8 | 7±3 |
| DeltaRL (cmH2O/Ls) | 4±6 | 3±1 | 15±3* | 20±2 | 15±2* | 22±2 |
| EstL (cmH2O/Ls) | 20±2 | 18±3 | 42±1* | 47±4* | 44±3* | 55±4* |
| Estw/EstL | 33±8 | 39±8 | 23±3 | 17±3* | 25±4 | 19±3* |

CONCLUSION. There was no tidal FL in our experimental conditions. Absence of tidal FL could be explained by chest wall mechanical properties. At low lung volume, low Estw and EstL ratio should maintain small airways patency.

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INTRODUCTION. The goal of this study was to verify whether tidal expiratory flow limitation (FL) was present during acute bronchocclusion induced by metacholine (MCH) challenge in pigs.

METHODS. In 6 female pigs (35-38 kgs) anaesthetised, tracheostomised and mechanically ventilated, acute bronchoconstriction was induced by subcutaneous nebulisation of MCH (FDC 88, Mediprom, Paris, France). The objective was maximal inspiratory pressure (Pmax) of 40 cm H2O. Once this achieved, the nebulisation was stopped and measurements of tidal FL using the NEP test (1) and respiratory mechanics using rapid airway occlusion technique were performed including: total positive end-expiratory pressure (PEEP), interrupter (Rint) and tissue (DeltaR) resistance and static elastance (Est). The measurements were done before MCH (T0) and at time of target-pressure (T1). Values are mean±SEM.

RESULTS. Before MCH, tidal FL was not detected in all the animals. At T1, FL was present in 4 pigs (table 1) over 40±20% of the tidal volume.

CONCLUSION. MCH challenge in pigs is associated with tidal FL in most of the cases. FL is associated with a more intense bronchoconstriction.

REFERENCE(S). 1- Am J Respir Crit Care Med 1994;150:1311-1317.

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ASESSMENT OF EXPIRATORY FLOW LIMITATION IN METACHOLINE CHALLENGE IN PIGS

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INTRODUCTION. In total 100 paired IAP and Cdyn measurements were performed in 4 body positions look at the effects of body position on IAP and dynamic compliance (Cdyn). Should be the same regardless of body position since fluid is not compressible. This study will assess the acute increase in IAP.

METHODS. In 6 female pigs (35-38 kgs) anaesthetised, tracheostomised and mechanically ventilated, acute bronchoconstriction was induced by subcutaneous nebulisation of MCH (FDC 88, Mediprom, Paris, France). The objective was maximal inspiratory pressure (Pmax) of 40 cm H2O. Once this achieved, the nebulisation was stopped and measurements of tidal FL using the NEP test (1) and respiratory mechanics using rapid airway occlusion technique were performed including: total positive end-expiratory pressure (PEEP), interrupter (Rint) and tissue (DeltaR) resistance and static elastance (Est). The measurements were done before MCH (T0) and at time of target-pressure (T1). Values are mean±SEM.

RESULTS. Before MCH, tidal FL was not detected in all the animals. At T1, FL was present in 4 pigs (table 1) over 40±20% of the tidal volume.

CONCLUSION. Putting a patient in different body positions has significant effects on IAP. This is in contradiction with the hypothesis that the abdominal compartment is fluid in character, since IAP would then remain constant. Assessment of IAP should therefore be done in the complete supine position. The supine position significantly increases IAP, and lowers Cdyn compared to the supine. The effects on IAP are more pronounced in obese patients and the effects on Cdyn more in the non-obese. Putting a patient upright may deteriorate respiratory function, caused by the acute increase in IAP.

REFERENCE(S). 1- Am J Respir Crit Care Med 1994;150:1311-1317.

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EFFECT OF BODY POSITION ON INTRA-ABDOMINAL PRESSURE AND RESPIRATORY COMPLIANCE

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INTRODUCTION. Intra-abdominal pressure (IAP) is an important parameter. The abdomen follows the law of Pascal since it is considered primarily fluid in character. If this is true IAP should be the same regardless of body position since fluid is not compressible. This study will look at the effects of body position on IAP and dynamic compliance (Cdyn).

METHODS. In total 100 paired IAP and Cdyn measurements were performed in 4 body positions (supine, anti-trendelenburg, trendelenburg and upright) in 22 ventilated ICU patients. The Cdyn (ml/cmH2O) was calculated by the following formula: Cdyn=(tidal volume)/(plateau pressure - PEEP). The M/F ratio was 1/1, BMI 25.8±5.3, age 41±1* 9±1 40±8* 33±2 100±15 35±2 46±5

RESULTS. Before MCH, tidal FL was not detected in all the animals. At T1, FL was present in 4 pigs (table 1) over 40±20% of the tidal volume.

CONCLUSION. MCH challenge in pigs is associated with tidal FL in most of the cases. FL is associated with a more intense bronchoconstriction.
316 RESPIRATORY MONITORING DURING PRESSURE CONTROLLED VENTILATION (PCV)
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INTRODUCTION. Pressure Controlled Ventilation (PCV) allows a better patient-ventilator interaction compared to Assisted Control ventilation (ACV), since patients can increase both the respiratory rate (f) and the tidal volume (VT), whilst during ACV only f is. It is difficult to have reliable data of respiratory mechanics during PCV since the decelerating flow makes almost impossible to monitor respiratory function. This problem could be circumvented by the Least Squares Fitting Method (LSFM), which determines respiratory mechanics without the need for constant inspiratory flow, end-inspiratory and end-expiratory occlusion (1). The only concern regards the presence of expiratory flow limitation (EFL), which implies that data must be calculated during inspiration. Our aim was to demonstrate that the LSFM gives reliable data in PCV. Hence data obtained both in ACV and PCV were compared with those obtained with conventional method.

METHOXS. Ten patients ventilated with the same VT at 0 and 5 cmH2O of PEEP, by using randomly either PCV or ACV Resistance (Rrs), compliance (Crs) and PEEPi were obtained by fitting the equation P=Res*VT+Crs*P+PEEP (LSFM), both during inspiration and the whole breath 2) by conventional method based on expiratory (PEEPst) and inspiratory occlusion (Cdyn,rs = VT/P-PEEPst; Rm,x,rs = Pmax-P2/V'), where Pst is the pressure at 0 flow and P2 is the plateau (5 sec) pressure. Data were analysed as mean difference (bias) and SD (precision) (Bland-Altman analysis).

RESULTS. 1) Patients characteristics. Age: 74 ± 4 years; Sex: 8 male; Rm,x,rs: 25 ± 11 cmH2O. L-1.l-1; Cdyn,rs: 35 ± 12 ml.cmH2O-1; PEEPi: 4.5 ± 4.1 cmH2O 2) LSFM allows calculation of reliable data both during ACV and PCV. 3) This result is not influenced by PEEP. 3) Data were weighted on whole breath on height higher bias and decreased precision; this was due to EFL (3 psi). 4) PCV exhibited more precision than ACV. 5) The use of PEEPi increased the reliability of the data obtained by the LSFM.

CONCLUSION. The LSFM could be used to monitor patients undergoing PCV.

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317 FLOW WAVEFORM DURING WEANING OF LONG-TERM MECHANICALLY VENTILATED PATIENTS
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INTRODUCTION. In long-term ventilated patients, weaning failures are related to worsened respiratory system mechanics during spontaneous breathing. Early detection of respiratory load effects during weaning.

METHODS. In 21 intubated patients recovering from acute respiratory failure of various abnormal respiratory mechanics. Early detection of respiratory load effects during weaning.

RESULTS. Values for IAP were 13±7±5mmHg vs 12±6±2mmHg for PEEP with significant correlation (r=0.64; P<0.01). The LSFM could be used to monitor patients undergoing PCV.

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318 PARITIONING OF RESPIRATORY MECHANICS IN INTRA-ABDOMINAL HYPER-TENSION (IAH)
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INTRODUCTION. IAH above 15mmHg causes restrictive lung disease due to diminished chest wall (CW) static compliance (Cst)(1-3). This study will look for a correlation between IAP-Peerlued and IAP-LIP (lower inflection point) by partitioning total respiratory system (TRS) mechanics in lung and CW in pts with/without IAH.

METHODS. A total of 27 inspiratory and expiratory PV curves (super syringe) were constructed in 5 pts, these curves were partitioned in CW, lung and abdominal curves. M/S ratio: 1/4, age 72.8±5.3, APAHCE II 30.4±4.3, SAPS II 62.4±7.3.

RESULTS. The values for IAP were 13±7±5mmHg vs 12±6±2mmHg for PEEP with significant correlation (r=0.64; P<0.01). Bland and Altman analysis showed a good agreement: IAP was almost identical to PEEP with a bias of -0.8±1.9 (SD) mmHg (95% CI -1.19 to 0.4); the limits of agreement (LA) were -4.6±0.3 (95% CI -4.8 to 4.3 for the LLA and 2.7±0.2 for the UL). There was a good correlation between IAP (15±6±4cmH2O) and LIP (14.5±5±2cmH2O) LIP (cmH2O) = 0.5×IAP + 2.6 (R2=0.93, p<0.0001). Abdominal compression resulted in an increase in IAP from 7.4±3.2 to 15.6±2 causing flattening of the TRS-PV curve. Partitioning showed that this decrease in Cst was solely due to the increase in IAP and concomitant increase in PEEP with flattening of the CW-PV curve while the lung-PV curve remained unchanged.

CONCLUSION. IAP-PEEP and IAP-LIP are strongly correlated. This has important implications in daily clinical practise. The mean LIP was around 14±4cmH2O IAH diminishes TRS Cst due to a diminished CW-Cst while lung-Cst remains unchanged. In ventilated patients with IAH the clinical message from this study is: ”best PEEP=IAP”. Since IAP can easily be obtained at the bedside we suggest this simple strategy instead of the more time consuming, not generally accepted and not without risk super syringe method. These results have implications on the American-European consensus definitions on ARDS where it is suggested to limit Pplat<55. We would like to use DeltaPplat (=Pplat-IAP) instead, otherwise lung protective ventilation in IAH becomes impossible.

REFERENCE(S). 1. Malbrain M.C(2001) In: Vincent J(J)ed Yearbook, Springer-Verlag, Berlin, pp547. 2. Runier VM. AJRCCM 1997;156:1082-91. 3. Gattinoni L. AJRCCM 1998;158:3-11.
TIME COURSE OF SIALIC ACID METABOLISM ALTERATIONS IN AN ANIMAL MODEL OF SEPSIS

INTRODUCTION. We recently observed that sialic acid (SA), a carbohydrate included in the terminal position of glycoproteins, rapidly decreases in septic patients both on red blood cell (RBC) membranes (1) and on circulating proteins (2). This was associated with an increased in free SA in the sera (2). One possible mechanism of the SA metabolism alterations could be an increased effect of circulating sialidase produced by white blood cells or by the endothelium. To confirm the rapid alteration of SA metabolism in sepsis, we studied the evolution of total (free SA and SA bound by inflammatory proteins) and free SA in a sheep model of septic shock induced by cecal ligation and perforation.

METHODS. 10 mature female sheep were anesthetized, mechanically ventilated and invasively monitored. Baseline measures were performed before surgery (T-1) and after celac perforation (T0). Sheep were fluid resuscitated for 20 hours (T0-T20) and then after sacrificed. Total serum SA was measured each hour by an enzymatic colorimetric assay (SA, Roche) adapted for microdeterminations. Free SA concentrations were obtained by the same method after ultracentrifugation to delete proteins. Blood lactate concentrations were also determined each hour.

RESULTS. Temperature increased rapidly (T4; p = 0.02). Both mean arterial pressure and cardiac index decreased rapidly and after increased with fluids resuscitation (T5; p < 0.01). Total SA decreased (0.55 ± 0.11 versus 0.45 ± 0.07 mg/dL at T0). Lactate also increased (T1; p < 0.01). Total SA was measured each hour by an enzymatic colorimetric assay (SA, Roche) adapted for microdeterminations. Free SA concentrations were obtained by the same method after ultracentrifugation to delete proteins. Blood lactate concentrations were also determined each hour.

CONCLUSION. In septic shock, an increased sialidase activity is probably responsible of the rapid decrease in free SA in the sera. One possible mechanism of the SA metabolism alterations could be an increased effect of circulating sialidase produced by white blood cells or by the endothelium. To confirm the rapid alteration of SA metabolism in sepsis, we studied the evolution of total (free SA and SA bound by inflammatory proteins) and free SA in a sheep model of septic shock induced by cecal ligation and perforation.

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1. Piagnerelli M, Sautour F, Zouaoui Boudjeltia K, Wang Z, Vanhaerevebeek M, Vincent J. Dpt of Intensive Care, Erasme University Hospital, Brussels, "Experimental Medicine Laboratory, ISPPC A. Vesale Hospital, Montigny-le-Tilleul, Belgium.

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INTRODUCTION. NF-kappaB plays a key role in inflammatory processes. The cyclopropylprostanoglandine 15-Deoxy-Delta12,14-PGJ2 can inhibit NF-kappaB activation through inhibition of IKB. We tested the effects of 15-Delta-PGJ2 in a porcine model of hyperdynamic long term septicemia.

METHODS. To up now 12 anesthetized, ventilated and instrumented pigs were randomized to receive either placebo or 15-Delta-PGJ2 started at 12h of i.v. LPS (1 g/kg/min for 1h, 0.25 mcg/kg/min for the remainder 11h). Before and at 12, 18 and 24h of LPS we assessed systemic and hepato-splanchic hemodynamics and metabolism. Hydroxystearic starch was infused to maintain mean arterial blood pressure above 60 mmHg. A Friedman rank sign analysis of variance and a subsequent Dunnett test and the Mann-Whitney test were used to analyse intra- and intergroup differences, respectively.

RESULTS. Before endotoxin there was no intergroup difference. 15-Delta-PGJ2 infusion did not significantly affect any of the hemodynamic and metabolic parameters assessed.

CONCLUSION. In contrast to literature reports 15-Delta-PGJ2 to inhibit NF-kappa activation did not influence hemodynamics or metabolism. A proinflammatory effect of 15-Delta-PGJ2 resulting from pro-oxidative properties (2) and/or incomplete NF-kappa inhibition due to insufficient tissue PGJ2 concentrations (3) may have caused these findings.

1. Piagnerelli M, supported by The Institute of Child Health.

INTRODUCTION. Intraoperative lipopolysaccharide (LPS) induces sustained systemic, metabolic and inflammatory changes, mimicking some aspects of the physiological response to acute inflammation in critically ill patients. This study aimed to assess the correlation of the physiological changes after LPS administration in healthy subjects, focused on systemic and inflammatory parameters.

METHODS. The response to intravenous single bolus LPS was observed in 8 healthy male volunteers, using plasma substrate determination (glucose, FFA), indirect calorimetry (EE), and metabolic and/or respiratory quotient in healthy volunteers.

RESULTS. Subjects had no symptoms during the first hour. At T75, they began to feel ill, with nausea and headache. Body temperature (+1.13°C), heart rate (+54%), and respiratory rate (+34%) increased, starting from T60 to T120 min; peak at T240 min. Cardiac output increased continuously in both groups from 7.0±0.5kPa to determine changes in central respiratory drive (RO) as recorded from the phrenic nerve activity. Thirty minutes after HVR 1 intravenous lipopolysaccharide (1.5 mg/kg LPS, E. Coli B0111:04) was administered. After 2 hours, rats were again exposed to normocapnic hypoxia (HVR 1) for 10 minutes (PaO2 37ºC. Rats were subjected to normocapnic (PaCO2 6kPa) hypoxia (HVR 1) for 10 minutes (PaO2 7.0±0.5kPa) to determine changes in central respiratory drive (RO) as recorded from the phrenic nerve activity. Thirty minutes after HVR 1 intravenous lipopolysaccharide (1.5 mg/kg LPS, E. Coli B0111:04) was administered. After 2 hours, rats were again exposed to normocapnic hypoxia (HVR 2; PaO2 7.4±0.6kPa) for a 10 minute period. Data are presented as means±SEM with ANOVA (post-hoc Tukey testing) statistical analysis.

RESULTS. HVR 1: Peak phrenic activity and RO increased by 206%77% (p=0.04) and 176%55% (p=0.03) over baseline, respectively, within two minutes of hypoxia. Heart rate (HR) increased 22±7bpm and mean arterial pressure (MAP) fell 35±10mmHg within 2 minutes of hypoxia. After LPS, RO increased by 138%72% over baseline (p=0.001) with a MAP fall (11±2b to 95±11mmHg) and HR increase (25±18bpm). HVR 2 response was variable, with RO (35±15b%, p=0.15) and HR (13±18b%, p=0.23) unchanged, despite metabolic acidosis (pH 7.33 pre LPS vs pH 7.27±0.01 post LPS). However, MAP again declined by 28±10mmHg (p=0.04).

CONCLUSION. Systemic inflammation alters HVR. Impairment of peripheral chemoreceptor function and/or central respiratory drive may occur.

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Grant acknowledgement: Supported by The Institute of Child Health
INTRODUCTION. Hyperlactemia is a hallmark of hypermetabolic and hyperdynamic sepsis in critically ill patients. It is correlated with the development of multiorgan failure and patients outcome. The aim of our study was to determine the contribution of whole body and skeletal muscle lactate production after lipopolysaccharide (LPS) administration in healthy subjects.

METHODS. CAP37 plasma levels in 10 patients undergoing coronary artery bypass grafting surgery were determined by ELISA. In the first protocol, CAP37 concentrations in 5 patients were studied. To test the hypothesis that activated neutrophil-endothelial cell interactions in disseminated intravascular coagulation (DIC) cause endothelial injury contributing to multiple organ dysfunction syndrome (MODS) and poor outcome. The levels of sE-selectin, sICAM-1, sVCAM-1, neutrophil elastase, and sThrombomodulin were measured within 12 hours after the diagnosis of sepsis (day 0), and on days 1-4 after the diagnosis. The numbers of systemic inflammatory response syndrome (SIRS) criteria that patients met and DIC scores were determined simultaneously.

RESULTS. Median CAP37 plasma concentration was raised significantly from 8ng/ml at baseline to 428ng/ml 3 min. after routine administration of heparin. With the onset of cardiopulmonary bypass procedure, the CAP37 plasma levels dropped significantly to a median of 241ng/ml corresponding to 8.9% of the CAP37 concentration measured 3 min. after routine administration of heparin. Protamine seems to be a strong stimulus for CAP37 release in humans. Protamine administration of recombinant human PAF acetylhydrolase protects mice against lethal sepsis. Results of the combined therapy revealed reduced IL-6 levels in mice subjected to CLP.
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LABORATORY COAGULOGY IN THE CRITICALLY ILL - PROTEIN C AND ANTIITHROMBIN III
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INTRODUCTION. Numerous studies have demonstrated that severity and outcome of sepsis is associated with a decrease of protein C (PC) and antithrombin III (AT III) plasma levels. However, they focused on pts with sepsis rather than the incidence of laboratory coagulopathy in the ICU. We explored the relationship between PC/AT III levels and the presence and development of organ dysfunction according to the ACCP/SCCM criteria in a large ICU-cohort.

METHODS. We performed a 7-months prospective study in a 28-bed surgical ICU in 328 critically ill pts (3375 days) with an ICU stay >24 hours. Plasma PC/AT III levels were measured daily using an activity assay (Chromogenix AB, Sweden). The LLN for PC is 70% and 80% for AT III, respectively.

RESULTS. Distribution of pts: no SIRS: 28 pts (2.5%), SIRS: 173 (53.2%), sepsis 63 (19.4%), and severe sepsis or septic shock: (sevSep-SS) 51 (15.6%). ICU mortality was 17.8%, with an attributable mortality rate for sevSep-SS of 50.9%. Min PC/AT III levels in pts without SIRS were 60.3±4.6 (19-130)/57.2±2.7 (29-91)%, SIRS 59.2±1.8 (14-130)/55.4±1.1 (22-106), sepsis: 60.4±2.7 (21-121)/59.8±2.6 (3-114) and severe sepsis or shock (sevSep-SS) 58.1±2.6 (5-100)/40.1±1.8 (15-71)%. p<0.0001 for differences in PC/AT III between SIRS and sevSep-SS, p<0.0001 between sepsis and sevSep-SS. However, nearly 95% of lowest PC/AT III levels were beyond the LLN. Min PC/AT III levels were correlated with increases of a max total SOFA and total MAX SOFA Score, p<0.0001. The same association was seen for platelet count, thromboplastin time, PTT and fibrinogen (p<0.0001) regardless of the inflammatory etiology. Min PC/AT III levels were predictive for sepsis-related death (p<0.0001). The AUC for PC/AT III to discriminate SIRS from sevSep-SS was 0.57 / 0.68, comparable to thromboplastin time (p<0.0001), PTT (p<0.0001) and fibrinogen (p<0.0001). There was a trend towards a decrease of PC/AT III levels in the three days before onset of sevSep-SS, but not in SIRS or sepsis.

CONCLUSION. Laboratory evidence of coagulopathy is common in critically ill pts and is associated with the severity of inflammation rather than the etiology. The low specificity of PC/AT III must be taken into account when these markers were used in guiding therapy of pts with sevSep-SS.

Grant acknowledgement: Thuringian Government, grant B-309-00014

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EFFECTS OF ANTITHROMBIN ON CYTOKINE PRODUCTION IN MAJOR VASCULAR SURGERY
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INTRODUCTION. Antithrombin (AT) is an important endogenous factor to control coagulation, fibrinolysis and inflammation. We already suggested that AT could inhibit the acceleration of coagulopathy and polymorphonuclear leukocyte elastase production in major vascular surgery. The purpose of this study was to investigate the effects of AT on cytokine production in major vascular surgery using the analysis of cytokine levels in the blood samples obtained in the previous study.

METHODS. Twelve patients (aged 55 to 80 years) scheduled for Y graft replacement for abdominal aortic aneurysm were divided into two groups (AT group and Control group) at random after informed consent and institutional approval. Heparin 2,000 units were administered before clamping the aorta. In the AT group, AT 3,000 units were infused before clamping the aorta and 24 hours later. Informed consent was obtained before surgery. IL-1α and IL-8 could not be detected statistically by the ELISA method. The LLN for IL-1α and IL-8 was 18 and 5 pg/mL, respectively.

RESULTS. Antithrombin reduced plasma concentrations of IL-1α and IL-8, and tumour necrosis factor (TNFα) after surgery in the AT group compared to the Control group.

CONCLUSION. In graft replacement for abdominal aortic aneurysm, AT decreased and IL-6, and -8, and TNFα increased. Administration of AT 6,000 units suppressed the increase of IL-6, -8, and TNFα. AT might decrease post surgical complication induced by IL-1 and TNFα.

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PROTEIN C ADMINISTRATION IMPROVES SURVIVAL IN AN EXPERIMENTAL MODEL OF SEPSIS: PRELIMINARY RESULTS
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INTRODUCTION. Considering the prominent role of microvascular coagulation in sepsis and protein C’s major role in normal haemostasis, a key mechanism for the benefit is its direct antithrombotic activity, thereby preventing microvascular thrombosis, vascular congestion, and the resulting organ failure. Protein C administration has been successfully added in the treatment of patients with meningococcal sepsis, while little is known on its effect on sepsis of other aetiologies. The aim of the present study is to investigate the effect of human protein-c administration on the survival of septic rats.

METHODS. Septis was induced using the cecal ligation and puncture model in 90 adult Wistar rats. All subjects were randomly assigned into two study groups, one (n=40) receiving intravenously human protein-c 100 units/kg (Ceprotin, Baxter AG) and one (n=50) receiving placebo treatment. 2, 8 and 14 hours after the induction of sepsis. Clinical and survival data were collected till 60 hours after the induction of sepsis.

RESULTS. Rats receiving protein-c treatment had a 60-hour post sepsis induction survival rate of 75%, while rats of the control group had a survival rate of 54% (p=0.0029). Clinical signs of sepsis and prominent death were demonstrated at least 12 hours later in the protein-c group compared to the control group (p<0.05).

CONCLUSION. Human protein-c administration significantly improves the survival of septic rats and delays the presentation of clinical signs of sepsis.

Grant acknowledgement: The project is supported by Baxter AG.

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DROТRECΟΙΓΑΝ ALFA (ACTIVATED) EFFECTS IN PATIENTS WITH SEVERE SEPSIS WITH OR WITHOUT DIC
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INTRODUCTION. Drotrecogin alfa (activated) (DrotAA) reduces 28-day mortality in patients with severe sepsis. Disseminated intravascular coagulation (DIC) is an acquired disorder associated with severe sepsis. It is characterized by activation of coagulation and loss of normal regulation, which can lead to microvascular damage, organ failure and death. This study examined the effects of DrotAA in patients with severe sepsis with or without overt DIC.

METHODS. Patients in the PROWESS trial were retrospectively evaluated for presence of overt DIC using the International Society on Thrombosis and Haemostasis (ISTH) definition. Baseline characteristics of patients with and without overt DIC were compared using chi-square and Wilcoxon rank-sum tests. Mortality and serious bleeding rates in DrotAA and placebo treated patients were compared by DIC category using absolute risk, relative risk, and odds ratios. Homogeneity of odds ratios over DIC category was tested using Breslow-Day.

RESULTS. Of 1690 patients, 454 had overt DIC, 1114 did not, and 122 had severe 2 missing laboratories. Overt DIC patients were more likely to have hypertension, COPD, higher APACHE II scores, and more organ failures (all p<0.001). Comparing DrotAA treatment to placebo, the absolute risk reduction in mortality was numerically greater in patients with overt DIC than without (12.5% vs. 5.0%). The relative reduction in odds of dying was not different between DIC categories by treatment (p=0.261). Serious bleeding rates during infusion of DrotAA compared to placebo were 3.0% vs. 0.9% in patients with overt DIC and 1.9% vs. 1.1% in patients without. The degree of increase in odds of bleeding was not different between DIC categories by treatment either during infusion (p=0.498) or over 28 days (p=0.918).

CONCLUSION. Severe sepsis patients with overt DIC had different demographics, different comorbidities, worse disease severity, and higher mortality than patients without overt DIC. DrotAA significantly improved survival whether or not patients had overt DIC. Benefit (improved survival) and risk (serious bleeding) were numerically greater but not significantly different in patients with overt DIC.

Grant acknowledgement: This study was funded by Eli Lilly and Co.
INTRODUCTION. In the PROWESS trial, administration of drotrecogin alfa (activated) (DrotAA) plus standard therapy to adults with severe sepsis significantly reduced 28-day all-cause mortality compared with placebo (PRO) plus standard therapy (p=0.005). Low dose steroid therapy in patients unresponsive to ACTH stimulation (75% of those meeting Anneau enrollment criteria) had prolonged survival, but not significantly improved 28-day mortality of patients with septic shock (Anneau, JAMA 2002:288:862). This abstract examines intravenous steroid use in PROWESS patients meeting Anneau enrollment criteria.

METHODS. Steroids were allowed, but were not required in PROWESS. The duration and route but not dose of steroids was collected. For analysis, patients were identified using Anneau enrollment criteria (AEC) /treatment with study drug within 8 hours of onset of shock, infection, fever or hypothermia, tachycardia, systolic blood pressure <90 on vasoressors, mechanical ventilation, and one of: urine <0.5mL/kg, lactic acidosis or PaO2/FiO2 <280. ACTH stimulation test was not done in PROWESS. We also analyzed the PROWESS data without requiring that study drug treatment was initiated within the 8-hour window.

RESULTS. AEC (n=97): PRO mortality was 38% (19/50), DrotAA mortality was 28% (13/47); and the relative risk (RR) was 0.73 (0.41-1.30, 95% CI). AEC with Steroids at Baseline and/or Infusion (n=38): PRO mortality was 45% (9/20); DrotAA mortality was 28% (5/18); and the RR was 0.62 (0.25-1.50). AEC without Steroids (n=57): PRO mortality was 33% (10/30); DrotAA mortality was 26% (7/27); and the RR was 0.78 (0.34-1.76). AEC without Requiring the Time Window (AEC-NT) (n=612): PRO mortality was 38% (118/313); DrotAA mortality was 29% (88/299); and RR was 0.78 (0.57-1.09). AEC-NT with Steroids at Baseline and/or Infusion (n=224): PRO mortality was 34% (50/151); DrotAA mortality was 33% (36/109); and the RR was 0.76 (0.54-1.07). AEC-NT without Steroids (n=379): PRO mortality was 34% (65/191); DrotAA mortality was 26% (49/186); and RR was 0.78 (0.57-1.07).

CONCLUSION. Patients likely to respond to low-dose steroids by the Anneau enrollment criteria (AEC) constitute a small fraction (4.4%) of patients with severe sepsis who were enrolled in PROWESS. Regardless of steroid use, patients have survival benefit from treatment with drotrecogin alfa (activated).

REFERENCE(S). Anneau et al., JAMA 2002:288:862

Grant acknowledgement: Research support by Eli Lilly

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REGIONAL RESOURCE USE IN PROWESS

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INTRODUCTION. Drotrecogin alfa (activated) [DrotAA] administration to adult severe sepsis patients in the PROWESS trial significantly decreased 28-day and hospital mortality. We explored regional differences, both overall and by treatment group, in hospital survival and resource use in the United States (EU), and other (OT).

METHODS. We determined intensive care unit (ICULOS) and hospital length of stay (HLOS), hospital discharge location, and hospital mortality in a long-term follow-up study of PROWESS. Follow-up at hospital discharge was 98% (n=1658). TISS-28 (T28) scores were recorded while the patient was in ICU during PROWESS. All comparisons were performed with Wilcoxon rank-sum or Kruskal-Wallis tests.

RESULTS. Absolute risk reduction in hospital mortality of 6.3% (US,n=692), 5.8% (EU,n=489), and 2.9% (OT,n=477) was observed. There were no differences between DrotAA and placebo in median survivor HLOS (days) within any of the regions (US 15.5 vs 15.0, p=0.81; EU 27.5 vs 28.0, p=0.63; OT 21.0 vs 21.0, p=0.55). In hospital survivors, there was no effect of treatment (DrotAA vs placebo) as measured by mean total T28 within a region (US 332 vs 324, p=0.73; EU 446 vs 416, p=0.38; OT 314 vs 366, p=0.094). Overall, median survivor HLOS among the 3 regions was significantly different (p<0.001), with a significant difference in median survivor ICULOS by region also observed (p<0.001). Overall, in EU compared to the US or OT, we observed significantly higher median total T28 scores in hospital survivors (323 vs 245 or 232 both p=0.001). Hospital survivors had more days on vasoressors in EU compared with US or OT (4d vs 2d, or 3d both p=0.001). Differences in health care systems across regions were reflected in hospital discharge location. More patients in EU were discharged home compared with the US or OT (79.3% vs 64% among those alive, 45.9% vs 26.0% and 71.5% v 62.3% (p=0.001 or 0.02) while more patients in US discharged to a skilled nursing facility compared with EU or OT (39.1% vs 18.6% or 10.8%, n=33, or 12.1%, n=40 both p=0.001).

CONCLUSION. A survival benefit with DrotAA was observed at hospital discharge regardless of region. Regional differences in overall total resource use likely reflect differences in health care systems and reimbursement mechanism in the US, EU, and OT regions participating in PROWESS and were not due to increased number of survivors with DrotAA.

Grant acknowledgement: Eli Lilly
MECHANISMS OF HLA-DR DOWN REGULATION IN SEPSIS: TRANSCRIPTION AND POST TRANSLATION.

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INTRODUCTION. The lowered expression of HLA-DR expression on monocytes has been well documented as a feature in sepsis. The precise mechanism by which this occurs is still not fully understood. We have previously described that shedding of HLA-DR from the surface of monocytes may be one mechanism by which a lowered surface expression becomes observed. A recent report has demonstrated that a post-translational mechanism may exist where HLA-DR is retained within the cell or endocytosed from the surface. In this study, we attempted to ascertain if this mechanism of HLA-DR regulation was a feature in our septic patients and also in healthy volunteers. We also investigated whether the rate of transcription of HLA-DR was different in healthy controls compared with septic patients.

METHODS. After consent was obtained 7.5ml of arterial blood was taken from patients who fulfilled the ACCP (n = 5). Peripheral blood mononuclear cells were isolated by Ficoll Paque isolation and stained for HLA-DR expression in both permeabilised and non-permeabilised cells for intracellular and surface HLA-DR expression respectively. Immunofluorescent microscopy was used for detection of both intracellular and surface HLA-DR on monocytes. Reverse transcription PCR was used to investigate the levels of the HLA-DR mRNA in septic patients and healthy controls. A numerical value was generated from the bands on the gel using densitometry software, which allowed statistical analysis between septic patients and healthy controls.

RESULTS. In the septic patients we studied it was observed that there was a higher intracellular presence of HLA-DR in the septic patients (n=5) compared to the healthy controls (n=5). This was observed in septic patients with reduced surface expression of HLA-DR. When the mRNA levels of septic patients were compared to healthy controls, on days 0 and 3 the mRNA of the septic patients were statistically significantly lower than that of healthy controls. p=0.02 and p=0.05 respectively.

CONCLUSION. We have shown that in our septic patient the mechanism which may contribute to the lowered surface expression are shedding of HLA-DR from the surface (previously shown), transcriptional and post translational regulation. Future work needs to be done to investigate the mediators that may cause the intracellular HLA-DR to be expressed on the surface.

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Grant acknowledgement: Royal Liverpool and Broadgreen NHS Trust
LIPOPOLYSACCHARIDE BINDING PROTEIN IS NOT A SPECIFIC MARKER OF SEVERE SEPSIS

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INTRODUCTION. Lipopolysaccharide binding protein (LBP) has been described as an inflammatory acute phase protein, contributing to the onset and progression of infection, sepsis, and organ dysfunction. We explored the relationship between LBP levels and the presence and development of organ dysfunction according to the ACCP/SCCM criteria in a large ICU-cohort.

METHODS. We performed a 7-months prospective study in a 28-bed surgical ICU in 328 pts with an ICU stay >24 hours. Serum LBP was assayed daily using a commercially available immunomass assay system (DPC Biermann, Bad Nauheim, Germany). The ULN for LBP is 12 ug/ml.

RESULTS. The incidence of inflammatory response was as follows: no SIRS: 28 patients (2.5%), SIRS: 173 (53.2%), sepsis: 63 (19.4%), and severe sepsis or septic shock (sevSep-SS): 51 (15.6%). ICU mortality was 17.8%, with an attributable mortality rate for sevSep-SS of 50.9%. LBP levels were available for 3375 patient days. Max LBP in pts without SIRS was 29.7±3.63 (7.2-109.7) ug/ml; SIRS: 29.6±1.27 (3.8-103.0), sepsis: 33.9±8.12 (8.8-75.7) severe sepsis or septic shock (sevSep-SS): 52.8±3.51 (8.1-204.0)(ug/ml; p<0.001 for differences between sevSep-SS, sevSep-SS, and no SIRS. Differences in procalcitonin (PCT) levels were significant between all categories (p<0.001). C-reactive protein (CRP) levels differ only between SIRS and sevSep-SS. Median LBP levels in pts with a max total SOFA Score of 1-6 points was 23.8 (3.9-109.7) mg/ml, compared to 29.5 (3.8-154.0) in pts with SOFA Scores of 7-12, 41.5 (3.8-200.0) in pts with 13-18 points and 45.16 (14-204) in pts with 19-24 points thereby far beyond the ULN. The most pronounced association with increases of SOFA was found for PCT and IL-6 levels, (p<0.001). LBP but not CRP levels were higher in non-survivors of sevSep-SS (p<0.001). Max PCT levels correlated most with sepsis-related death (p<0.001). The AUC for LBP to discriminate SIRS from sevSep-SS was 0.53, comparable to C-reactive protein (0.55). The accuracy was highest for serum procalcitonin (0.80) and platelet count (0.71).

CONCLUSION. LBP serum levels are found to be elevated in nearly all critically ill pts and are not restricted to infectious etiologies. The acute phase response mediated by LBP seems to be associated more closely to the severity of organ dysfunction than the response mediated by CRP, whereas an increase of PCT levels indicates more specifically the degree of organ dysfunction and prognosis in pts with sevSep-SS.

Grant acknowledgement: Thuringian Government, grant B-309-00014

HIGH SPECIFICITY MARKERS TO IDENTIFY SURGICAL ICU PATIENTS AT INCREASED RISK FOR SEPSIS

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INTRODUCTION. Early identification of patients with systemic inflammatory response syndrome (SIRS) who are at increased risk for sepsis would permit earlier intervention and potentially result in more favourable outcomes. However, early detection of sepsis is problematic and the disease may be relatively advanced before sepsis is clinically suspected. Highly specific markers that distinguish patients with SIRS who will or will not develop sepsis are therefore particularly desirable.

METHODS. Fifty surgical intensive care unit (SICU) patients presenting with SIRS were studied. Most patients were admitted for cardiovascular or peripheral vascular surgery, or as a result of trauma. Cell surface HLA-DR on monocytes as well as CD11b and CD64 on polymorphonuclear cells (PMN) were assessed daily by flow cytometry with QuantiBRITE quantisation. Plasma levels of IL-6, IL-10, CRP, and procalcitonin were assessed by ELISA or luminometric assays. Patients were retrospectively classified based on whether they did (Group 2) or did not (Group 1) develop sepsis over a maximum 14-day observation period. Markers with premonitory value on a specific study day were identified by comparing data from Group 1 patients with data from pre-surgical Group 2 patients.

RESULTS. At specificity >90%, CD11b (>10,482 antibodies bound per cell [AB/C]; p=0.002) on day 1 and IL-10 (>29 pg/ml; p<0.001) on day 2 identified 48% and 57%, respectively, of the patients who would later develop sepsis. CD64 (>3,125 AB/C; p<0.001), IL-6 (>24 pg/ml; p<0.001) and IL-10 (>227 pg/ml; p=0.004) on day 3 and CD64 (>2,672 AB/C; p<0.001) on day 4 predicted sepsis in about 50% of the remaining Group 2 patients. Single marker performance was not notably enhanced by single day bivariate logistic models.

CONCLUSION. The best single day prognostic markers with high specificity for early identification of SICU patients with SIRS who are at increased risk for sepsis are quantitative expression of CD11b on PMN and plasma IL-10. These data support the hypothesis that exaggerated neutrophil activation, accompanied by activation of the stress response, predisposes to, or predicts, sepsis.
INTRODUCTION. Procalcitonin (PCT) has often been considered as a good marker of sepsis, with a higher specificity than CRP. In this study, we have evaluated PCT serum level as a predictor of outcome in critically ill patients (pts).

METHODS. All consecutive pts admitted in a 7-bed ICU for 5 months were included in the study. Pts have been sorted in 4 groups: severe sepsis (group A), medical, non infected pts (group B), sepsis (group C) and severe sepsis (group D). CRP, PCT, LBP, and IL-6 serum levels have been determined on the day severe sepsis criteria were met (group A), or on the admission day (groups B, C, D). Markers serum values have been displayed as median (SD).

RESULTS. 109 pts (55 males; 54 females; mean age: 55.1±15.5 year) have been included in this study. Overall ICU mortality was 7.3%; 7 pts in group A and 1 patient in group B. To predict sepsis, PCT had a sensitivity of 93% and a specificity of 73% (cutoff=0.9ng/mL) while LBP (cutoff=26.75ng/mL) and CRP (cutoff=6.2mg/dL) showed a sensitivity of 82% and 92% and a specificity of 85% and 79% respectively. In addition, PCT could predict mortality with a 100% sensitivity and a 69% specificity when serum level was >1.22ng/mL. These values where higher than for CRP (sens.:87.5%; spec.:67%, cutoff>7mg/dL) and for LBP (sens.:75%; spec.:71%, cutoff=26.75ng/mL). With a PCT cutoff of 2.65ng/mL, sensitivity was 87.5%, but specificity was lower than for CRP (sens.:87.5%; spec.:67%, cutoff>7mg/dL). In this study, we have evaluated PCT serum level as a predictor of outcome in critically ill patients (pts). With a PCT cutoff of 2.65ng/mL, sensitivity was 87.5%, but specificity was lower than for CRP (sens.:87.5%; spec.:67%, cutoff>7mg/dL). In this study, we have evaluated PCT serum level as a predictor of outcome in critically ill patients (pts).

CONCLUSION. PCT is a sensitive and a specific marker for prediction of sepsis, as previously described, but also a better predictor of mortality than CRP and LBP in critically ill patients. PCT serum level could guide clinicians to detect patients with severe sepsis at high risk of mortality.
HOSPITAL COST OF SEVERE SEPSIS: CAP VS OTHER SOURCES OF INFECTION

INTRODUCTION. Severe sepsis (SS) is associated with a significant cost. The cost of SS may vary from one region to another, is often estimated and influenced by the way healthcare is financed. Hospital costs of SS patients (pts) were reviewed from one academic and one non-academic hospital.

METHODS. Retrospective analysis of ICU length of stay (LOS) and direct cost data extracted from patients' electronic records from the surgical ICU of the University Hospital Göttingen, Göttingen, Germany. All adult ICU admissions with LOS > 24 hours over a 24 month period (Jan 1 2000 –Dec 31 2001, N=1,631). Direct variable cost (consumables) was assessed bottom-up by means of a patient data management system. Personnel cost were calculated per day of treatment.

RESULTS. Cluster analysis partitioned the ICU population into 3 specified homogenous patient groups based on ICU LOS and total direct costs (i.e. variable and fixed) as discriminating variables: Cluster 1 (n = 1,382; LOS = 2.7 days; mean Cost= €2,273) Cluster 2 (n=196; mean LOS = 12.3 days; mean Cost = €12,334). Cluster 3 (n=53; mean LOS = 29.2 days; mean Cost=€ 32,522). Cluster 1 consumed 31.5%, cluster 2 and 3 68.5% of total ICU costs. An upper 95 percentile LOS of 6.6 days allowed cluster 1 to be replaced by a LOS profile population of 57 days population (n = 1355; 97% population and 96% total ICU cost overlap with cluster 1) representing 83% of total ICU pop and 42% of total ICU costs. Cluster analysis performed on the > 7 days population into 2 further clusters (n = 221; n = 55) suggested differentiated patient populations characterised by mortality (10% vs. 25%) and sepsis diagnosis (36% vs.86%) in a selected sample. Similar skewed distributions of ICU costs have been reported earlier [1].

CONCLUSION. It may be feasible to formulate a LOS-based reimbursement scheme for ICU services in Germany based entirely on the selection of (appropriate) patients’ ICU LOS profiles patient populations which match closely homogenous cost-LOS patient clusters. Certification of ICUs based on structure and quality criteria will be necessary to avoid abuse of such additional payment.

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Grant acknowledgement: This study was supported by a grant from Lilly Deutschland GmbH, Germany.
352 COST OF ILLNESS IMPOSED BY SEVERE SEPSIS IN SWITZERLAND

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INTRODUCTION. Although severe sepsis affects between 7.8%-24.7% of all cases admitted to the ICU [1], country-specific information regarding the associated costs are often not recorded. This study estimates the cost of illness of severe sepsis in Switzerland by calculating the direct and indirect patient-related costs using the societal perspective.

METHODS. To estimate the direct costs a retrospective analysis was undertaken using the records from 61 patients from three University hospitals. Resource use was determined by a bottom up approach [2] and valued using centre-specific unit costs for medication, nutrition, blood products and disposables. Official tariffs were used to value diagnostic services, clinical procedures and laboratory and microbiology analysis. Total direct costs were calculated by adding centre-specific personnel and hotel costs to resource use. Indirect costs were measured using official Swiss statistics from 1998-2000.

RESULTS. Severely septic patients had a mean ICU length of stay (LOS) of 12.9 days ± 9.9 days (survivors 12.6; non-survivors 13.2). ICU mortality of severely septic patients was 49.2%. Average direct ICU cost was €28,179 per patient (€2,187 per day). The incidence of severe sepsis ranged from 3,500–8,500 cases per year in Switzerland. Using this incidence range and the average direct costs measured, the total direct cost of severe sepsis in Switzerland can be found to range from €99 million to €239 million when applying the same incidence range and a discount rate of 5% to future costs. The cost of illness of severe sepsis in Switzerland is therefore between €326–€808 million when adding both indirect and direct costs together.

CONCLUSION. Patients with severe sepsis have a high ICU mortality, prolonged ICU LOS, and are expensive to treat. The COI imposed by severe sepsis in Switzerland is considerable in the ICU and after patients are discharged.

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Grant acknowledgement: Eli Lilly Switzerland SA

353 COST-EFFECTIVENESS OF DROTRECOGIN ALFA (ACTIVATED) IN TREATING SEVERE SEPSIS IN SWEDEN

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INTRODUCTION. Severe Sepsis is a significant burden in Sweden with a mortality between 20%-50% [1,2] and a mean direct ICU cost per patient of €30,600 [2]. In PROWESS drotrecogin alfa (activated) significantly reduced the all cause 28-day mortality in severe sepsis patients [3]. The following study estimates the cost-effectiveness of drotrecogin alfa (activated) with standard therapy compared to standard therapy alone for patients with severe sepsis in Sweden.

METHODS. In the cost-effectiveness analysis treatment patterns, resource use and unit costs of Swedish severe sepsis patients were applied to the efficacy data from the PROWESS trial. Life expectancy of survivors was estimated using Swedish life tables. Adjustment for post-discharge mortality and quality of life reductions associated with severe sepsis were made. Since PROWESS did not enrol patients in Sweden the patient records from 55 ICU-patients treated for both sepsis and at least one acute organ dysfunction in the Huddinge University Hospital in Sweden were used. Costs were assessed using the resource tracking and cost assignment system of this hospital (using 2002 prices). The cost per patient of drotrecogin alfa (activated) was based on the average use in the PROWESS trial and the Swedish price of SEK458 (€50) per mg as of 2002.

RESULTS. The cost-effectiveness ratio for drotrecogin alfa (activated) was found to be €13,400 per QALY and €19,500 per QALY when discounting QALY at 3%. The respective discounted ratios for all patients were €14,800 and €21,400.

CONCLUSION. Drotrecogin alfa (activated) improves survival and is cost-effective when compared to many accepted healthcare interventions in Sweden. The cost-effectiveness improves for patients with two or more organ dysfunctions.

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Grant acknowledgement: Lilly Sweden

354 CORRELATION OF TWO THERAPEUTIC INTERVENTION SCORING METHODS AND HOSPITAL COSTS. A MEXICAN STUDY

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INTRODUCTION. One of the purposes of grading the therapeutic intervention is being a score or cost index. The objective of this study is determining correlations existing between two therapeutic intervention scoring systems: TISS-28 and NEMS and hospital patient care costs, in the ICU. We tested the hypothesis that TISS-28 and NEMS can explain >70% of variability in costs in ICU.

METHODS. A prospective study in a polyvalent ICU in a general hospital during a period of one year. Variables gathered daily were cost of hospital care, and TISS-28 and NEMS scores. The stochastic analysis was carried out with a Pearson moment-product correlation coefficient, a p value of <0.05 was considered statistically significant.

RESULTS. We have 1,144 matched determinations of systems in 371 patients. The highest care costs, in descending order were: drugstore, materials, blood bank, intensive care, haemodialysis, respiratory support, image studies, laboratory and biomedical support. Mean values (range) for each system were: TISS-28, 27 ± 10 (8-62) and NEMS 29 ± 9 (9-51). Correlation between systems was r=0.824 (p<0.01), r2=0.680. Correlation system-cost was: TISS-28 r=0.374 (p<0.05), r2=0.140, and NEMS r=0.253 (p<0.05), r2=0.064.

CONCLUSION. The system that had a better correlation was TISS-28, however, the explained variability was only of 14%, so that these systems cannot be used as cost surrogate markers, but can be used as level markers of therapeutic support. Within this context and due to the high correlation between both, the use of NEMS is suggested due to its simplicity.

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Grant acknowledgement: Eli Lilly Switzerland SA

355 RELATIONSHIP OF TREATMENT COSTS WITH SEVERITY SCORES IN ICU PATIENTS

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INTRODUCTION. Several commonly used classification methods exist for assessing critically ill patients and have been found to correlate well with observed outcome (e.g. ICU and/or hospital mortality). Few investigators have examined how well these scoring systems explain variation in ICU costs [1]. We investigated the relationship between three measures of severity of illness based on daily assessment: I) total maximum SOFA score; II) total SAPS II score and III) total SOFA score in a sample of high cost patients.

METHODS. Basic clinical characteristics (reason for admission, type of patient), ICU outcome, severity of illness, and ICU treatment costs were examined retrospectively among 69 adult patients (LOS > 7 days) admitted to the mainly Surgical ICU. Mean age was 57.8 years, 62% of all patients had infection of which 74% were septic, and ICU mortality was 20%. Median length of stay in the ICU was 11 days (inter quartile range 9 days). Total ICU treatment cost for the 69 patients ranged from €4,576 to 43,701 (mean €14,330, median €10,696). Univariate analysis was performed to explore the relationship of each individual variable on total treatment costs. Factors significant at univariate analysis were assessed using multiple linear regressions modelling with total ICU costs as the dependent factor. Direct variable cost (consumables) was assessed bottom-up by means of a patient data management system. Personnel cost were calculated per day of treatment.

RESULTS. Total maximum SOFA score 10.7a 5.5, total SOFA score 8.2a 9.9, total SAPS II 565.8a 473.8. All three measures of severity of illness were significantly associated with direct cost (all P-values < 0.001). SAPS II was the most strongly correlated with ICU costs (R2=0.745). Other significantly associated factors: mortality (P<0.05), infection (P<0.001), sepsis (P<0.001). Severity of illness scores were highly correlated with each other (all P-values <0.01). Only the total SAPS remained significant in the multiple linear regression modelling. (P<0.001, R2=0.813).

CONCLUSION. Total SAPS II is a good predictor of the actual ICU treatment costs in high cost patients, especially in patients with a high incidence of infection compared to the other scores evaluated.

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Grant acknowledgement: This study was supported by a grant from Lilly Deutschland GmbH, Germany
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NEMS AS A SURROGATE MARKER OF USE OF RESOURCES.

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INTRODUCTION. NEMS (Nine Equivalents of Nursing Manpower Use Score) is an excellent tool to measure the nursing workload and it is a surrogate marker of costs. However, it has not been validated in LatinAmerica.

METHODS. A prospective study in two ICU’s during 51 months. Demographic, NEMS, use of invasive access and diagnostic and therapeutic procedures were recorded. We calculated the Pearson correlation coefficient, a p-value of <0.05 was considered statistically significant.

RESULTS. We included 1,083 patients. Median length of stay was 3 days. Invasive devices more used were: Bladder catheter 78.2%, and central venous catheter 72.7%. Procedures: Mechanical ventilation 64.6%, and parenteral nutrition 8.6%. Drugs: antibiotics 50.9%, vasoressors 55.6% and sedation 23.5%.

Correlation between NEMS and variables studied

| VARIABLES | r   | r2  | p     |
|-----------|-----|-----|-------|
| Invasive devices (Days) | 0.881 | 0.776 | <0.001 |
| Length of stay in ICU (Days) | 0.748 | 0.559 | <0.001 |
| Length of stay in MV (Days) | 0.805 | 0.648 | <0.001 |
| Drugs IV (n) | 0.645 | 0.416 | <0.001 |
| Procedures (n) | 0.868 | 0.753 | <0.001 |

MV: Mechanical ventilation

CONCLUSION. NEMS has an excellent correlation with length of stay in ICU, use of invasive access, procedures and drugs IV. NEMS can be used as a surrogate marker of use of resources in Latinamerican ICU’s.

REFERENCES.

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VOLUME OF ACTIVITY AND OCCUPANCY-RATE IN INTENSIVE CARE UNIT (ICU). ASSOCIATION WITH MORTALITY.

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INTRODUCTION. Mortality after many procedures is lower in centres where more procedures are done. It is controversial whether this is true for ICU too. We examined the relationship between volume of activity of ICU and hospital mortality of all ICU treated patients (pts). The results are shown in tabular form below.

| Year | Number of admissions | Mean APACHE II Score | ICU Mortality % | Haemofiltration % | HES Units/Cost | Gelatin Units/Cost | Total Cost (€) | Cost/patient (€) |
|------|---------------------|---------------------|-----------------|-------------------|---------------|------------------|---------------|------------------|
| 2000/1 | 536 | 16.8 | 16 | 6.2 | 5249/8208 | 298/8130 | 19422 | 36.24 |
| 2001/2 | 551 | 16.8 | 14.2 | 8.7 | 5249/8208 | 298/8130 | 16338 | 29.65 |
| 2002/3 | 629 | 16.2 | 13.4 | 6.2 | 5249/8208 | 298/8130 | 14161 | 22.51 |

RESULTS. The results are shown in tabular form below.

| Year | Number of admissions | Mean APACHE II Score | ICU Mortality % | Haemofiltration % | HES Units/Cost | Gelatin Units/Cost | Total Cost (€) | Cost/patient (€) |
|------|---------------------|---------------------|-----------------|-------------------|---------------|------------------|---------------|------------------|
| 2000/1 | 536 | 16.8 | 16 | 6.2 | 5249/8208 | 298/8130 | 19422 | 36.24 |
| 2001/2 | 551 | 16.8 | 14.2 | 8.7 | 5249/8208 | 298/8130 | 16338 | 29.65 |
| 2002/3 | 629 | 16.2 | 13.4 | 6.2 | 5249/8208 | 298/8130 | 14161 | 22.51 |

CONCLUSION. A change from HES to gelatin as our standard resuscitation fluid has not had an adverse impact on ICU mortality – this has continued to decline despite unchanged APACHE II scores. The change has unfortunately had no impact on the need for haemofiltration among our patients. We have shown that by applying evidence-based medicine, significant cost savings can be made – in our case by reducing our per-patient spend on colloids by 38%.

REFERENCES.

16th Annual Congress – Amsterdam, Netherlands – 5–8 October 2003 S95
INTRODUCTION. The study reports the costs evolutions of drugs (D) and single use materials (SAM) in ICU that were rarely studied.

METHODS. Since 1998, the costs of D and SAM in 3 ICU were collected (€). The hospital budget (in € X 100) and hospital costs of D and SAM (in € X 10) were recorded.

RESULTS. The hospital budget, the costs of D and SAM for institution and for ICU are shown in figure. The hospital budget, the hospital costs of D and SAM and the ICU cost of SAM increased of 24, 59, 25 and 31%. A 6% decreased in ICU cost of D was reported. During the period, the number of admissions, ICU days increased whereas the age of patients, the length of stay in ICU and the SAPS II were not altered.

CONCLUSION. D costs in ICU decrease in contrast with other departments. The increase in SAM cost is similar to other departments.

Poster Session
Prognosis and outcome – 361

361 PRONOSTIC VALUE OF PLATELET COUNTS DROP IN NON THROMBOCYTOPENIC PATIENTS HOSPITALIZED IN INTENSIVE C

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INTRODUCTION. Recent literature suggests that platelet decrease in ICU patients could have a pronostic value. The aim of this study was to determine the threshold of platelet drop independently associated with death.

METHODS. Data from 2800 patients hospitalized more than 48 hours in nine ICUs were prospectively collected (1997-2001) for the OUTCOMEREA® database. 984 patients met the inclusion criteria: normal platelet counts at admission (>150000/mm3), and ICU stay>6 days. Six prospectively collected (1997-2001) for the OUTCOMEREA® database. 984 patients met the inclusion criteria: normal platelet counts at admission (>150000/mm3), and ICU stay>6 days. Six thresholds of platelet drops on day 4 were tested in univariate and multivariate analysis, from -10% to -60% of the highest count obtained on day 0 or 1, by 10% steps.

RESULTS. Most of the patients (96%) died within the first 30 days, an additional 22 patients died within the first year, and another 10 patients within the second year after surgery. The cTnI level was < 2 mcg/ml in 146 patients, and > 2 mcg/ml in 27 patients. The corresponding odds ratios were 33 (95% confidence interval (CI) 3.7-296; P<0.01) for 30-day mortality, 6.5 (95%CI 2.6-16; P<0.001) for 1-year mortality, and 4.5 (95% CI 1.9-11; P<0.001) for 2-year mortality.

CONCLUSION. cTnI is a powerful predictor of both, short-term and long-term all-cause mortality of patients with documented CAD or at high risk for CAD undergoing major noncardiac surgery.

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DETERMINANTS OF PROLONGED MECHANICAL VENTILATION AFTER CORONARY ARTERY BYPASS GRAFTING
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INTRODUCTION. The aim of the study was to determine patient characteristics and operative and postoperative variables responsible for the need of prolonged mechanical ventilation following coronary artery bypass grafting.

METHODS. We retrospectively reviewed the records of 1428 consecutive patients who underwent CABG at our institution between Jan 1, 2000 and Jun 31, 2002. Patients were assigned to two groups (postoperative mechanical ventilation < 12 h and > 12 h). Demographic data, risk factors, data of operative and postoperative period were collected and compared between the groups.

RESULTS. 388 patients (27.1%) required prolonged postoperative mechanical ventilation. 1040 patients (72.9%) were extubated within 12 hours following surgery. Patients who were ventilated longer were older (mean age 66.1 vs 62.2 years), they had higher Euroscore value (3.9 vs 2.7), higher rate of urgent surgery (18.8% vs 9 %), Operative risk factors for prolonged ventilation were duration of surgery and cardiopulmonary bypass (CPB), hypothermia during CPB. Postoperative complications such as reexploration for bleeding and reduced cardiac output with postoperative use of intraaortic balloon pump and inotropes had also significantly important impact on length of postoperative mechanical ventilation (table 1). Patients in prolonged postoperative ventilation group had longer ICU stay (3.3 vs 2 days).

CONCLUSION. According to our data both patient preoperative data and surgery related factors affect the length of postoperative ventilation. Identification of risk factors for prolonged mechanical ventilation can help in designing preemptive strategies for improving outcomes in these patients.

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PERFORMANCE OF CARDIAC SURGERY RISK MODELS OF NORTH AMERICA IN AN EUROPEAN UNIVERSITY HOSPITAL
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INTRODUCTION. The aim of this work was to assess, to compare and to validate the predictive models originally developed in another country should be used in our general surgical patients.

METHODS. We analyzed the records of 1428 consecutive patients who underwent CABG at our institution between Jan 1, 2000 and Jun 31, 2002. Patients were assigned to two groups (postoperative mechanical ventilation < 12 h and > 12 h). Demographic data, risk factors, data of operative and postoperative period were collected and compared between the groups.

RESULTS. 388 patients (27.1%) required prolonged postoperative mechanical ventilation. 1040 patients (72.9%) were extubated within 12 hours following surgery. Patients who were ventilated longer were older (mean age 66.1 vs 62.2 years), they had higher Euroscore value (3.9 vs 2.7), higher rate of urgent surgery (18.8% vs 9 %). Operative risk factors for prolonged ventilation were duration of surgery and cardiopulmonary bypass (CPB), hypothermia during CPB. Postoperative complications such as reexploration for bleeding and reduced cardiac output with postoperative use of intraaortic balloon pump and inotropes had also significantly important impact on length of postoperative mechanical ventilation (table 1). Patients in prolonged postoperative ventilation group had longer ICU stay (3.3 vs 2 days).

CONCLUSION. According to our data both patient preoperative data and surgery related factors affect the length of postoperative ventilation. Identification of risk factors for prolonged mechanical ventilation can help in designing preemptive strategies for improving outcomes in these patients.

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LIMITATIONS OF APACHE II IN ADJUSTING FOR CASE MIX
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INTRODUCTION. We have previously shown that patients admitted to ICU from HDU have a higher mortality rate than those admitted from other sources (1). The objective of the present study was to compare APACHE II scores and the Standardised Mortality Ratio (SMR, the ratio of observed to expected mortality) for all patients admitted to either ICU and HDU, and for those patients transferred from HDU to ICU.

METHODS. APACHE II scores and outcome data were prospectively collected in both units for eligible patients for a period of three months from mid-December 2002. Readmissions and liver transplantation were excluded.

RESULTS. There were 614 admissions, 165 to ICU and 449 to HDU. After applying exclusion criteria there were 147 eligible patients from ICU, 388 from HDU. Full data including follow up to hospital discharge is presently available on 127 and 295 respectively. 20 patients were transferred from HDU to ICU. The patients admitted to the two areas are different and the ICU patients have higher mean APACHE II scores than HDU patients. Patients transferred from HDU to ICU also have high scores. The SMR for ICU is higher than for HDU although the SMR for the pooled data is close to 1.

CONCLUSION. In this study, APACHE II underestimates mortality in a unit admitting more severely ill patients and overestimates mortality in the less ill patients admitted to HDU. The high mortality of patients requiring transfer from HDU to ICU is confirmed. The need for caution in using APACHE II to compare outcomes in units with markedly different case mix is reinforced. This may be particularly important for international comparisons.

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367
SERIAL BLOOD GLUCOSE MEASUREMENT AND OUTCOME IN INTENSIVE CARE
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INTRODUCTION. A controlled trial in mostly postoperative cardiac patients, has demonstrated that control of blood sugar to below 6.1 mmol/l using insulin and carbohydrate improves survival in those staying longer than 5 days (1). In our non-cardiac ICU, however, the trigger for insulin therapy is 10 mmol/l. Hypothesis: There may be an increased mortality in all patients with poorer control of blood sugar using the 10mmol/l threshold.

METHODS. This was a retrospective case review of 154 consecutive admissions of more than 5 days to an adult general ICU over 1 year. Patient characteristics, type of admission, diabetic history, serial blood glucose (BM) measurements to unit discharge, and unit outcome were recorded. The area under the serial measurements polygon of glucose against date/time was measured for each patient and adjusted for the duration of stay (AUC) to give a summary value. Patient characteristics, AUC values for medical and surgical survivors and non-survivors were then compared using t-tests, Wilcoxon, or F-test-testing as appropriate.

RESULTS. The main results are in table 1. There were 79 medical and 75 surgical patients with 14 and 12 deaths respectively. There were no differences in the age, sex distribution, or proportion of diabetics or mean duration of stay between survivors vs non-survivors in either group. BM values were similar in surgical (7.3, 1.2 vs 6.8, 1.3) but not medical (7.6, 1.3 vs 8.55*, 1.2) (mean, SD) survivors vs non-survivors in the AUC values for medical patients also showed a significantly greater value in non-survivors.

CONCLUSION. We were able to demonstrate a mortality rise in long stay medical patients depending on BM despite using our current treatment trigger of 10mmol/l. A finding not repeated in our general surgical patients.

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368
IDENTIFICATION OF POOR PROGNOSTIC FACTORS FOR CANCER PATIENTS REQUIRING MECHANICAL VENTILATION

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INTRODUCTION. Cancer patients requiring mechanical ventilation (MV) have a high mortality. Our objective was to identify factors related to in-hospital death in patients receiving MV for at least 24h admitted to the intensive care unit (ICU) at the Instituto Nacional de Cancer, Brazil (INCA).

METHODS. Data were prospectively collected during the first 24h of ICU stay and assessed by univariate and multivariate analysis. Patients were stratified based on type of admission, main reasons for MV and cancer diagnosis. In multivariate analysis, variables were expressed as odds ratio (CI 95%, p-value).

RESULTS. From 1216 ICU patients, 443(36.4%) required MV. ICU and hospital mortality rates were, respectively, 19.7% and 29.0% for overall patients, and 49.7% and 63.0%, for patients receiving MV. Mean age was 56.9±17.4 years. There were 282(63.7%) medical admissions and 99(22.3%) patients had haematologic malignancies. SOFA score1 was 7.8±3.9 points and predicted mortality assessed by Cancer Mortality Model2 was 73.3±20.6%. The main reasons for MV were: sepsis (57.8%); ALI/ARDS (35.2%); postoperative recovery (13.5%); central nervous system involvement (9.5%); advanced tumour (9.9%); cardiac arrest (7.4%); and pulmonary embolism (4.5%). In septic patients, pneumonia was the source of infection in 58.6%. In multivariate analysis, the following variables were selected: age (years)=1.02 (1.01-1.04, p<0.001); cancer progression=2.99 (1.63-5.50, p<0.001); performance status 1-2=2.04 (1.11-3.74, p=0.021); leukaemia=10.58 (1.16-96.94, p=0.036); Glasgow coma scale=6.27 (1.67-23.54, p=0.007); vasopressors need=2.15 (1.24-3.71, p=0.006); acute renal failure=2.89 (1.53-5.44, p<0.001); platelet count<99 (0.99-1.00, p=0.037); bilirubin=2.99 (2.42-3.68, p=0.001); postoperative recovery=0.38 (0.17-0.86, p=0.020); PaO2/FiO2<150=3.01 (1.29-6.90, p=0.011); and extensive lung involvement by any tumour=14.54 (3.66-57.65, p<0.001).

CONCLUSION. Both factors related to cancer status and acute illness were associated with poor outcome in our patients. We believe knowledge of such easily available clinical features can help health professionals in providing a better use of ICU resources, reducing inappropriate aggressive support, such as MV.

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369
RISK OF PROGRESSION OF INFECTION OR SEPSIS TO SEVERE SEPSIS AND SHOCK: THE RISSE SCORE

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INTRODUCTION. Criteria for the systemic inflammatory response syndrome (SIRS) are not specific enough to identify infected patients at risk of worsening to severe sepsis or shock. The objective of this work was to examine the incidence of and variables associated with progression of infected patients to a more severe sepis stage and to propose a new objective definition of SIRS variables

METHODS. Prospective inception cohort of patients (n=4,443) admitted to 28 intensive care units in academic centers throughout Europe during a 1-year period, and having a first infection at admission or during the ICU stay. Main outcomes measured were thirty-day cumulative incidences of severe sepsis or septic shock and hospital mortality

RESULTS. The cumulative incidence of progression from infection to sepsis (n=1,531 patients) to severe sepsis or shock - accounting for the competitive risk of death without worsening - was 22% at day-14 and 24% at day-30. Twelve variables were independently associated with worsening: temperature (≥38.2°C), heart rate (≥120/min), systolic blood pressure (≥110 mmHg), platelet count (≥150x10^9/L), serum sodium (≥145 mMol/L), bilirubin (≥30Mol/L), mechanical ventilation, and 5 variables characterizing infection (pneumonia, peritonitis, primary bacteraemia, and infection with gram positive cocci or aerobic gram negative bacilli). The risk of progression from infection to severe sepsis score (RISSE) developed from these variables ranged from 0 to 49, and four classes of risk, ranging from 9% to 55%, were defined

CONCLUSION. Using objectively defined criteria for SIRS and impending organ dysfunction should help physicians stratify patients according to their level of risk, to design management strategies or testing new interventions

Grant acknowledgement: Educacional grants from Roche and GSK

* belongs to Oral Presentations. Severe infections: A worldwide issue page S75

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PERFORMANCE OF MOD, SOFA AND LODS SCORES TO PREDICT MORTALITY IN SEPTIC SHOCK PATIENTS

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INTRODUCTION. The aim of this work was to assess the mortality in septic shock patients and the performance of Multiple Organ Dysfunction (MOD) score, Sepsis-related Organ Failure Assessment (SOFA) score, and Logistic Organ Dysfunction System (LODS) score, to predict this mortality.

METHODS. Prospective observational study of 254 patients who meet the criteria for septic shock defined by the American College of Chest Physicians and Society of critical Care Medicine Consensus Conference, in a tertiary referral centre. Predicted probabilities of hospital death for patients were estimated by applying the three models and were compared with actual mortality rates. Performance was assessed by evaluating calibration with the Hosmer-Lemeshow goodness-of-fit test, and discrimination with receiver operating characteristic (ROC) curve.

RESULTS. The mortality rate was 46.1%. Chi-square values were 3.94 for MOD, 3.87 for SOFA and 4.38 for LODS. The area under the ROC curve was 0.917 for MOD, 0.912 for SOFA and 0.906 for LODS

CONCLUSION. In our experience MOD, SOFA and LODS scores perform very well, with calibration and discrimination very high, and they are appropriate tools to assess mortality in septic shock patients.
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**CORRELATION BETWEEN INFUSION PUMPS, SOFA AND OUTCOME**

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**INTRODUCTION.** It is “common wisdom” that the number of infusion pumps correlates with severity of illness and outcome. These relations were investigated.

**METHODS.** Daily SOFA scores and maximum number of infusion pumps were registered in all patients between 1/1/99 and 1/1/2003 with a length of stay >24 h. Cumulative number of pumps and cumulative SOFA scores were computed for the total ICU stay. Data are expressed as mean (SD).

**RESULTS.** Complete data were available in 1865 patients and 11027 ICU-days. The daily and cumulative SOFA scores were computed for the total ICU stay. Data are expressed as mean (SD).

CONCLUSION. Non-survivors had both higher daily and higher cumulative numbers of pumps and SOFA scores, and there is a good correlation between them. However, the number of pumps nor the SOFA score is indicative for outcome in the individual patient.

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**CAN INTENSIVE CARE SURVIVAL BE PREDICTED USING THE COMPONENTS OF SIRS AND SEPSIS?**

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**INTRODUCTION.** Scoring systems predict mortality in critically ill patients but none show the relative importance of their components. Studies on febrile medical patients [1] have previously demonstrated that some components of SIRS predicted mortality more accurately than the presence of SIRS or sepsis itself. We evaluated the criteria for Systemic Inflammatory Response Syndrome (SIRS) and sepsis [2] combined with infection site and organ dysfunction for mortality prediction in patients admitted to our Intensive Care Unit (ICU).

**METHODS.** This study was performed prospectively in a university teaching hospital general intensive care unit. Two hundred and thirty patients were included who met at least three of the following criteria: (1) Expected survival for at least 24 hours, (2) Expected stay on ICU for at least 72 hours, (3) evidence of inflammation or infection and (4) currently receiving antibiotics.

**RESULTS.** Logistic regression was used to determine which variables significantly contributed to mortality prediction on admission (day 1) and day 3. The predictive values for mortality for patients with SIRS and sepsis were compared with the new model. SIRS was present in 97% of patients and 51.7% had confirmed sepsis. On day 1 only soft tissue infection or coagulation dysfunction significantly predicted death. However, day 3 variables significantly predictive for death were circulatory and respiratory dysfunction, leucocytosis and soft tissue infection. These significant variables on days 1 and 3 predicted mortality better compared to categorical SIRS and sepsis.

CONCLUSION. SIRS and sepsis are poor mortality predictors in a general ICU cohort. The predictive power is markedly increased when logistic regression is used to analyse the variables of SIRS along with infection and organ dysfunction. The derived models demonstrate which significant variables contribute to mortality.

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Grant acknowledgement: Mersey Regional Health Authority

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**COMPARISON LONG TERM SURVIVAL IN SEPSIS AND NON-SEPSIS PATIENTS**

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**INTRODUCTION.** Survival is the primary goal of intensive care. As severe sepsis remains a prominent cause of mortality, morbidity and costs we studied the impact of severe sepsis on long term survival compared with non-sepsis patients (1).

**METHODS.** From September 2000- January 2003, patients admitted to the ICU for > 48 hours were eligible for inclusion. Survival was followed at discharge ICU, discharge Hospital and 3 and 6 months after discharge ICU. Severe sepsis was defined by the presence or highly likely suspicion of infection, two or more SIRS criteria and one or more dysfunctioning organ systems. Severity of disease was measured by APACHE II. Survival was analysed by Kaplan-meyer survival statistics and by the use of the log-rank test to study differences between the two groups.

RESULTS. 339 patients of whom 111 met the criteria for severe sepsis were included in the study. Eighteen patients were lost to follow up. Patients with severe sepsis (age 67 ± 12.9 ) stayed in the ICU longer (18.7 ± 11.3 p<0.1) than patients without sepsis (age 69.3 ± 11.7) Small differences were found in APACHE II scores of sepsis and non- sepsis patients (21.2 vs 18.3 respectively). Six months after discharge ICU, survival of sepsis patients was lower compared with non-sepsis patients, but this result was not significant (p = 0.15).

CONCLUSION. In contrast with the study of Sasse et al. (1) in this study patients with sepsis demonstrated a lower but not significant difference in survival compared with non-sepsis patients.

**REFERENCE(S).** K.C. Sasse et al. Long term survival after intensive care unit admission with sepsis. Critical Care Medicine Vol. 23, No 1040-1047.

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**Poster Session**

**Antibiotic therapy and resistance – 375-387**

**375**

**THE PHARMACOKINETICS OF LEVOFLOXACIN IN THE CRITICALLY ILL**

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**INTRODUCTION.** In critically ill patients a number of factors may result in altered pharmacokinetics. Potential changes in renal clearance, protein binding and volume of distribution may lead to significant changes in pharmacokinetics. This is important because clinical efficacy is thought to relate to pharmacokinetic parameters. Only one previous study has examined levofloxacin pharmacokinetics in critically ill patients [1].

**METHODS.** Ten critically ill adult patients with a normal serum creatinine and a clinical indication for administration of levofloxacin were studied. Levofloxacin 500 mg IV was administered as a 60 minute infusion. Arterial blood samples were taken at 0,60,120, 180, 300, 540 and 720 minutes after the start of the infusion. Levofloxacin concentrations were measured using high pressure liquid chromatography.

**RESULTS.** Results are given in table 1.

**Pharmacokinetic data**

| Parameter          | Mean        |
|--------------------|-------------|
| Maximum concentration mg/l | 12.3        |
| Half life (beta) h  | 9.90        |
| AUC mg.h/l         | 96.6        |
| Clearance l/h      | 6.04        |

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Grant acknowledgement: Supported by a grant from Daiichi Pharmaceuticals
ANTIMICROBIAL RESISTANCE IN NEUROLOGICALLY IMPAIRED CHILDREN REQUIRING INTENSIVE CARE.

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INTRODUCTION. Antibiotic resistance impacts on the clinical management of all patients in a paediatric intensive care unit (PICU). Identifying the high-risk patient groups allows one to formulate a patient profile for your unit.

METHODS. From March 1999 until February 2002, 28 children diagnosed with cerebral palsy (CP) were admitted to our PICU for 4 or more days. As part of a microbiological surveillance program, rates of microbial carriage, infection, and antibiotic resistance were monitored prospectively.

RESULTS. 89% of these CP children (25/28) carried abnormal bacteria (Klebsiella, Pseudomonas aeruginosa and MRSA) in throat and gut. 57% (16/28) carried resistant bacteria – ceftazidime-resistant Pseudomonas species by 12 children (43%) and MRSA by 4 children (14%). Once identified, our unit has a policy of administering selective decontamination in order to eradicate carriage of abnormal (resistant) flora, and hence infection with this flora. During their PICU stay, 15 CP children (54%) developed 34 infections. Lower airways (15) and blood (9) were the two most commonly infected sites, whilst Pseudomonas aeruginosa (12) and coagulase-negative staphylococci (7) were the predominant infecting organisms. One child acquired two infections with different resistant bacteria. 74% of these infections were primary endogenous infections, i.e. resulted from abnormal bacteria they carried on admission to the PICU. Median PICU day of infection was 4.5 (IQR 2–31). Infection rates in this group were higher than the overall rates for CPICU. 21% of the children (6/28) died during their PICU admission, compared to an overall PICU mortality of 4.25% and for PICU patients staying 4 or more days of 9.8%.

CONCLUSION. Infection rates and mortality were substantially higher in this subset of PICU patients. They depict a major source of resistant bacteria in both the community and hospital. This finding is new and impacts on their clinical management. Neuromotorically impaired patients represent a subgroup of PICU patients that should be isolated on admission to the PICU. Surveillance cultures are mandatory in order to tailor the antibiotic therapy.

DIFFERING STRATEGIES FOR ANTIBIOTIC PRESCRIBING FOR BACTERAEMIA IN THE CRITICALLY ILL PATIENT

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INTRODUCTION. No studies can be found in the literature to inform practice of antibiotic therapy (Rx) for bacteraemia (B).

METHODS. In January 2001, a detailed questionnaire was sent to membership lists of ESICM to survey antibiotic prescribing policy. The form was returned by 201 centres; (i) start (Rx) in all cases without microbiologists or infectious disease specialists, (ii) start (Rx) occasionally together with microbiologists or infectious disease specialists, (iii) start (Rx) routinely (79.7%, range 43.8–100) and the microbiologists nor infectious disease doctors input; (iv) only 10.4% (range 0–50) and in 7.6% (range 0–15.8) of cases. First line antibiotic therapy was within the guidelines and second line antibiotic therapy was within the guidelines in 82.3% and 84.1% of cases respectively. The antibiotic mix is divided into five different antibiotic strategies.

RESULTS. A total of 254 ICUs responded, predominantly general (77.5%) were recruited. The predominant general (77.5%) and national bodies including UK, Italy and Australasia to survey antibiotic prescribing policy. Optimal practice.

CONCLUSION. Appropriate use of antimicrobials and strict hygiene measures are important for the prevention of infection from these strains which present growing resistance to broad-spectrum antibiotics.

ACINETOBACTER BAUMANNII AS A CAUSE OF BACTEREMIA IN AN INTENSIVE CARE UNIT

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INTRODUCTION. Bacteria due to Acinetobacter baumannii (AB) is characterized by a nosocomial infection appearing mostly in Intensive Care Units (ICUs). Treatment of AB bacteremia is complicated by the widespread spread of multidrug resistance of the organism to antibiotics.

METHODS. All cases of AB bacteremia identified during an one-year period at the 12 – bed medical-surgical ICU of a 700 bed General Hospital in Athens were registered, along with the characteristics of patients and resistance of AB to several antibiotics. The identity and MIC determinations of isolates were performed by the VITEK II AST GNO4 card (bioMérieux, France).

RESULTS. During one year (1st January - 31 December 2002), 201 critically ill patients were hospitalized in our ICU. A total of 362 blood cultures were positive. AB was present in 56 cases (23.8%). 56/210 patients (27.8%) presented one or more episodes of bacteremia due to AB. Polybacterial bacteremia occurred in 16% of AB cases. AB central venous catheter colonization was observed in 24/56 cases (42.8%). Imipenem and ampicillin-sulbactam were active against 48.1% and 78.6% of isolates respectively, followed by amikacin (22.2%), gentamicin 17.3%, tobramycin 8.6%, piperacillin – tazobactam 16% and levofloxacin 16%. The mean age of patients was 48.5 years (range 14–79) and the mean duration of ICU stay was 30.8 days (range 6 – 103). Cause of admission was medical in 60.7 %, surgical in 39.3% of cases. Known predisposing factors (1) were identified as follows: parenteral feeding 32.1%, mechanical ventilation 100%, and previous use of third generation cephalosporins 68%. Mortality rate was 30.3%.

CONCLUSION. Fifty two of AB isolates (64.2%) were resistant to imipenem and between them 41% resistance has been noted to ampicillin – sulbactam. All strains were sensitive to colistin. Fifty two of AB isolates (64.2%) were resistant to imipenem and between them 41% resistance has been noted to ampicillin – sulbactam. AB was resistant to carbapenems in 12% of cases. AB was resistant to quinolones in 64% of cases. AB was resistant to aminoglycosides in 64% of cases. AB was resistant to penicillin – β-lactamase inhibitors in 41% of cases.
CHANGE OF RESISTANCE OF HIGH RISK ICU PATHOGENS FROM 2000 UNTIL 1ST SEMESTER 2002
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INTRODUCTION. The choice of antibiotic should not be based on the subjective crisis, but on objective data. It is vital to use antibiotics for proved infection based in sensitivity data that are specific for each ICU. Only the more serious patients can receive empiric antibiotics, but with explicit time limit. The microbial resistance constitutes increasing problem of the most significance importance.

METHODS. In the present study is evaluated the change of resistance of microbial pathogens in 34 Greek ICU’s the last two years in order to be selected the suitable antibiotics and infection control measures. We studied the resistance of selected microbial pathogens from blood cultures in patients of ICU’s and we compared the percentage increase of resistance at the 1st-six months 2002 with the resistance of previous two years 2000-2001. Increase % of the recent resistance ≡(resistance 1st semester 2002-mean value of resistance 2000-2001)/mean value of resistance 2000-2001×100.

RESULTS. In the 1st semester 2002 in blood cultures were developed strains: 109 Acinetobacter Bauman., 75 P. Aeruginosa, 19 Enterobacter spp., 44 K.pneumoniae, 17 P. aureus, 119 Enterococcus

Increase % of recent resistance

| % increase | acinetobactum | pseudomonas | enterobact | klebsiella | staph | enterococcus |
|------------|---------------|-------------|------------|-----------|------|-------------|
| baum.      | pseud.       | spp          | pm         | aureus    |      |             |
| cefazidine | 9.86%        | 46.82%      | 30.56%     | 26.62%    |      |             |
| amikacin   | 4.2%         | 4.49%       | 112.12%    | -3.15%    |      |             |
| tobramycin | 49.96%       | 3.64%       | 11.19%     | 76.52%    |      |             |
| ciproxin   | 1.95%        | 6.68%       | 40.26%     | -23.84%   |      |             |
| imipenem   | 4.98%        | 62.68%      | 155.63%    | 396.04%   |      |             |
| vancomycin | 0%           | 42.74%      |            |           |      |             |

VANCOMYCN - RESISTANT ENTEROCOCCI IN AN INTENSIVE CARE UNIT
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INTRODUCTION. Vancomycin – resistant enterococci (VRE) have been first described in the late 1980’s VRE rates are higher among severely ill patients specifically those in ICU’s. Several risk factors have been identified as responsible for the colonization or/infection of patients with VRE such as demographic factors, severe illness and use of some antimicrobials. Our aim was to determine the prevalence of these factors in our patients.

METHODS. All cases of VRE strains identified from November 1999 to April 2003 at the 12 – bed multivalent ICU of our 700 bed General Hospital in Athens were registered. The identity and MIC determination of isolates were performed by the VITEK II AST – GNO4 card (bioMerieux, France). We here describe the first VRE cases isolated in our ICU and the risk factors involved.

RESULTS. From November 1999 to April 2003, 508 patients have been hospitalized in our ICU. A VRE has been isolated from 33 patients (6%, 5 %), 27 men (69%) and 10 women (31%). The mean age of patients was 45, 8 years (range 20 -75). The mean length of ICU stay was 54 days (range 7 -183). Morta-ley rate was 36 %. Sites of isolation were blood (18), intraabdominal catheters (15) and intraabdominal drainage tubes (6).Cause of admission was medical in 51% of cases and surgical in 49% of cases. Mean duration of hospitalization before VRE isolation was 20, 5 days (range 13 – 90). Risk factors were identified as follows: underlying diseases were present in 14 cases (42.5%); diabetes mellitus, pancytopenia, renal disease, malignancy. 33% of patients have been subjected to a major abdominal surgery. Use of antimicrobials preceding the isolation of VRE: third generation cephalosporins were given to 57 % of patients, fluoroquinolones to 42% and antimicrobials against anaerobes to 48%. An antistaphylococcal agent has been used in 85% of patients.

CONCLUSION. High percentages of patients received 3rd generation cephalosporins, glycopeptides, fluoroquinolones and metronidazole, presented underlying diseases or had a major surgery. Careful use of antimicrobials in ICU patients with major problems and a long ICU stay could probably protect patients from the emergence of such multiresistant strains.

EVOLUTION OF ANTIBIOTIC PRESCRIPTION AND TREATMENT DURATION IN A MEDICAL-SURGICAL ICU
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INTRODUCTION. Antibiotic (ATB) policy in an individual unit is influenced by patients characteristics and epidemiological factors that can change overtime. Antibiotic pressure depends on the spectrum and also the duration of the therapy.

METHODS. The aim of our study was to assess the pattern of ATB prescriptions and the evolution in a 5 years period. Prospective study 2 months/year from 1998 to 2002 in a 32 beds medical-surgical ICU in a reference hospital. In all the patients staying>1 day, the administered antibiotics were recorded.

RESULTS. We studied 637 patients, mean age 54.8 years, APACHE II 16.8, pre-ICU in-hospital stay 10.2 days, ICU LOS 12.4 days, and in-ICU mortality 31.5%. Some of the risk factors for developing infection were: Mechanical ventilation 414 (65%), immunosuppression 103 (18.8%) and neutropenia 22 (4%). In 201 (36.6%) patients, infection was present at admission, being 25.7% community-acquired,130 (23.7%) patients developed 228 ICU-acquired infections. In 536 (84%) patients 1352 ATBs were prescribed. The mean duration was 7.3 d (12 ATB d of stay), but the longer courses corresponded to antifungal (Anfotericin B 12.9 d, Fluconazole 10.2 d) and antiviral (Ganciclovir 17.2d, Aciclovir 11.8d) agents. Table1 shows the evolution of the most frequently prescribed ATBs.

| ATB (N) | 1998 (N=278) | 1999 (N=294) | 2000 (N=325) | 2001 (N=215) | 2002 (N=240) | Mean duration days |
|---------|--------------|--------------|--------------|--------------|--------------|-------------------|
| %       | %            | %            | %            | %            | %            |                   |
| Amoxicillin | 109         | 11.5         | 12.2         | 10.7         | 12           | 16.6              |
| Piper-Tz | 130          | 11.5         | 7.1          | 12.9         | 5.5          | 9.5               |
| Cefepime | 90           | 4.6          | 8.1          | 6.7          | 5.1          | 8.3               |
| Gatifloxacin | 92      | 5.3          | 6.4          | 4.6          | 10.2         | 8.7               |
| Amoxicillin | 81          | 6.8          | 6.4          | 3            | 6.5          | 7.9               |
| Imipenem | 3.2          | 3.5          | 1.7          | 4            | 5.1          | 5.4               |

THE VALUE OF ROUTINE MICROBIAL CULTURES DURING SELECTIVE DIGESTIVE DECONTAMINATION.
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INTRODUCTION. Routine microbial surveillance cultures are a cost-intensive part of the strategy of selective digestive decontamination (SDD). This microbiological monitoring is regarded as necessary for early identification of pathogens responsible for pneumonia, but also provides information on colonization of patients and changes of bacterial resistance during prophylactic antimicrobial therapy. This study was conducted to evaluate the value of routine microbial investigations performed during SDD on a university surgical intensive care unit (ICU).

METHODS. Data of 786 patients admitted to the surgical ICU for more than 24 hours during a two-years period were analyzed. Pneumonia was diagnosed according to Centers of Disease Control guidelines. Bacterial and mycological cultures of tracheal aspirates, nasal, pharyngeal and rectal swabs were collected on admission and then twice weekly. Both topical (polymyxine, tobramycin, amphotericin B) and systemic (cefotaxime) antimicrobial agents were routinely administered to ventilated patients who were expected to remain in the ICU for more than 24 hours.

RESULTS. A total of 75 episodes of pneumonia were diagnosed in 69 patients. Pathogenic organisms were isolated in 56 episodes, but in 10 episodes the pathogen was isolated due to routine cultures prior to the onset of pneumonia. An almost complete picture of bacterial colonization was provided when bacterial monitoring was restricted to regular tracheal aspirates in combination with a pharyngeal swab on admission. Candida was isolated from tracheal aspirates in 21% of patients and from pharyngeal swabs in 49% of patients. Only three episodes of pneumonia due to Candida spp. were diagnosed.

CONCLUSION. Sufficient bacterial surveillance during SDD could be provided by routine tracheal aspirates in conjunction with a pharyngeal swab on admission. Mycological cultures - for its low positive predictive values - can be restricted to high risk patients and to diagnostic cultures during infections.

CONCLUSION. High rate of ATB prescriptions in high risk patients. In general, duration of treatment was low, except for antifungal and antiviral agents. No increase in the use of wide-spectrum ATB.
In the study period 78 patients were treated in the ICU for perforated gut. 268 digestive tract (SDD) was used to prevent secondary endogenous infection. Amfotericin B after April 2000. In addition, since April 2000 selective decontamination of the gut. The standard antibiotic therapy was piperacillin plus gentamycin and meropenem. February 2003, who were treated for perforation of the gut (both upper and lower digestive tract)

METHODS.

In a prospective (06/00 to 01/01) multicentric (176 centres) study, all the patients (pts) undergoing surgery for intra-abdominal infections (except postoperative peritonitis) were evaluated. Clinical and microbiological parameters were collected. Changes and duration of AB were decided by the attending physician. The consequences of AB changes performed before or after identification (ID) of the pathogens were assessed on the outcome. The efficacy of AB was evaluated over 30-days of follow-up. Chi-2 test and ANOVA were used, p<0.05 significant.

RESULTS.

Among the 761 CIA pts and 247 NIA pts, AB changes were performed in 304 (47%) and 123 (62%) pts respectively (p<0.01). AB was given for 9±15 and 12±18 days in CIA and NIA groups (p<0.01). AB changes were decided in 427 pts (including persistant infection n=88, organs resistant to initial AB n=101, superinfection n=28). Success was obtained in 92% and 82% of CIA and NIA, with contrasted results (table1). Early AB changes and repeated changes were mostly observed in situations of clinical worsening or absence of improvement.

Criteria of severity and prognosis expressed in %

| Criteria of severity and prognosis | AB | CIA (n=175) | NIA (n=169) | CIA (n=62) | NIA (n=62) |
|-----------------------------------|----|------------|------------|------------|------------|
| ICU Admission                     | 9  | 19*        | 21*        | 39*        |
| Mech ventilation                  | 3  | 7          | 10         | 16*        |
| Change AB                         | 12 | 31         | 13         | 42         |
| Clinical failure                  | 2  | 5          | 2          | 8          |
| Resistant bacteria                | 11 | 15         | 8          | 8          |

*p<0.01 vs A; ** p<0.01 vs no change in the same group

CONCLUSION.

Early or repeated AB changes reflect a clinical situation of crisis or therapeutic failure. Those results reinforce the plea for adequacy of AB from the empirical phase of treatment.

Grant acknowledgement: GSK France

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EPIDEMIOLOGY AND TRENDS IN PATIENTS WITH ABDOMINAL SEPSIS DUE TO A PERFORATED GUT

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INTRODUCTION.

Patients with perforation of the gut with faecal peritonitis and sepsis syndrome usually need intensive care treatment. Antibiotic therapy and supportive care are the cornerstones of treatment. We studied the epidemiology and time-trends in this patient population observed in our ICU over four years.

METHODS.

This observational study describes the patients in the ICU, from October 1998 till February 2003, who were treated for perforation of the gut (both upper and lower digestive tract) with abdominal sepsis. The standard antibiotic therapy was piperacillin plus gentamycin and metronidazole before April 2000 and cefotaxime plus ciprofloxacine plus metronidazole plus amfotericin B after April 2000. In addition, since April 2000 selective decontamination of the digestive tract (SDD) was used to prevent secondary endogenous infection.

RESULTS.

In the study period 78 patients were treated in the ICU for perforated gut. 268 abdominal cultures were obtained in 61 of these 78 patients (of 17 patients the results were not recorded) revealing 69 Enterobacteriaceae, 13 Pseudomonas, 12 Acinetobacter, 33 Candida 65 Enterococci, 19 anaerobes and 67 others. Time trends are shown in the table. The mean age varied over the study period between 67 and 71 years. Before the change in antibiotic policy the mortality was 9/17 patients; SMR 1.15 (95%CI 0.52-2.19), after implementation of SDD the mortality was 18/61; SMR 0.63(95% CI 0.37-1.00).

| Criteria of severity and prognosis | AB | CIA (n=175) | NIA (n=169) | CIA (n=62) | NIA (n=62) |
|-----------------------------------|----|------------|------------|------------|------------|
| ICU Admission                     | 9  | 19*        | 21*        | 39*        |
| Mech ventilation                  | 3  | 7          | 10         | 16*        |
| Change AB                         | 12 | 31         | 13         | 42         |
| Clinical failure                  | 2  | 5          | 2          | 8          |
| Resistant bacteria                | 11 | 15         | 8          | 8          |

*p<0.01 vs A; ** p<0.01 vs no change in the same group

CONCLUSION.

Early or repeated AB changes reflect a clinical situation of crisis or therapeutic failure. Those results reinforce the plea for adequacy of AB from the empirical phase of treatment.

Grant acknowledgement: GSK France

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ANTIBIOTIC THERAPY OF COMMUNITY-ACQUIRED PERITONITIS: EVALUATION OF FOUR EMPIRICAL REGIMENS

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INTRODUCTION.

A large number of antibiotic regimens (AB) have been recommended in the empirical treatment of community-acquired peritonitis (CP)1. However, none of them have been clearly assessed in open epidemiological studies. The aim of the current study was to describe the type of patients (pts) receiving the most prescribed AB in CP.

METHODS.

In a prospective (06/00 to 01/01) multicentric (176 centres) study, 761 pts undergoing surgery for CP were collected. Demographic parameters, severity criteria and prognosis of the pts receiving one of the four most prescribed AB were assessed: amoxicillin/clavulanic acid (AA) alone or combined with aminglucosides (AA), third generation cephalosporins+imidazoles (CI) alone or combined with aminglucosides (CIA). AB choices and management were left to the attending physician. Results are expressed as % and compared by Chi-2 test.

RESULTS.

468 pts (61%) were analysed (table1). Demographic data were similar in all groups (Male 59%, mean age 49±20 years, non underlying disease 92%). Proportions of success were similar in all groups (A:96%, Al:90%, CI:95%, CIA:89%). Pts without any AB changes had similar proportions of success (A:96%, Al:96%, CI:94%, CIA:97%).

CONCLUSION.

AB selection depends directly on the clinical severity of CP. Although AA, CI and CIA regimens were selected by the french consensus1, no recommendation has been edited based on clinical severity, an issue probably to take into account.

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IS IT BETTER TO ADMINISTER VANCOMYCIN BY CONTINUOUS INFUSION?

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INTRODUCTION.

Antibiotics that require a prolonged time above MIC can be given by a large loading dose and short dosing intervals to maintain therapeutic levels. Since optimal therapy with vancomycin depends on maintaining serum concentrations above the MIC, it has been suggested that continuous intravenous infusion may be a suitable mode of administration, as it would achieve a flat concentration-time profile. This study evaluates if vancomycin therapy is more effective with the use of intravenous administration by continuous infusion compared to our previous practice of intermittent dosing.

METHODS.

Dosing guidelines for continuous infusions were developed from a simulation study. Effective with the use of intravenous administration by continuous infusion compared to our previous practice of intermittent dosing.

RESULTS.

The two groups were comparable in terms of age, M:F ratio, concomitant antibiotics and diagnoses. Both groups received vancomycin for a mean of 8.8 days but more drug concentrations were measured in the continuous group 152 versus 114 in the intermittent group. 110 (72%) of the samples were in the target range of 15-25mg/l for the continuous group but only 57 (50%) of the predicted troughs were in the target range of 5-15mg/l for the intermittent dosing group. The continuous group demonstrated a trend towards faster resolution of MRSA infection by 2 days (p=0.04). No patients in either group experienced toxic side effects.

CONCLUSION.

Vancomycin can be safely administered by infusion using appropriate guidelines developed from known pharmacokinetic variables. The higher achieved plasma concentrations may be associated with increased efficacy.

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**PARENTERAL GLUTAMINE ATTENUATES INSULIN RESISTANCE IN MULTIPLE TRAUMA PATIENTS**

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**INTRODUCTION.** Skeletal muscle accounts for 80% of insulin mediated glucose uptake. It seems presumable that muscle wasting prevention by glutamine administration could attenuate insulin resistance in multiple trauma patients.

**METHODS.** 40 multiple trauma patients randomised into 2 groups, both of 20 patients. They were receiving isocaloric nutrition. Control group (C) were receiving 1.5 g of AA/kg bw/24 h (standard parenteral AA solution without glutamine), tested group (AG) were receiving 1.1 g of AA/kg bw/24 h as standard AA solution and 0.4 g/kg bw/24 h of parenteral dipeptide alanlyglutamine (AG). Euglycemic hyperinsulinemic clampings were performed on the 4th and 8th day.

**RESULTS.** On the 4th day, the better insulin-mediated glucose disposal was found in Group AG, but without significant difference from Group C. On the 8th day after injury, insulin sensitivity in Group C was significantly smaller than in Group AG (p < 0.03).

**CONCLUSION.** Nutrition with parenteral AG administration significantly attenuates insulin resistance in multiple trauma patients.

**Grant acknowledgement:** Supported by a grant of Charles University GAUK 60/2001.

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**POSTOPERATIVE INCREASED METABOLISM OF ASCORBIC ACID**

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**INTRODUCTION.** Reduced ascorbic acid (AA) concentration in plasma in the postoperative period has been well documented (1-4). The underlying reason is not clear but only an altered postoperative AA consumption would justify a postoperative substitution.

**METHODS.** The AA consumption was investigated pre- and postoperatively on 18 patients undergoing major maxillofacial surgery. The metabolic clearance (Clmet) of AA in plasma was calculated on the first postoperative day and compared to the preoperative values subsequent to bolus-injection of AA, 6 mg/kg body weight. Blood specimen were taken before and after 5, 15, 30, 45, 60, 90, 120 and 240 minutes after injection. Urine was collected. AA in plasma and urine was analyzed using a high performance liquid chromatographic technique.

**RESULTS.** The preoperative concentration of Clmetra was 4.0 ± 1.9 l/h (mean/SD). On the first postoperative day Clmetra (6.3 ± 2.5 l/h [mean/SD]) increased significantly (p<0.001). A dose of approximately 1155 mg/d AA should be necessary to compensate the losses.

**CONCLUSION.** There is a significantly increased postoperative metabolism of AA that should be considered for future dosage recommendations in postoperative patients.

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**Grant acknowledgement:** The study was supported in part (vitamin ampulles, part of the costs for analyzing ascorbic acid) by Pharma-Forschung, Gieen, Germany. We disclose any advisory board affiliations in Pharma-Forschung GmbH sponsoring the research.

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**EFFECTS OF DIFFERENT TYPES OF ENTERAL NUTRITION ON RELEASE OF SERUM CHOLECYSTOKININ**

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**INTRODUCTION.** Cholecystokinin (CCK) is a major stimulator of exocrine pancreatic secretion. Serum levels of CCK are low in fasting and in parenteral nutrition, and stimulated in intraduodenal administration of nutrients. There is little evidence of CCK release in jeunally fed patients. Aim of the study was to test the impact of different routes of administration and types of enteral nutrition on CCK release.

**METHODS.** 25 patients after acute pancreatitis were enrolled into the study. CCK, gastrin, insulintolike growth factor-1 (IGF-1), and glycaemia levels were estimated in every patient under different types of nutrition: total parenteral nutrition, total enteral nutrition into the jejunum, total enteral nutrition into the stomach, and oral bolus sipping. Oligopeptide and whole protein formulas were used for enteral feeding. CCK was estimated by EIA, gastrin and IGF-1 were estimated by RIA. The results were statistically evaluated by ANOVA.

**RESULTS.** Administration of oligopeptide formula represented the highest trigger on CCK levels in bolus (sipping) feeding (average 452.9 pg/mL) in comparison with continuous enteral feeding into the stomach (average 390.3 pg/mL), jejunum (average 384.2 pg/mL), and parenteral nutrition (average 379.9 pg/mL). Similarly, administration of whole protein formula represented the highest trigger on CCK levels in sipping (average 498.7 pg/mL) in comparison with continuous enteral feeding into the stomach (average 385.5 pg/mL), and jejunum (average 388.9 pg/mL). The results were statistically significant (p<0.05).

**CONCLUSION.** The results indicate that either parenteral nutrition, and enteral nutrition with oligopeptide and whole protein formula administered continuously into the stomach or into the jejunum have a very low impact on exocrine pancreatic stimulation in comparison with oral intake. These findings support the hypothesis that use of enteral nutrition even in early stages of acute pancreatitis on in treatment of its late symptomatic complications.

**Grant acknowledgement:** The study was supported by grants: IGA MZ 6050-2/2000;FB MSM 11210001.

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**PROMOTILITY AGENTS FACILITATES POSTPYLORIC PLACEMENT OF NASOBUODENAL FEEDING TUBES IN INTENSIVE CARE**

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**INTRODUCTION.** To evaluate the effects of erythromycin, domperidone, and metoclopramide on postpyloric placement of nasoobuodenal feeding tubes, this randomized, double-blind, placebo-controlled trial was performed.

**METHODS.** Eighty critically ill, mechanically ventilated patients were involved in this study. Patients enrolled were grouped according to the Glasgow Coma Scale as being below eight points (GCS<8) or above eight points (GCS>8). The two groups, GCS<8 or GCS >8 were then randomized independently to receive four different medications via nasoenteric feeding tube: erythromycin (E Group), domperidone (D Group), metoclopramide (M Group), and placebo (water) (P Group) followed by blind placement of a feeding tube. Then patients were given right semi-decubitus and 30° fowler position for an one hour.Tube placement was verified by an abdominal radiograph.

**RESULTS.** The rates of postpyloric placement were significantly better in E Group (17/20), D Group (14/20), and M Group (11/20) than P Group (2/20) (p<0.05; p=0.0000). In patients with GCS<8, the success rates with erythromycin (8/10), domperidone (6/10), and metoclopramide (4/10) were significantly higher than placebo (0/10) (p<0.05 ; p=0.007). In the GCS >8 group the success rates with erythromycin (8/10), domperidone (8/10), and metoclopramide (7/10) were significantly higher than with placebo (2/10) (p<0.05; p=0.0144). On the other side, no difference was noticed in the success rates of all these drugs with comatose and noncomatose patients.

**CONCLUSION.** Erythromycin, domperidone, and metoclopramide are effective in facilitating placement of a nasoenteric feeding tube into the duodenum in both coma patients (GCS<8) or noncomatose patients (GCS >8), mechanic ventilated critically ill patients.
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INTRODUCTION. Pulmonary aspiration of enteral tube feed is both common (up to 40%) and a leading cause of pneumonia [1]. The conventional glucose oxidase dipstick test has been shown to be inaccurate and its use has been abandoned [1]. The modified glucose oxidase test monitors aspiration by both glucose enrichment of standard feed and semi-quantitative measurement of glucose concentration in the tracheal secretions, improving both sensitivity and specificity [2].

Using this test we performed a pre- and post-intervention observational study to examine the effect a multidisciplinary educational program supported by a clinical information management system (CIMS)Centricity QS, GEMS-IT, Annapolis, USA) aimed at reducing the incidence of aspiration of enteral feed in critically ill intubated patients.

METHODS. There was a 6 month multidisciplinary educational period during which time the CIMS was also updated with fields to prompt the user with regard to semi-recumbence and monitoring of tracheal and pharyngeal secretions. The educational program consisted of formal tutorials and daily ward round reinforcement aimed at improving interventions related to the reduction of pneumonia and pulmonary aspiration. Protocols for measuring gastric residual volumes in fed patients were enforced and feeds withheld or pro-kinetic agents introduced as needed. Pulmonary aspiration of enteral feed was monitored 3-4 times daily. Data collected was analysed using the Fisher’s Exact test.

RESULTS. The pre-intervention group (n=25) had an incidence of feed aspiration of 44% and a prevalence of 69/1000 intubation days. The post-intervention group (n=43) had an incidence of feed aspiration of 19% (p<0.05) and a prevalence of 30/1000 intubation days (p<0.05).

CONCLUSION. With appropriate education and interventions, pulmonary aspiration of enteral feed can be reduced in the critically ill intubated patient.

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Pulmonary Aspiration of Enteral Feed as Detected Using a Modified Glucose Oxidase Test.

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INTRODUCTION. Accurate measurement of energy expenditure is essential in patients receiving nutritional support to meet metabolic needs and avoid the complications of over or under-feeding. The purpose of this study was assess energy expenditure by indirect calorimetry and estimated the stress factor for Harris-Benedict equation.

METHODS. The study was a prospective conducted in a polyvalent ICU. Patients were enrolled and divided into 5 groups based on type of admission. Epidemiologic and demographic data were collected. We measured resting energy expenditure by indirect calorimetry, estimated resting energy expenditure by Harris-Benedict equation and estimated the stress factor for Harris- Benedict equation.

RESULTS. 129 patients were included (33% female, 67% male) with a median of age 64 years old. 298 measurements were made with 9 hours of median valuable time. The mean values determined by Harris-Benedict equation were significantly lower (25%) than the mean values by indirect calorimetry. The stress factor median for Harris-Benedict equation was 1.31.

CONCLUSION. Indirect calorimetry represents the most valuable tool for measured resting energy expenditure, but we could conclude from our study that, when associated estimated resting energy expenditure by Harris-Benedict equation with the stress factor (1.25-1.35) could be a precious tool to estimate resting energy expenditure.

Nutrition in critically ill patients during high level/complex care (Italian intensive care units)

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INTRODUCTION. Nutrition (fasting, parenteral-PN, enteral-EN and mixed-MN) in critical illness was revised in a prospective study on costs in 45 Italian ICUs.

METHODS. Enrolment criteria: ICU stay longer than 47 hours, non-traumatic brain haemorrhage (BH), stroke (ST), acute COPD, ALI/ARDS, trauma (T), brain trauma (BT), heart failure (HF) and major abdominal surgery (AS). Exclusion criteria: pts who never received high level of care (HLC) (Iapichino: Intensive Care Med 2001). Nutrition and calorie supply were monitored from the first to the seventh HLC day.

RESULTS. 388 pts received HLC for at least one day. 9.3% of the pts were never fed (25.8% of HF were not fed), 13.6% received only PN (78.9% of AS), 39.7% of pts received pure EN and 23% (all AS included) were never given with. 8% of pts received only MN (15% of T and BT), 77.1% of the all pts received some day of MN (gut use). In 78.5% of 2115 pts HLC days nutrition was given. Higher EN prevalence was in ALI/ARDS (41.3%), HF (47.5%) and BH (47.7%). The prevalence of PN was low in all the groups excepted in AS (73.3%). Gut use was given between 50% and 76% of all HLC days excepted in AS (58%). On the 1st HLC day enteral mean calorie intake (8-14 kcal/kg) was not statistically different: 1) for all diagnosis groups given pure EN as well as those given MN 2) within same diagnosis groups when comparing EN vs MN supply. The mean enteral calorie intake between 4th and 7th day in each diagnosis group was higher with EN (15-19 kcal/kg) than with MN (11-14 kcal/kg) (P<0.001). Both EN and MN intakes also differed among diagnosis groups (P<0.05). Enteral calorie supply with EN increased with time in all diagnosis groups. With MN it remained stable in T, BT and COPD, while there was a minor trend to increase in BH, AS, and ALI/ARDS.

CONCLUSION. Nutrition is consistently and early given in critical disease, gut supply is widely used except in AS. Pure EN calorie intake is below the need on the first HLC day of illness but increases approaching 20 kcal/kg/day. Energy supply by the enteral route in MN (8 and 12 kcal/kg), is quite similar for all diagnostic groups at the first HLC day. In the following days, the enteral component of MN (unlike pure EN) remained substantially stable, suggesting that is given according to standard criteria and is not titrated on clinical grounds.
1). Energy supply did not change within group A (p=ns) and increased within group B over time. Energy supply (kcal/d) was different between the two groups on days 1 and 4 (Table of AN were documented. isocaloric levels and remained unchanged until day 5. Patients underwent daily metabolic hypocaloric energy supply (50% on day 1), which was increased progressively until day 3 to days. Energy requirements were calculated as 25 kcal/kg/d. Patients of group A were planed to assure adequate energy supply from admission. We have, therefore, undertaken this prospective study to compare isocaloric and hypocaloric starting of AN in critically ill patients.

METHODS. On the day after ICU admission (day 1), 41 consecutively, critically ill medical patients were randomised into two groups (group A: n=21, group B: n=20). Study period was 5 days. Energy requirements were calculated as 25 kcal/kg/d. Patients of group A were planed to receive isocaloric supply during the study period. Patients of group B were intended to obtain hypocaloric energy supply (50% on day 1), which was increased progressively until day 3 to isocaloric levels and remained unchanged until day 5. Patients underwent daily metabolic monitoring and the incidence of hyperglycemia as well as the number and causes of interruptions of AN were documented.

RESULTS. Energy supply (kcal/d) was different between the two groups on days 1 and 4 (Table 1). Energy supply did not change within group A (p=ns) and increased within group B over time (p<0.05). Hyperglycemic events were more frequent in patients of group A (n=83) compared to group B (n=40) (p<0.05). Interruptions of AN occurred more often in patients of group A (n=15) than in patients of group B (n=4) (p<0.05).

| Group A (n=21) | Group B (n=20) | p-value |
|---------------|---------------|---------|
| Day 1 1002 ± 540 | 550 ± 287 | <0.01 |
| Day 2 1298 ± 760 | 1263 ± 429 | 0.63 |
| Day 3 1664 ± 484 | 1664 ± 484 | 0.06 |
| Day 4 1717 ± 586 | 1717 ± 586 | <0.05 |
| Day 5 1656 ± 657 | 1656 ± 657 | 0.11 |

CONCLUSION. An isocaloric start of AN did not meet energy requirements of critically ill patients during the first 5 days after admission to a medical ICU, and it was associated with higher complication rates. A hypocaloric beginning of artificial nutrition, therefore, seemed to be more suitable for nutritional therapy in these patients.

RELIGIOUS PERSPECTIVES ON ORGAN DONATION

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INTRODUCTION. A year long project was undertaken to research the UK’s major religions’ perspectives on organ donation. A multi-faith conference in the UK in 2000 showed that despite religious leaders’ public and strong consensus in favour of organ donation, this message was not being disseminated into the public arena and into some areas of health care.

METHODS. The project looked at various religious issues and enlisted the help of religious authorities, both UK and worldwide, in producing a variety of educational material. The response was very positive and a wealth of resources developed. Written leaflets and audio cassettes have been produced about organ donation and religious views of the Jewish, Buddhist, Sikh, Hindu, Christian and Islamic faiths. Important issues such as life after death and the body are discussed and various languages used. Information has been distributed to ICUs nationally with particular emphasis on areas with large ethnic minority populations. The purpose is to inform staff and to support potential donor families for whom religious opinion is important. Extra material and information is available on UKT’s website.

RESULTS. An initial survey of ICU staff had reported a definite need for staff education about religious perspectives. A teaching pack was also produced for transplant co-ordinators and donor liaison nurses to use in training programmes. A supportive CD Rom is also under development.

CONCLUSION. The project was successful in getting information into the health care setting for staff and relatives. As a consequence to the religious authorities involvement plans are now underway for both a chaplaincy conference and a Muslim religious leaders conference to continue increasing awareness and discussion of organ donation.

WITHOLDING PRACTICES IN AN INTENSIVE CARE UNIT (ICU) IN 2001-2002

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INTRODUCTION. In ICU, about 50% death after withholding (WH) (1). We reviewed the withholding practices in our surgical ICU (8 beds) by analysing the files of dead patients from January 2001 to September 2002.

METHODS. From the dead patients’ files from 01/2001 to 09/2002, we reviewed the files, the daily care files and the hospitalization reports of patients dead after a WH. we analysed : moribund character at the admission (assessed by physician), patients with evolved cancer, with acute cerebral disease, with an age > average survival (out of 26), in 17 patients assessed as moribund at admission (out of 21), 8 having an evolved cancer (out of 14) and 12 with an acute cerebral disease (out of 13). In these 32 patients with WH decision, 23 were sedated,18 were mechanically ventilated, 12 received hemodynamic support, 9 had antibiotherapy and 2 had artificial nutrition. None had hemodialysis. 29/32 families were informed of WH and 17 were present at the time of patient’s death. We noted the importance of gestures and silent pauses, while trying to understand beyond the word actually spoken. There are messages which are hidden behind certain banal remarks or behind the patients’ relatives’ aggressive behaviour. Though active listening we learned how to find the right moment to break bad news. These meetings led to a great mutual understanding so passing from a formal level to a humane relationship. The improved relationship and greater understanding led us to longer visiting hours and relatives’ active part in the patient treatment as soon as condition would allow. Relatives were invited to take an active role in weaning the patient from artificial nutrition. In this way they felt useful and gradually the intimate relationship between family members was renewed after the brusque interruption.

CONCLUSION. This experience showed that you cannot draw up guidelines which would be useful in communicating with families. The relatives would immediately be aware of a formal, distant approach to their suffering. We think that relationship with the patients’ family can only be improved though real listening and a real acceptance of their suffering. The changes benefit not only the relatives but also the patients. In fact they improve life and well-being for everyone involved.
From fill rate mode to fixed rate mode (FR) at 70 beats min⁻¹, lower than with 10 beats min⁻¹ at NICO₂ device (Novametrix). The weaning test was done by switching the pump operating mode.

**METHODS.** From the recorded death cases in the Unit in 2001-2002, we analyzed the origin of patients with WH decision (home (H), emergency department (ED), medical (MW) or surgical (SW) wards and other institutions (OI) and the durations of stays before and during ICU.

**RESULTS.** Among 703 admitted patients, 96 (13%) died including 42 with WH decision. The distribution of patients origins and the durations of stays before and during ICU are shown in figures 1 & 2.

CONCLUSION. 27 (67%) patients with WH decision come from a medical or surgical wards. Among them, 12 (44%) had a duration of stay before ICU greater than 7 days arising the question of an earlier WH decision before ICU.

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**Poster Session**

**Cardiovascular dynamics:**

**The role of therapy (II) – 401-411**

**401**

**USING NON-INVASIVE CARDIAC OUTPUT MEASUREMENT IN A PROTOCOL OF WEANING OF NOVACOR LVAD**

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**INTRODUCTION.** We assessed the native cardiac function in a patient with dilatative cardiomyopathy who was under mechanical assistance with a Novacor – LVAD (Baxter Health Care Corp.) for six months. The patient was intubated for an abdominal wall repair, and postoperative, we tested him for a potential weaning from Novacor.

**METHODS.** The assessment of the adequacy of the native cardiac function was done with the NICO₂ device (Novamatrix). The weaning test was done by switching the pump operating mode from fill rate mode to fixed rate mode (FR) at 70 beats min⁻¹, lower than with 10 beats min⁻¹ at every 30 minutes, down to 30 beats min⁻¹.

**RESULTS.** While the left ventricle was totally assisted (fill rate mode) by the Novacor, the cardiac output measured by NICO₂ (CO₂/CO = native CO + pump output) was higher than the pump output (PO). Because of the still existing native cardiac output, echocardiographic revealed by the native aortic valves openings. During the weaning protocol we observed that the CO₂/CO remain quite stable, despite the diminishing of the PO (see table). That lead us to the conclusion that the patient native cardiac function had recovered enough and we could start the conventional weaning protocol.

**CONCLUSION.** The assessment of the adequacy of the native cardiac function with the NICO₂, when we intend to wean the patients from Novacor LVAD provides accurate data. Those results were close correlated with the results of the conventional weaning test done 48 h later, in which we used echocardiography (a stable LVEF about 35%, a very significant improvement, LVEF being 18% before the Novacor implant). Those results were further confirmed by the patient good general status after the explant of the LVAD.

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**STRICT HEART RATE CONTROL BY CONTINUOUS BETA-BLOCKADE ATTENUATES Natriuretic Peptide Release**

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**INTRODUCTION.** Plasma levels of natriuretic peptides may serve as important markers for acute coronary syndromes and left ventricular performance. The present study was designed to determine whether systemic heart rate (HR) control achieved by continuous peroperative administration of the short-acting beta-blocker esmolol might influence on peroperative cardiac neurohormonal activation and myocardial ischemia.

**METHODS.** With approval of the local ethics committee 34 patients scheduled for elective abdominal aortic surgery were randomly assigned to receive strict HR control (n=17, esmolol) to a target HR of 20% below baseline measurements by continuous peroperative treatment with esmolol or standard therapy (n=17, control). HR control began after induction of anesthesia and continued for 48 hours thereafter. Monitored variables included invasive arterial and pulmonary artery pressures, cardiac index, and automated ST-segment analysis of leads II and V5 of the electrocardiogram. Plasma samples were analyzed for atrial (ANP) and brain (BNP) natriuretic peptide, and cardiac troponin T (cTNT) after induction of anesthesia, 20 minutes after aortic clamping, after declamping, at the end of surgery, and in the morning of the first and second postoperative day.

**RESULTS.** There was no incidence of esmolol-related adverse events such as congestive heart failure, bronchospasm, or prolonged haemodynamic instability. Target HRs were achieved in all patients receiving esmolol. Cardiac index, mean arterial and pulmonary artery pressures did not differ among groups. Plasma levels of ANP and BNP were comparable between the groups at baseline. ANP and BNP levels increased significantly in both groups, reaching peak values at the end of surgery (esmolol 9.1±5.2 pg/mL, control 9.2±3.19 pg/mL; control 8.2±5.1 pg/mL, and 16.2±4.7 pg/mL). Although plasma levels of ANP did not differ among the two groups, BNP release was significantly higher in the control group. cTNT values remained unchanged in all patients throughout the whole study period.

**CONCLUSION.** Strict HR control achieved by continuous peroperative administration of esmolol was associated with an attenuated BNP release, which might reflect reduced myocardial wall stress. The markedly increased BNP concentrations in the control patients could be the result of a temporary ventricular dysfunction, suggesting short-term myocardial ischemia.

Grant acknowledgement: This study was supported by Baxter Healthcare Corp., Germany

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**APPLICATION OF NTG RESTORES IMPAIRED MICROVASCULAR PERFUSION IN GASTRIC TUBE RECONSTRUCTION**

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**INTRODUCTION.** Esophagoplasty with gastric tube reconstruction is the surgical treatment for patients with cancer of the lower esophagus. Complications are stenosis of the gastric tube (25-40%), and leakage of the cervical anastomosis (5-10%), which are associated with impaired microvascular bloodflow (MBF) and ischemia of the gastric tube. Venous congestion might contribute to an impairment of gastric MBF and tissue oxygenation. Aim of the present study was to determine MBF and microvascular Hb saturation in different parts of the gastric tissue during reconstruction. It was hypothesized that local application of nitroglycerine (NTG) could resolve impaired flow if caused by venous congestion.

**METHODS.** In 18 patients, MBF was determined with laser Doppler flowmetry and mHbSO₂ with reflectance spectrophotometry. The O₂C device (Lea Medizintechnik, Giessen, Germany) incorporates both techniques, allowing simultaneous measurements in the same tissue volume. Measurements were performed in the lower, middle, and upper part of the gastric tube, following opening of the abdomen (T=0), ligation of the gastric arteries (T=1), construction of the gastric tube (T=2), and completion of the anastomosis (T=3). Then topical application of NTG was performed at the fundus. At each stage, systemic hemodynamics were recorded.

**RESULTS.** Although MBF did not change significantly in the pylorus and corpus, at the fundus MBF decreased progressively from 212 ± 52 AU at T=0 to 68 ± 48 at T=3 (p<0.05). mHbSO₂ was between 55 and 65 % in all places at baseline, and did not change significantly during the reconstruction. Hemodynamic parameters remained stable. Following application of NTG at the fundus, MBF increased with 100 %. No changes was observed in the mHbSO₂, or in systemic hemodynamics.

**CONCLUSION.** During gastric tube reconstruction, MBF but not mHbSO₂, was impaired near the cervical anastomosis. This might at least partly be attributed to congestion of the venous compartment, because local application of the venuodilator NTG resulted in a partial restoration of the MBF. It might be assumed that congestion of the microvascular bloodflow is compatible with an initial preservation of the mHbSO₂, whereas an exclusive arterial flow impairment would result in a decrease of mHbSO₂ as well. Further research is necessary to investigate the effect of peroperative administration of NTG on the microvascular oxygenation of the gastric tube tissue.
**EFFECT OF CONTINUOUS POSITIVE AIRWAYS PRESSURE ON HEPATIC FLOW IN PATIENTS WITH COPD**

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**INTRODUCTION.** The aim of this study was to compare the effects of continuous positive airways pressure (CPAP) on hepatic flow in health subjects compared to patients with chronic obstructive pulmonary disease (COPD)

**METHODS.** Ten stable copd patients (age: 69.2 +/- 6.4 yrs; sex ratio: 2 female, 8 male) and eleven health subjects (age 36.9 +/- 8.8; sex ratio: 6 female, 5 male) underwent an echo-doppler examination of hepatic flow before and after the application of cpap. At the baseline and after 10 minutes of 1 cm H2O of cpap delivered by face mask we obtain the values of the portal vein blood velocity (PV), hepatic artery (LRI) and splenic artery (SRI) resistivity index. No further examination of hepatic flow before and after the application of cpap. At the baseline and after 10 minutes of application of cpap we obtained the values of resistivity index.

**RESULTS.** At the baseline the mean values in health subjects were: LRI 0.65 +/- 0.08; SRI 0.55 +/- 0.07; PV 30.9 +/- 13.0 m/sec. After cpap there was a significative increase of LRI (0.70 +/- 0.07 p=0.49) and of PV (31.4 +/- 13.0 m/sec). At the baseline and after 10 minutes of application of cpap we obtained the values of resistivity index.

**CONCLUSION.** The results of this study suggest that in health subjects cpap causes a decrease of venous portal flow and hepatic artery flow. In patients with severe copd the application of cpap could improve the hepatic flow.

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**HEMODYNAMIC EFFECTS OF NITROGLYCERIN AND LEVOSIMENDAN DURING DIFFICULT WEANING**

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**INTRODUCTION.** The aim of our study was to pharmacologically reduce preload and afterload in a group of difficult to wean MICU patients (pts) during transition from mechanical ventilation (MV) to spontaneous breathing.

**METHODS.** 8 male pts were studied. All of them were catherized with a Swan Ganz catheter, after following at least 2 unsuccessful T-piece trials on 2 consecutive days. Hemodynamic and blood-gas parameters were monitored before (pressure-support mode) and during the first 10 min of the T-piece trial. In 4 pts (2 COPD with CHF and 2 IFP with Cor Pulmonale - called N group) an IV infusion of nitroglycerin was started, titrated to maintain a normal blood pressure, while in 4 pts (4 COPD with CHF), a 24-hour infusion of levosimendan was started (L group). Measurements were repeated in 60' of the T-piece trial.

**RESULTS.** Pts hemodynamics are shown in tables 1 and 2. 2 pts of the N group were successfully extubated, while in 2 MV was resumed (new infection). All 4 pts of the L group were successfully extubated, while 2 were re-intubated (GI bleeding, new infection). Comparison between the 2 drugs showed a more pronounced effect for levosimendan in lowering Pw (p=0.0002) and V02 (p=0.0003).

**CONCLUSION.** Hemodynamic improvement by nitroglycerin or levosimendan may facilitate weaning in pts with a low cardiopulmonary reserve.

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**THE IMPACT OF VASOACTIVE DRUGS ON STATIC AND DYNAMIC PRELOAD PARAMETERS**

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**INTRODUCTION.** Optimal MAP in critically ill is still discussed. Little is known how manipulation of MAP within physiologic range with different vasoactive drugs influences static (PAP/CO/PV) and dynamic (SVV) preload parameters [1].

**METHODS.** Six normotensive patients on CMV with low/no catecholamines and without significant cardiac dysfunction (SVI > 35 ml/m2) were studied. All had PAC in situ and besides PICCO system was introduced. After baseline measurement MAP was manipulated +20 mmHg at random with stepwise titration of either NE, phenylephrine (PHE) and nripide (NB4 pts) or NE decrease (2 pts). After 30 minutes minimum new measurement was performed. Study was approved by local EC. Values as median (range). Statistics: Friedman ANOVA, Wilcoxon matched pair test; p<0.05 considered significant.

**RESULTS.** Results are summarized in Table 1. Patients remained stable between study periods (Friedman for 4 baselines NS).

| Drug                  | MAP mmHg | MPAP mmHg | CVP mmHg | PAOP mmHg | ITBV1 m/m2 | SVV % |
|-----------------------|----------|-----------|----------|-----------|------------|-------|
| Baseline              | 74 (71-81) | 25 (22-32) | 9 (8-13) | 11 (6-14) | 950 (664-1052) | 9 (7-14) |
| Norepinephrine        | 96 (93-104) | 27 (23-32) | 9 (9-12) | 12 (8-12) | 991 (712-1200) | 8 (6-11) |
| Phenylephrine         | 96 (92-112) | 29 (27-36) | 8 (9-13) | 12 (9-14) | 903 (694-1081) | 8 (7-14) |
| Nipride/NE decrease   | 63 (54-71) | 24 (20-24) | 8 (5-11) | 10 (4-13) | 874 (684-1118) | 16 (6-22)** |

* significantly different from baseline

**CONCLUSION.** SVV reflects decreased preload caused by vasodilatation better than static parameters. Pulmonary and cardiac filling pressures increase after pure aVaI stimulation more significantly than after combined aVaI/beta1 stimulation.

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Grant acknowledgement: Support: Pulsion, Geri
408 EFFECTS OF THORACIC EPIDURAL ANAESTHESIA (TEA) ON MICROVASCULAR OXYGENATION OF THE GASTRIC MUCOSA

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INTRODUCTION. The effects of thoracic epidural anaesthesia (TEA) on the microvascular oxygenation of the gastric mucosa (mHbO2) are unclear. TEA should, by splanchic sympatholysis, increase mHbO2, but undesired systemic side effects of TEA may counteract these desired regional splanchic effects. Ventilation with high positive end-expiratory pressures (PEEP) -as model of compromised hemodynamics-[1]- decreases mHbO2 by depression of systemic O2-transport (DO2) and also by regional effects, e.g. sympathetic mediated vasomotor constriction[2]; the latter should be prevented by TEA. Since effects of a TEA on mHbO2 may depend on the respective DO2, we studied the TEA-effects also after restoration of DO2 with infusion of HES.

METHODS. On 6 healthy, chronically instrumented dogs (flowmeter for cardiac output measurement, sevoflurane, mechanical ventilation, permission of local government) we repeatedly studied mHbO2 (spectrophotometry,EMPHO-II[3]) and DO2 under the following conditions: Baseline, TEA, TEA+HES, TEA+PEEP, TEA+PEEP+HES. TEA was performed randomly with lidocaine or saline (controls). Data are means±SEM. Statistics: ANOVA, p<0.05.

RESULTS. The TEA maintained mHbO2 (47±3% before and 49±4% with TEA) despite significant reduction of DO2. The HES-infusion, titrated to restore DO2 to the baseline level, even increased mHbO (49±4% to 51±4%). In contrast, TEA aggravated the PEEP-induced reduction of mHbO2 (lidocaine-TEA: 32±1% vs saline-TEA: 44±4%), in parallel with an aggravated depression in DO2. HES-infusion completely restored the depression of mHbO2 (to 45±2%).

CONCLUSION. TEA per se maintained mHbO2 -despite significantly reducing DO2- possibly by redistribution of perfusion towards the gastric mucosa. The aggravated reduction of mHbO2 by PEEP was paralleled by an aggravated depression of DO2, which together supports the concept of increased systemic sensibility, but does not indicate selective depression of regional splanchic oxygenation during TEA. The compensation of the mHbO2-depression by HES-infusion, titrated to restore DO2, also speaks against a selective depression of mHbO2 during TEA. However, during TEA there is a higher sensitivity of regional and systemic oxygenation during compromised cardiovascular conditions.

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409 EFFECTS OF CLONIDINE ON INTESTINAL PERFUSION AND OXYGENATION

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INTRODUCTION. Clonidine is an alpha-2 adrenoceptor agonist with many interesting properties, which is used more and more in intensive care medicine for treatment of postoperative delirium and alcohol withdrawal. However, clonidine is accused to severely impair gastrointestinal function by reducing gut motility and mucosal perfusion[1,2], but there is still a lack of conclusive data. This study was designed to investigate the effects of intravenously applied clonidine on intestinal perfusion and oxygenation in an acutely instrumented pig model.

METHODS. Following approval by the local animal ethics committee 19 anaesthetized, clonidine on intestinal perfusion and oxygenation in an acutely instrumented pig model.

RESULTS. During baseline there was no difference in SW in all groups (10.6 mum). In animals with PDA and HS the SW was 8.39 mum vs. 6.36 in HS animals after 60 min HS, and 7.58 mum in C plus HS animals. After reperfusion SW was 7.95 mum in HS animals, 9.36 mum in PDA plus HS and 9.90 mum in C plus HS animals.

CONCLUSION. In animals with sympatholysis during HS, the sinusoidal width was greater than in animals without sympatholysis. With PDA the SW was maintained better than with C. Sympatholysis might have a protective effect on hepatic microperfusion during haemorrhagic shock due to an increase in sinusoidal width.

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410 EFFECT OF PERIDURAL ANAESTHESIA AND CLONIDIN ON HEPATIC SINUSOIDAL WIDTH DURING HAEMORRHAGIC SHOCK

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INTRODUCTION. Ischaemia and reperfusion of the liver may occur perioperatively during surgical procedures. In these cases especially impaired microvascular flow contributes to perioperative liver injury. This animal study was designed to investigate, whether systemic sympatholysis with clonidine (C) or regional sympatholysis with peridural anaesthesia (PDA) affect hepatic sinusoidal width (SW) as one marker for sinusoidal perfusion during and after haemorrhagic shock (HS).

METHODS. Following approval by the local animal ethics committee 36 Sprague-Dawley rats were randomly assigned to one of six groups: Controls, animals with PDA, animals with C, animals with HS, animals with PDA and HS, animals with C and HS.

RESULTS. Baseline, TEA, TEA+HES, TEA+PEEP, TEA+PEEP+HES. TEA was performed randomly with lidocaine or saline (controls). Data are means±SEM. Statistics: ANOVA, p<0.05.

REFERENCES. [1]Scheeren et al., Crit Care Med 2002;30:881-7
[2]Sellden et al., Anesthesiology 1989;70:242-50

411 ENDOCRINOLOGIC EFFECTS OF A CONTINUOUS VASOPRESSIN INFUSION IN ADVANCED VASODILATORY SHOCK

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INTRODUCTION. Arginine Vasopressin (AVP) has been shown to be a potent vasopressor agent in advanced vasodilatory shock refractory to standard catecholamine therapy. A recent prospective study proved that the combined infusion of AVP and norepinephrine (NE) was superior when compared with NE infusion alone in the treatment of cardiocirculatory failure in advanced vasodilatory shock (1).

METHODS. Thirty-eight patients with advanced vasodilatory shock were prospectively randomized to receive a combined infusion of AVP and NE or NE infusion alone. In AVP patients, AVP was infused at a constant rate of 4 U/h. Endocrinologic and hemodynamic parameters were documented before, 24, and 48 hours after study entry. Endocrinologic parameters included serum concentrations of AVP, adrenocorticotropic hormone, cortisol, renin, angiotensin II, aldosterone, prolactin, endothelin, and atrial natriuretic factor. For statistical analysis, a mixed effects model was used.

RESULTS. Baseline, TEA, TEA+HES, TEA+PEEP, TEA+PEEP+HES. TEA was performed randomly with lidocaine or saline (controls). Data are means±SEM. Statistics: Wilcoxon signed rank test, Mann-Whitney-U-test.

REFERENCE(S). [1]Dünser MW, Hasibeder WR, Frisenecker BE, Knutzer H, Pajk W, Mayer AJ.

ENDOCRINOLOGIC EFFECTS OF A CONTINUOUS VASOPRESSIN INFUSION IN ADVANCED VASODILATORY SHOCK

REFERENCES. [1]Dünser MW, Mayer AJ, Ulmer H, et al. Arginine vasopressin in advanced vasodilatory shock: a prospective, randomized, controlled study. Circulation 2003 [in press]
EARLY EXTUBATION FOLLOWING PEDIATRIC CARDIAC SURGERY

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INTRODUCTION. To determine if early extubation of children undergoing paediatric cardiac surgery was feasible we initiated a program in Zagreb, Croatia in February 1999.

METHODS. Records of children undergoing cardiac surgery during the period from February 1999 to December 2002 were reviewed. A total of 341 children were identified. Deaths in the operating room or immediately upon arrival to the intensive care unit were excluded from further review. Early extubation is extubation in the operating room or within 4 hours after arrival to intensive care unit. Successful extubation is patients not reintubated.

RESULTS. Patient ages ranged from newborn to 29 (median 1.9) years and weight from 1.8 to 61.5 (median 11.0) kilograms. There were 162 males. Early extubation was accomplished in 70.89% (229 of 323). Reintubation was required in 16 (6.98%) patients. The successful extubation rate for the entire group was 93% (211 of 229). Median age was 2.1 years in the extubated group and 1.3 years in the non-extubated. Children age 0-3 months were less likely to be extubated (32% vs.79%). Children undergoing bypass were more likely to be extubated than non-bypass patients (76% vs 32%).

CONCLUSION. Early extubation can be accomplished in children undergoing cardiac surgery. It is a safe procedure with shorter stay in intensive care unit and less complication related to mechanical ventilation.

MANAGEMENT OF THE CADAVERIC ORGAN DONORS IN THE PICU AND ANAESTHESIA DURING ORGAN HARVEST

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INTRODUCTION. In the last years there has been seen the ever increasing number of the patients awaiting an organ transplant as the only curative treatment of their disease shifts the age limits of suitable cadaver organ donors to both higher age limits (above age of 60) as well as lower ones in the case of paediatric donors.

METHODS. This report presents authors’ experience based on the care of 36 cadaver donors since 1993.

RESULTS. The authors suggest some principles of the care of the potential donor in the paediatric intensive care unit, specifically in comparison to the care of the adult donor. A special attention is given to the issues of assessment of the „brain death”, the tests prior to the PGA (atropine test, fluorescein test, etc.) and the actual arrangement of the cerebral PGA. The importance of the continuity of the intensive care before and after establishing the diagnosis of brain death is emphasized. The stress is put on the ventilation, cardiovascular system, arrhythmias, haemostasis, body temperature, infection prevention and intensive continuous monitoring of the vital functions of both the recipient and donor. Specific details of the preparation of the donor for organ harvesting and anaesthesia during the procedure are discussed.

CONCLUSION. In the last section the authors address variety of sensitive issues regarding legislation, previous informed consent, the consent of the paediatric patient’s family and the influence of their involvement on the number of successful donations. They also discuss the maintenance of the medical record and overall approach to the management of the paediatric cadaver donor in the settings of intensive care unit.
NON INVASIVE VENTILATION IN INFANTS: CIRCUITS AND DEVICES, A BENCH TEST.

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INTRODUCTION. Since more than three years, bilevel non invasive ventilation (NIV), delivered with a turbine-driven ventilator, has been used in our unit. One of the most important feature for non invasive ventilation in infant is the synchronization between patient and device. However, NIV devices were designed for use in adult patient. To determine which is the more adapted circuit and NIV device, we conducted a bench to test circuits and devices.

METHODS. On a two-chambers mechanical lung model (VentAid TTL®, Michigan Instruments Inc., Michigan, USA), we compared three turbine-driven portable ventilators (VPAPIST® Resmed Ltd North Rye-Del-AU, Synchrony® Respironics Murrayville-USA, PV1020® Brea Medical AG Mönchke-S) associated in succession to nine different circuits using three diameters (10, 15 and 22 mm) and two lengths (50 and 100 cm) for a total of 27 combinations. A spirometer (Jaeger GmbH, Hochberg, D) was integrated to the circuit to observe: 1) response time (time between onset of inspiratory effort simulation and onset of delivery of pressure support), 2) response volume (flow integration surface area for the same period) and 3) response flow (maximal flow at the start of pressure support delivery). Ten curves were average for each test. Unpaired t-test was used for comparisons.

RESULTS. Mean response time was 0.09 sec for VPAPIST®, 0.16 sec for Synchrony® and 0.14 sec for PV1020®. VPAPIST® response time was significantly shorter than Synchrony® (p < 0.0001) and PV1020® (p = 0.0001). Mean response volume of VPAPIST® (5.2 ml) was significantly shorter than Synchrony® (14.1 ml, p = 0.0001) and PV1020® (10.2 ml, p = 0.0001). Mean response flow was 6.54 L/min for VPAPIST®, 9.99 L/min for Synchrony® and 8.70 L/min for PV1020®. It was significantly smaller than Synchrony® (p < 0.0001) and PV1020® (p < 0.001).

The change of circuits did not interfere with these results.

CONCLUSION. In this bench test, the VPAPIST® had the shorter response time, the smaller response volume and the lowest response flow when compared to the Synchrony® or the PV1020®. Surprisingly, the different circuits used during this bench test had no influence on the performance of these NIV devices. If interpreted with reference to the respiratory physiology of the infant, these results suggest that the choice of a NIV device for use in the infant is important to insure good synchronization with this respiratory therapy.

THE DEVELOPMENT OF PAEDIATRIC HOME CARE VENTILATION PROGRAM IN THE CZECH REPUBLIC

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INTRODUCTION. There has been a dramatic progress in the artificial lung ventilation since its origins in the fifties. The application of the newest technical discoveries enabled to develop ventilators providing not only the basic lung ventilation but also allowing for a significant comfort to the patient during prolonged periods of the ventilation. The development of his type of respirators represented the beginning of the era of home-based ventilation.

METHODS. The transition from hospital-based to home-based ventilation required to address economic, medical, technical and psychosocial aspects. The centres for education and training of the patient’s family members have been formed in the large state and university hospitals. It was shown during the last ten years of home-based ventilation that: a) HCV is more economic than long term hospitalization b) HCV represents a significant improvement in the quality of life of a chronically ventilated patient. The HCV program is administered in several steps: a) technical and legislative aspects have to be addressed initially b) education and training of the patient’s family members c) gradual adjustment of the patient to the home environment d) permanent stay at home and regular preventive visits to the hospital.

RESULTS. The program of home care ventilation is being developed in the Czech Republic for last three years. Our PICU program involves currently five permanent patients. The most common diagnosis as an indication for enrolment for the HCV program in paediatrics are neuromuscular disorders, cystic fibrosis of the lung, sleep apnoea syndrome and deformities of the skeleton, posttraumatic spinal chord lesion, AVM of the brain stem.

CONCLUSION. The program of the HCV is developing successfully in the Czech Republic. We have overcome the initial legislative and funding problems. The HCV become an accepted trend in the Czech Republic and its importance is on a rise due to the obvious economic and technical advantages as well as the life quality improvement of the patients.

TRACHEAL AGENESIS: HOW TO KEEP SURVIVING FOR 9 MONTHS

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INTRODUCTION. This case reported could be a type I by Floyd’s classification1. By prenatal diagnosis was known only a pylorus atresia, congenital complex cardiopathy and polyhydramnios.

METHODS. A newborn female, at 35th week of gestation with a birthweight of 2,900 g was born with immediate respiratory distress, with no audible cry, is described. The endotracheal intubation was impossible, in spite of visible and normal vocal cords. We achieved tracheal intubation with fibroscope through the oesophagus, until the main carina and bronchi were visible. The successive laryngoscopy revealed a subglottic stop, with posterior laryngeal schisis. A Foley tube was positioned in this wide oesophagus to prevent mainstem bronchi and lungs. The first CT scan confirmed diagnosis she underwent a surgical operation; the following were performed: distal oesophageal binding, gastrostomy, oesophagotomy with cervicostomy for saliva drainage and a pseudotracheostomy with oesophagus, to position a poliflex stent Rush (ID mm 10 1 x 45 mm) at the carina for airways control, gastro-entero anastomosys and Meckel’s resction. The patient underwent a definitive correction of a cardiothoracic consisting of TAPVR and DORV. The last CT scan showed 2 tracheal rings next to carina, arising from the anterior wall of the oesoephagus, tracheal gap was 67 mm.

RESULTS. Our patient’s conditions are good: b.w.kg. 5.7, spontaneous breathing with minimum O2 support. A tracheal armed tube, associated with tracheostomy cannula obtains airways control; another artificial stent would be auspicious. The very short tract of ciliated epithelium have been the probable cause of 4 respiratory infections.

CONCLUSION. In virtue of the successful management we are required considering the possible definitive surgical correction, for a good quality of life.

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2. Haben CM, Rapaport M, Clarke D J Am Coll Surg 2002; 1: 217-222.

EVALUATION OF EARLY DETECTION AND MANAGEMENT OF DISSEMINATED INTRAVASCULAR COAGULATION IN PATIENTS A

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INTRODUCTION. This prospective study aimed at evaluation of the outcome of early management of disseminated intravascular coagulation (DIC) among high risk patients admitted to Pediatric Intensive Care Unit (PICU) for 24 months.

METHODS. The study included 50 high risk patients (pre-DIC) subdivided according to their D-dimer level into the following three groups: A) pre-DIC ≤ 1000 μg/L, B) pre-DIC 1001-3000 μg/L, C) pre-DIC > 3000 μg/L. The main outcome measure was the incidence of DIC in each group at PICU admission.

RESULTS. The correlation of D-dimer and FDP assay showed the best correlation for early pre-DIC (r = 0.90). In our series, 4 (8%) of the 50 patients developed DIC, with a peak incidence on day 3 post PICU admission. The correlation between D-dimer and FDP assay was significant (r = 0.77, < 0.05).

CONCLUSION. The early discovery and proper management of pre-DIC, before overt bleeding, in high risk patients admitted to PICU using combined D-dimer and FDP assays had positive impact on their prognosis.
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**PAEDIATRIC DROWNING AND NEAR DROWNING - FACTORS AFFECTING ACUTE AND POSTACUTE TREATMENT OUTCOMES**

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**INTRODUCTION.** Near-drowning is defined as an immersion event of sufficient severity to require medical treatment in which the patient survives for at least 24 hours, regardless of eventual outcome. Drowning is death from asphyxia, caused by submersion in water. Death is usually at the time of the submersion event or within a 24-hour period. Despite of the progress in medical sciences hypoxemia and ischemia remains the main cause of mortality and long-term morbidity. In developed countries drowning is the fourth leading cause of death for children and teenagers and the single leading cause of injury death for children under 5 yr of age.

**METHODS.** In the first part of this study authors followed a group of 107 patients admitted after near-drowning to PICU. They concentrated on circumstances affecting the acute treatment results. Among followed factors the most important are the duration of submersion and the interval of cardiopulmonary resuscitation. Intracranial pressure values within normal range do not necessarily predict a good outcome of the treatment.

**RESULTS.** In the second part of the study authors followed a group of 83 patients who survived the first acute treatment interval, admitted in the major number of cases to the 1st department of paediatrics over a period of 12 years. The authors tried to underpin the long-term treatment results concentrated mainly on the reduction of the permanent damage after-effects. In our conditions during the treatment period it was possible to improve the health status of the majority of our patients. We concentrated mainly on final neurological findings, motor and mental impairment, the ability of self-attendance and return to school. Results of 26 patients admitted to the 1st department of paediatrics in aphasic status are controversial; the treatment is prolonged and too capital-intensive. Due to diffuse brain injury the prognosis in near-drowning patients is much worse than that in patients suffering from cranioencephral injury.

**CONCLUSION.** Results of this study in consequence with the literature contradict the controversial hypothermia as a single factor predicting a good outcome. High mortality and long-term morbidity affirm extreme importance of paediatric drowning and near-drowning and indicate that the best hope for a cure of drowning and near-drowning lies in prevention.

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**PERINATAL RISK FACTORS FOR CEREBRAL PALSY IN VERY LOW BIRTH WEIGHT INFANTS: REGIONAL STUDY.**

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**INTRODUCTION.** For the last decade the positive tendency of neonatal mortality decrease is observed, however it is accompanied by increase of cerebral palsy (CP) and other neurodevelopmental disorders (1). The role of perinatal factors and intensive care volume in frequency of CP among very low birth weight (VLBW) infants were studied

**METHODS.** The retrospective antenatal, intrapartum and neonatal events and therapies analysis of 130 VLBW infants was performed. All survived VLBW newborns who were admitted into neonatal intensive care unit of Minsk city hospital during 1997-1999 were enrolled in the study.

**RESULTS.** 14 of 130 survived neonates suffered from CP to the age of 36 month. The VLBW neonates born in vaginal delivery compared with those born in caesarean section (18% vs. 2.3% respectively) as well as hypoxacpia and metabolic acidsis (100% vs. 65% and 36.4% vs. 10.4% accordingly) were at higher risk for CP(2). The VLBW neonates with severe puventricular/intraventricular haemorrhage (PVH/IVH) and periventricular leukomalacia suffered later from CP more often then those without such pathology (42.8% vs. 4.7%).

**CONCLUSION.** Vaginal delivery, hypoxacpia, metabolic acidsis and severe PVH/IVH are identified as risk factors for CP development (3).

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**MEASURING INTRA-ABDOMINAL PRESSURE IN NEWBORNS WITH MALFORMATIONS OF GIT**

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**INTRODUCTION.** Some newborns with malformations of gastrointestinal tract post-operatively have problems with high intra-abdominal pressure and questionable abdominal compartment syndrome.

**METHODS.** We analyzed five babies who had repair of omphalocele (2), gastroschisis (2) and diaphragmatic hernia (1) and did not doing well postoperatively. They had decreased blood pressure, urine output and need respiratory support.

**RESULTS.** The way we have measured intra-abdominal pressure was through an indwelling Foley catheter placed in stomach. Before measuring we injected 10 to 15 ml of saline into the patients stomach and catheter connect by tube with pressure connection to the bedside monitor. The pressure was measured every two hours. Pressure above 15 mmHg was pathologic and above 30 mmHg was an indication for opening the abdomen. All babies were operated when pressure was nearly 30 mmHg. General condition was much better after the operation.

**CONCLUSION.** Measuring an intra-abdominal pressure is very useful method in newborns with malformations of GIT.

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**SECONDARY ENDOGENOUS INFECTION IN PROLONGED PAEDIATRIC CRITICAL ILLNESS: A PROSPECTIVE 3 YEAR STUDY.**

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**INTRODUCTION.** Secondary endogenous infection is caused by hospital micro-organisms including aerobic Gram-negative bacilli (AGNB) and methicillin-resistant S aureus (MRSA) acquired after admission to the paediatric intensive care unit [PICU]. They first are found in the oropharynx following by carriage and overgrowth in the digestive tract. Subsequently colonisation and then infection of the internal organs may occur.

**METHODS.** This prospective, observational, cohort study was undertaken in a 20 bedded PICU. Only critically ill children requiring 4 or more days on PICU were included. The microbial carrier state was monitored by surveillance cultures of throat and rectum obtained on admission and twice weekly afterwards. when patients were found to be carriers of AGNB and MRSA polymyxin or tobramycin and or vancomycin were given as a paste in the throat and as a suspension in the gut 4 times daily throughout PICU treatment.

**RESULTS.** A total of 948 children were admitted 1,100 times to the unit. The mortality was 9.4%. 25 [2.6%] children had 36 secondary endogenous infections. The median admission age was 209 days [IQR 4-172], median length of stay 30.5 [IQR 14.5-81. The median day of onset for secondary endogenous infections was 29 [IQR 14-48.5], there were 18 lower airway infections and 7 bloodstream infections. Pseudomonas species and S aureus were the predominating micro-organisms. 7 secondary endogenous infections were due to resistant AGNB 11 children with secondary endogenous infections died, median day of death 74 [IQR 25-121].

**CONCLUSION.** Secondary endogenous infections occurred at a frequency of once a month, the causative micro-organisms were mainly Pseudomonas species and S aureus. Although, infrequent mortality in this group was high.

Grant acknowledgement: Chris Stoutenbeek Foundation
**INTRODUCTION.** Ecstasy (MDMA) is very popular designer drug in discotheque attendees. It is an amphetamine derivative with mescaline like effects and is considered by users as safe and without serious side effects. Substantial risks of toxic effects on nervous system with permanent adaptations in chronicle abuse may have potential protecting properties against toxically irreversible blockade of the enzyme acetylcholinesterase(AChE) with excess acetylcholine causing persistent depolarisation of the motor end plate. During IMS, prolonged suppression of AChE could progress to phase II block. However peripheral nerve stimulation using T/O Tetanus has failed to show a characteristic fade. We elected to study whether electro physiological monitoring might show a decremental response during IMS.

**RESULTS.** 7 out of 43 patients required ventilation for more than 6 days and showed over signs of intermediate syndrome - proximal muscle weakness, twitching and respiratory weakness. Only 1 out of 7 had a decremental response on RNS. This patient had symptoms of severe poisoning and was deeply comatose requiring controlled ventilation for 15 days after which he had full recovery of both symptoms and RNS. All other patients with IMS showed no changes on RNS.

**CONCLUSION.** RNS is a specific but poorly sensitive marker in diagnosing intermediate syndrome after OPC poisoning. Other markers like red cell cholinesterase levels may be studied for better specificity and sensitivity.

**REFERENCE(S).** 1. Senanayake et al. NEJM 1987;316:761-3 2. deBliecker et al. Crit Care Med 1993;21:1706-11
75 blood samples were taken from 27 patients. PCT values were increased and blood gases and leukocytes count. MAP was also recorded at the same days. For statistical men, 6 women, mean age 27 years) were included in the study. After haemodynamical

**METHODS.** A retrospective study was conducted from 1997 to 2000 in 608 trauma patients. Overall mortality was analysed, and three degrees of severity were then considered as well as severe cranial trauma (SCT). Statistical analysis was based on the Z score of the TRISS method (a score of less than – 1.96 was indicative of a significant difference in terms of mortality).

**RESULTS.** Predicted mortality was 15%, observed mortality 12%, and the Z score – 2.39 (p<0.05). Ninety percent of deaths occurred in the first 24 h. The M score was 0.91, indicating that the population studied was sufficiently similar to that used to elaborate TRISS. The mean age of patients was 34 years, and the M/F sex ratio 3/1. SCT was found in 19% of cases

**INTRODUCTION.** The TRISS method, developed from a cohort of 25,000 North American patients, allows expected mortality to be estimated within a population of trauma patients in an Anglo-Saxon management system. It is based on the Revised Trauma Score, the Injury Severity Score (ISS), and the age of patients. The purpose of the present study was to compare the mortality predicted by the TRISS method with that observed in a population of French trauma patients managed in a care system involving medical treatment before hospitalisation.

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**CONCLUSION.** Observed mortality in the population studied was less than predicted mortality, and this difference was more marked for patients with SCT and those with moderate severity. These results argue in favour of medical treatment before hospitalisation of polytrauma patients, as this factor constituted the main difference between the two management systems.

**PCT IN EARLY SEVERE TRAUMA**

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**INTRODUCTION.** In several studies the mortality in polytraumatic ICU patients was correlated with PCT levels, especially those with abdominal trauma. The aim of the study is to find out if PCT values at the first three days after injury are correlated with tissue hypoxia in several trauma.

**METHODS.** Twenty-seven multiple injured, mechanically ventilated, not infected patients, (21 men, 6 women, mean age 27 years) were included in the study. After haemodynamical stabilization arterial blood gases were taken at days 0, 1 and 2, for measurements of PCT, Lactate, blood gases and leukocytes count. MAP was also recorded at the same days. For statistical analysis the Paired-samples T test was used.

**RESULTS.** 75 blood samples were taken from 27 patients. PCT values were increased and significantly correlated with lactate one (p<0.05). No correlation was observed between PCT values and any other measures. Significant correlation was also found between MAP - Lactate (p<0.05) and MAP - PH (p<0.001).

**CONCLUSION.** Multiple injured patients have increased levels of PCT in three days after injury. Inflammatory cascade may be the reason of the correlation between PCT and Lactate values.

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**ARDS IN SEVERE TRAUMA: ASSOCIATED RISK FACTORS**

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**INTRODUCTION.** We want to analyse the factors associated with the development of acute respiratory distress syndrome (ARDS) in patients with trauma in Andalusia, according to the database of the multicentre GITAN project.

**METHODS.** Prospective observational multicentre study, analysing demographic, clinical and trauma severity variables during a 6-month period. Students t test was used for quantitative and chi2 test for qualitative variables. Multivariate analysis with logistic regression was applied. P<0.05 was regarded as significant.

**RESULTS.** Of the 612 patients studied, 44 (7%) developed ARDS. The presence of ARDS was associated with a higher APACHE II score (16.4±7.3 vs. 12.9±7.2 points); there was no case of ARDS among 51 patients with ≤5 points; 6 cases (4.5%) among 134 patients with 5-9 points; and 36 cases (10.4%) among 345 patients with e 10 points; chi2 =8.5 (p<0.003). ARDS was associated with higher ISS score (31.9±31.3 vs. 25±10.7, p=0.002), with 18 cases (4.2%) among 427 patients with <30 points and 24 cases (16.6%) among 145 patients with ≥30 points; chi2 =24.2 (p<0.001). It was also associated with femur fracture; it developed in 12 (19.4%) of the 62 patients with this fracture but in only 5.7% of the 530 cases without it; chi2 =15.7 (p<0.001). It was also associated with chest trauma ICD diagnosis and was present in 21 (18.6%) of 113 patients with this condition versus 23 (4.7%) of the 487 patients without it; chi2 =25.9 (p<0.001). Multivariate analysis showed that ARDS was associated with presence of ICD diagnosis (haemato- pneumothorax) (OR=5.46), fracture of femur (OR=4.53) and APACHE II score > 10 points (OR=3.15).

**CONCLUSION.** The development of ARDS in severe trauma is associated with ICU admission severity measured by APACHE II, and ICD diagnosis related to chest injury and femur fractures.

Grant acknowledgement: Authors are representing GITAN group.
432 REMIFENTHANIL ALONE FOR SEDATION OF PATIENTS AFFECTED BY CHEST TRAUMA

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INTRODUCTION. Since the incidence of chest trauma is projected to mount and the number of patients with chest trauma reaching the hospital alive will continue to grow, thus, the management of these patients will become an increasingly large part of critical care practice (1). Remifentanil is a new opioid agent which is able produce a predictable and easily level of sedation in post-cardiac patients (2). Aim of this study is to report our experience with remifentanil alone in sedating patients with chest trauma, over an one year period.

METHODS. In 2002 patients affected by chest trauma requiring sedation and ventilation were sedated with remifentanil (0.1 mcg/kg/min). The following data were recorded: age, sex, Simplified Acute Physiology Score II (SAPS), need of supplemental analgesia, ICU stay and mortality. Level of sedation was evaluated using Cook and Palmis and Ramsay scores.

RESULTS. 92 were sedated with remifentanil. Main characteristics of patients were: age 42.3 ± 7.2, male/female 52/40, SAPS II 36.41 ± 12.81, mean duration of in ICU stay was 21.62 ± 28.92. The overall mortality was 17%. Mean sedation score was 7.35 ± 1.2 (Cook and Palmis) and 4.2 ± 0.2 (Ramsay), respectively. No supplemental analgesic drug were required.

CONCLUSION. Remifentanil is a safe sedative agent and given alone is well indicated for sedation of patients affected by chest trauma and could offer advantages over many other drugs.

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433 PROGNOSTIC AND INFORMATIVE VALUE OF TEMPERATURE GRADIENTS IN THERMAL SHOCK

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INTRODUCTION. In patients with thermal shock thermoregulation is changed through peripheral and central mechanisms. Bigger temperature gradients are found in different parts of the human body. The aim of this study is to establish the clinical values of measured temperature gradients in patients with thermal shock.

METHODS. The study was conducted in the Clinic of burns, Emergency Institute „Pirgos“, Sofia, Bulgaria. The study includes 25 patients in the phase of thermal shock, 14 of them are children (from 2 to 9 years old) and 11 adults (from 18 to 50 years) with burned area from 15 to 50%. The patients were separated in 2 groups according to development of thermal shock - light or severe shock. Every 3 hours oral, rectal, skin temperature of the toe, and also temperature and relative humidity of the room have been investigated for 3 days after the incident. The study was conducted in the Clinic of burns, Emergency Institute "Pirogov", Italy

RESULTS. During the light thermal shock the internal temperatures (oral and rectal) and skin temperature are normalized on the 12 hours of the first day. During the severe thermal shock the internal temperatures remain under 37°C, but the mean skin temperature is between 24 - 26°C. In light development thermal shock OSTG and RSTG return to referent values as early as within 24 hours, when medical and infusional treatment has been started. But these gradients in patients with severe thermal shock remain from 16°C to 14°C till the end of the 3rd day. There are no statistically significant differences in ROTG in the two groups.

CONCLUSION. 1. Tracing the temperature gradients is fast, painless and reliable supplementary method that will help the diagnostic process.
2. The scale of temperature gradients shows the real possibility of evaluation of the haemodynamics and the results of the treatment.
3. The prognostic values of these gradients are to show the issue of the thermal shock, but not the prognosis of the disease.

434 RISK FACTORS FOR THE DEVELOPMENT OF MULTIPLE ORGAN DYSFUNCTION SYNDROME IN MULTIPLE TRAUMA PATIENTS

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INTRODUCTION. Multiple organ dysfunction syndrome (MODS) is a severe complication responsible for high mortality rates (M) in ICU. The aim of this clinical trial is to examine the risk factors for the development of MODS in multiple trauma (MT) patients (pts).

METHODS. We studied retrospectively 209 MT pts, 150 men (71.8%) and 59 women (28.2%), who entered the ICU and stayed >96h. Mean age: 39.8±19.3 years. Mean stay: 24.4±11.9 days. All of them were mechanically ventilated. They were divided in 2 groups; Group A 64 pts (30.6%) who developed MODS and group B 143 pts (69.4%) who did not. The following variables were analyzed: age, number of surgical procedures (nSP), number of preexisting significant diseases (nPD), number of units of red cell transfusions (nRT), sepsis, the presence of head injury (HI), injury severity score (ISS) and M. We used a logistic regression analysis to identify independent risk factors for the development of MODS in MT pts. Values of p<0.05 were considered statistically significant.

RESULTS. The results of the above variables in the three groups: All pts, Group A and Group B, respectively, were: age (years): 39.8±19.3, 38.2±16.0, 41.2±20.2; nSP: 289 (1.38±0.42), 142 (2.22±0.61), 147 (1.03±0.09); nPD: 0.5±0.04, 0.4±0.06, 0.5±0.05; nRT: 12 (6.4±2.6), 8.9±3.3, 5.4±2.2; sepsis: 79 (37.80%), 62 (96.90%), 17 (11.90%); HI: 114 (54.50%), 34 (53.10%), 80 (55.90%); ISS: 23.6±9.8, 31.1±10.4, 20.6±9.0; M: 71/209 (33.90%), 41/64 (64.10%), 30/143 (20.90%).

CONCLUSION. a) The number of surgical procedures (p<0.01), the number of units of red cell transfusions (p<0.05), high values of ISS (p<0.05) and the presence of sepsis (p<0.001) are significant risk factors for the development of MODS. b) MODS is related to increased mortality rates (p<0.001). c) In contrary: age, number of preexisting diseases (we notice that many pts were young and healthy, victims of traffic accidents) and presence of head injury as an independent risk factor (which is actually included in the ISS ) are not related to more frequent development of MODS. d) In 55 pts of group A (85.9%) MODS appeared between 11th and 16th day from the admission in the ICU (13.9±3.4 day).

435 PREDICTION OF PROLONGED VENTILATORY SUPPORT IN BLUNT THORACIC TRAUMA

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INTRODUCTION. Factors predicting prolonged (> 7 days) mechanical ventilation (MV) in adult thoracic trauma patients have not been well characterized.

METHODS. To clarify this issue, 69 thoracic trauma victims (53 men), with a median age of 35 years (range 17-85 years) and a median Injury Severity Score of 29 (range 14-41) were enrolled in the present study. Associated injuries included head-neck (77%), extremities (72%), external (67%), abdomen-pelvis (67%) and face (55%).

RESULTS. Thirty-three of the 69 patients (48%) required prolonged MV, ranging in duration from 8 to 38 days (median 18 days). Logistic regression analysis revealed that advancing age (odds ratio=1.04, p<0.04), severity of head trauma (odds ratio=1.92, p<0.008) and bilateral thoracic injuries (odds ratio=12.80, p<0.0001) were significant and independent predictors of long-lasting MV.

CONCLUSION. In thoracic trauma patients admitted in the ICU, prolonged MV is determined by age, degree of neurotrauma, and presence of bilateral chest injuries. This information may help in planning the long-term care of these patients.
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CLINICAL AND EPIDEMIOLOGICAL ASPECTS OF SEVERE TRAUMA IN ANDALUSIA (SPAIN)

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INTRODUCTION. Our objective was to analyse the epidemiological and clinical characteristics of patients with severe trauma in our autonomous region, as well as the care circuits and morbidity-mortality.

METHODS. Prospective observational multicentre study carried out of and in-hospital variables during a 6-month period. Severe trauma was defined by RTS<12 and/or ISS>15. Variables collected included demographic data, injury mechanism, previous location, ICD-9 diagnostic category, diagnostic procedures and surgery in first 24 h, severity scales, ICU complications and stay, and mortality. A descriptive analysis was performed and chi² and the Student’s t test were used for the comparison of means.

RESULTS. The study included 612 patients with severe trauma, predominantly male (78%) with a mean age of 36±19 yrs. The commonest diagnostic injury was traffic accident (65.3%) followed by falls (14%). Traffic accidents were more frequent at weekends. Motorcycle and car accidents predominated among the young patients, whereas elderly patients were more likely to be pedestrian have been run over. The commonest diagnostic categories were severe head injury (36%), chest trauma (25%), and abdominal injury (17%). Time and delay for diagnostic procedures and surgery, severity scales, ICU complications and mortality. A descriptive analysis was performed and chi² and the Student’s t test were used for the comparison of means.

CONCLUSION. These patients are usually young males, who develop respiratory complications in the ICU, have a longer ICU stay. There is a greater mortality among the elderly.

Grant acknowledgement: The authors are representing GITAN group.

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SEVERE ABDOMINAL TRAUMA: CLINICAL EPIDEMIOLOGY AND MEDICAL PRACTICE

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INTRODUCTION. Our objective was to analyse the epidemiological and clinical characteristics of severe abdominal injury, the medical practice circuits involved, and the delay in definitive diagnostic and surgical procedures.

METHODS. Prospective observational multicentre was carried out in Andalusià (Spain) during a 6-month period. Patients with severe trauma (RTS <12 and/or ISS>15) and abdominal injury (ICD-9 diagnostic categories 836-863) were included. Data were collected on demographic data, injury mechanisms, abdominal and non-abdominal injuries, times and delay for diagnostic procedures and surgery, severity scores, ICU complications and mortality. Times are expressed as median and interquartile range. A descriptive analysis was performed, and chi² and Student’s t test were used.

RESULTS. The registry included 612 patients with severe trauma, and 93 (15.2%) had abdominal injury (76.3% were male). The majority (75.6%) came from traffic accidents and were younger (31.8±17 vs 37.1±20 yrs; p<0.05), with more car accidents (46.7% vs 21.4%; p<0.05) and more transport by mobile ICU (74.7% vs 63.7%; p<0.05) compared with patients without abdominal injury. Pathological findings were shown in 98% of CT and 85% of Ultrasound images. Chest (60 patients) and head trauma (36 patients) were the most frequent associated non-abdominal injury. Localisations of injuries were: spleen, 45; liver, 3; gastrointestinal tract, 15; kidney, 12. Chest (60 patients) and head trauma (36 patients) were the most frequent associated non-abdominal injury. Pathological findings were shown in 98% of CT and 85% of Ultrasound images. 60-one patients underwent surgical treatment. Severity scores: ISS=34±12, RTS=9±2±8. APACHE II=15±8. The median ICU stay was 9 days and the hospital mortality was 22.6%.

Some of delay times

| Trauma - ER | ER - ER | ER - DPL | ER - CT | ER-Surgery |
|-------------|---------|----------|---------|-----------|
| Time (min)  | 56±10 (93%) | 45(15) | 45±(17) | 75±(17-1) | 130±(59,296) |

ER, emergency room; DPL, diagnostic peritoneal lavage; CT, computed tomography

CONCLUSION. In our region, epidemiological characteristics of abdominal injury are different from those of other injury, and they are associated with chest and head trauma. Time and delay for diagnostic and surgical procedures and surgery, severity scales, ICU complications and mortality. A descriptive analysis was performed and chi² and Student’s t test were used for the comparison of means.

CONCLUSION. We previously identified PCT as a predictor of early graft failure-related mortality after HTx (1). We now for the first time evaluated PCT as a prognostic marker in the early postoperative period after heart (HTx) and lung (Ltx) transplantation.

METHODS. Blood was prospectively collected at daily intervals from 100 consecutive patients (age 47±13 years) for up to 28 days following HTx (n=73) and Ltx (n=27). PCT serum concentrations were measured by immunoluminometry. In addition, C-reactive protein (CRP) was measured and WBC counts performed.

RESULTS. From the 1st until the 28th postoperative day (POD) PCT levels were significantly higher in non-survivors as compared to survivors, whereas CRP levels only from the 7th and WBC counts from 5th POD became significantly higher in non-survivors. Areas under the receiver operating characteristic curve for the risk of mortality on the 1st POD was 0.74 for PCT and increased continuously thereafter, compared to 0.47 for CRP and 0.48 for WBC counts on the 1st POD. A PCT value of > 2 ng/mL on the 7th POD as a predictor for mortality had a specificity of 65.8% and sensitivity of 75%.

CONCLUSION. In comparison to CRP and WBC counts PCT was identified as the best predictor of mortality in patients after HTx and Ltx. PCT measurements in the early postoperative period after HTx and Ltx may be helpful in early therapeutic decision making by identifying patients at high risk of mortality.

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RCT OF COAGULATION MANAGEMENT BY POINT OF CARE VS LABORATORY aPTT AFTER CARDIOPULMONARY BYPASS

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INTRODUCTION. Coagulation management after cardiopulmonary bypass (CPB) need measurements of activated partial thromboplastin time (aPTT) to avoid excess bleeding and start anticoagulation. Usual practice refers to results from the central laboratory, but they take too long. We hypothesized that bedside assessment of Point of care (POC) aPTT would reduce time to achieve the desired coagulation state, resulting in reduced blood loss and transfusions.

METHODS. 126 patients planned for surgery with CPB (42 valves/VV and 84 coronary artery bypass grafting (CABG)), were randomized in 2 groups. The Lab-group had the postop coagulation management guided by central laboratory aPTT (Lab-aPTT) values and the POC-group by POC-aPTT obtained by CoaguCheck pro. Prophylactic/therapeutic heparin was applied according to a guideline, accounting for the difference between Lab- and POC-aPTT (1).

RESULTS. Patients were similar in the two groups. POC-aPTT results were available earlier after venipuncture (3±2 vs 12±6±6 min in VV and 3±4 vs 14±6±1 min in CABG, both p<0.0001). This resulted in earlier introduction of heparin in the POC-group (7±23 vs 13±7 in VV and 11±5 vs 14±10 in CABG, p<0.01 and p<NS respectively). During ICU more Lab-aPTT results were in the desired range of V in the POC-group (6±2±3 vs 3±4, p=0.007) and they received more heparin/24h (15±9 vs 9±6 [1000 UI], p<0.01). The cumulative mediastinal blood loss during ICU was higher in the Lab-group (99±2±4ml) compared to the POC-group (63±3±0ml) (p<0.01, Bonferroni in VV but not CABG (109±6±1 vs 107±6±88 ml, p<NS). At ICU discharge, the hemoglobin was similar in the POC- and Lab-group (9.8±2 vs 9.3±1±4 g/L in VV and 9.7±1±5 g/L in CABG, both p<NS), but significantly more VV in the Lab-group needed blood transfusions during ICU compared to the POC-group (8±21 vs 12±1, p=0.03) (CABG: p<NS). Mortality and length of ICU and hospital stay of the 2 groups were similar in this small cohort. Agreement between POC- and Lab-aPTT was poor (17±33±ec) as already reported by our group (1).

CONCLUSION. POC-aPTT permitted a better management of coagulation after valvular surgery. POC-aPTT allowed decreasing mediastinal blood loss and transfusions after valvular surgery but not after CABG.

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Grant acknowledgement: Quality Unit, University Hospital Geneva
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COLLOIDS AND CRISTALLOIDS IN CARDIAC SURGERY PATIENTS: EFFECTS ON GAS EXCHANGE AND PULMONARY EDEMA

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INTRODUCTION. Various infusion fluids can be used during resuscitation from hypovolemia, after cardiac surgery. Cardiac surgery can lead to an increase of endothelial permeability and eventually the adult respiratory distress syndrome (ARDS). Colloids are believed to maintain the colloid osmotic pressure (COP) and would result in less propensity for development of pulmonary edema than crystalloids. HES and albumin might have additional benefits in ameliorating an increased permeability by 'plugging the leaks'. We tested these hypotheses by comparing fluid challenges with NaCl 0.9%, Gelofusine, Hemosil and albumin 5% in 39 patients with reduced filling pressures, after cardiac surgery.

METHODS. In this prospective, non-blinded, clinical trial, patients were randomly assigned to receive Hemosil (6% hydroxyethyl starch, MW 200,000, substitution 0.45-0.50), Gelofusine (40g/L), albumin 5% or NaCl 0.9%. Before and after the fluid regimen, we recorded demographics, haemodynamics and ventilator variables. We measured the pulmonary microvascular permeability by calculating the ΔPl-transferrin Pulmonary Leak Index (PLI) and the extravascular lung water (EVLW, with thermal/dye indicator dilution). Blood samples were taken for gas exchange parameters, protein levels and the COP. A chest radiograph was made and a lung injury score was calculated. Fluids were dosed during 90 minutes on the basis of the response within predefined pressure limits.

RESULTS. In the albumin group, there was a significant increase in the albumin concentration (p=0.003) and a decrease in the two other colloid groups (p<0.007), related to similar changes in total protein concentrations, except for the Gelofusin group, where the decrease in total protein did not reach statistical significance. The colloids were effective in elevating the COP (p<0.015). Twelve patients had an EVLW of more than 7 ml/kg and 19 patients had a PLI of more than 1400 mmHg x 10^-3 at baseline (= upper limit normal). Groups did not differ with respect to (changes of) EVLW, PLI and gas exchange after the fluid resuscitation compared to baseline measurements.

CONCLUSION. Despite a significant increase of the COP in the colloid groups, we could not find important differences in gas exchange, EVLW, radiographic abnormalities and pulmonary permeability between the different fluids used to correct hypovolemia after cardiac surgery. Grant acknowledgement: B. Braun Melsungen, Germany

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ATRIAL FIBRILLATION FOLLOWING CORONARY ARTERY SURGERY: INFLUENCE OF CARDIOPLEGIA

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INTRODUCTION. Atrial fibrillation (Afib) as the most frequent postoperative arrhythmia causes high morbidity and increased mortality. Delivery of cardioplegia in on-pump coronary artery bypass grafting (CABG) patients is not standardized. High volumes of cardioplegia, however, gas exchange parameters, pulmonary edema, haemodynamics and ventilator variables. We measured the pulmonary microvascular permeability by calculating the ΔPl-transferrin Pulmonary Leak Index (PLI) and the extravascular lung water (EVLW, with thermal/dye indicator dilution). Blood samples were taken for gas exchange parameters, protein levels and the COP. A chest radiograph was made and a lung injury score was calculated. Fluids were dosed during 90 minutes on the basis of the response within predefined pressure limits.

RESULTS. In the albumin group, there was a significant increase in the albumin concentration (p=0.003) and a decrease in the two other colloid groups (p<0.007), related to similar changes in total protein concentrations, except for the Gelofusin group, where the decrease in total protein did not reach statistical significance. The colloids were effective in elevating the COP (p<0.015). Twelve patients had an EVLW of more than 7 ml/kg and 19 patients had a PLI of more than 1400 mmHg x 10^-3 at baseline (= upper limit normal). Groups did not differ with respect to (changes of) EVLW, PLI and gas exchange after the fluid resuscitation compared to baseline measurements.

CONCLUSION. Despite a significant increase of the COP in the colloid groups, we could not find important differences in gas exchange, EVLW, radiographic abnormalities and pulmonary permeability between the different fluids used to correct hypovolemia after cardiac surgery. Grant acknowledgement: B. Braun Melsungen, Germany

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CARDIAC TROPONIN I AS A PREDICTOR OF ADVERSE OUTCOMES AFTER CORONARY ARTERY SURGERY

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INTRODUCTION. Cardiac troponin I (cTnI) is useful in the diagnosis of perioperative myocardial infarction (MI) after coronary artery bypass (CABG) (1) and high levels may be a marker for longer ICU stay and ventilator days, arrhythmias, ST changes and regional wall motion abnormalities (RWMAs) in the postop period.

METHODS. We prospectively enrolled 193 consecutive patients undergoing elective CABG. cTnI levels were measured soon after arrival in the ICU (T0), at 12 hours (T12) and 24 hours (T24). New intra or postop ST changes or q waves, the number and duration of postop intubation usage, time to extubation and the use of IABP were recorded. RWMAs were assessed by echocardio gram on the day after surgery.

RESULTS. cTnI levels correlated with time to extubation, ICU days, duration of intropulse support and number of intropulse used (Table1). Significantly higher mean cTnI levels were seen in patients with intra and postop ST changes, IABP support (p<0.0001) and new RWA (p<0.001) by unpaired t test. cTnI levels of >6.0 ng/ml were significantly associated with ventilation for >24 hours (Odds ratio = 6.325, Chi-square=16.04, p <0.0001).

CONCLUSION. Following CABG, T12 levels are predictive of prolonged ventilation, longer ICU stay, multiple inotropes for longer periods of time and requirement for IABP. Intra and postop ST changes and regional wall motion abnormalities are also associated with high cTnI levels.

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APPLICATION OF A NEW DEFINITION OF ACUTE RENAL FAILURE IN CARDIAC SURGICAL PATIENTS

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INTRODUCTION. Comparison among clinical studies on renal failure (RF) is limited by use of different biochemical cut-off values. Therefore, we evaluated postoperative acute renal changes according to newly proposed criteria that should adjust for degree of renal injury (1).

METHODS. Adult cardiac surgical patients (n=665) were stratified into low (23.4%), intermediate (38.5%) and high risk (38.0%) categories with EUROScore. Definitions: Acute renal injury (ARI) = serum creat. >120 mmol/L and plasma urea >8 mmol/L and/or urine output <800 ml/24h. Acute RF syndrome (ARS) = creat. >240 mmol/L and/or urea >16 mmol/L and/or urine output <400 ml/24h. Severe ARS = need of RRT. A/C indicates the presence of chronic RF.

RESULTS. Incidence of non complicated patients was 62.4%, of ARI and ARI A/C was 26.7%, of ARFS and ARFS A/C 4.2%, of severe ARFS 4.2%; their length of stay in ICU was longer for increasing degrees of renal impairment (32.6 x 30.7 hours vs 75.9 ± 45.1 vs 116.9 ± 28.95 ± 126.5, respectively, all with p<0.01 at t test). Mortality rates were 0.5%, 2.3%, 7.5% and 25%, respectively (p<0.01 severe ARFS vs ARI and no complicate. and p=0.05 vs ARFS, chi2 test)

Euroscore Low Risk Intermediate High Risk
No Renal Complic. 31.0% 21.6% 27.0%
ARI+ARI A/C 9.7% 40.2% 51.3%
ARS+ARS A/C 7.7% 19.2% 73.1%
Severe ARFS 3.8% 7.7% 88.5%

p<0.001 No Renal Complic. vs ARI, ARFS, and Severe ARFS, chi square test

CONCLUSION. Acute postoperative renal changes were more frequent for higher perioperative risk category. Increasing degrees of renal impairment were associated with longer ICU stay without affecting mortality. Adverse outcome may be explained by more severe levels of multi organ impairment. These definitions may be helpful to describe the different impact of renal injury and RF on use of resources and outcome.

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PEAK TROXONIN I LEVEL AS AN OUTCOME PREDICTOR IN PATIENTS UNDERGOING OPEN HEART SURGERY

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INTRODUCTION. Troponin I has a complete cardiospecificity and is used as a marker of myocardial damage after cardiac surgery. A recent study showed that Troponin I was a predictor of post cardiac surgery complications rate and outcome. The aim of this study was to assess the ability of the peak troponin I level (pTnI) to predict outcome in cardiac surgery patients and to compare its discrimination power with peak CKMB level (pMBM).

METHODS. We carried out a retrospective study on all patients admitted for cardiac surgery over a 12 month period. Three groups were considered: coronary artery bypass (CABG), valve replacement (Valve) or both valve replacement and CABG (Valve + CABG). We used the Receiver Operating Characteristic (ROC) curve to assess the discrimination power of the peak Troponin I level and peak CKMB level on ICU outcome.

RESULTS. Over the 12 month period, 707 patients were included (demographic data are presented in Table 1). The mean pTnI level according to the type of surgery was not statistically different although there was a trend for a higher level in patients who underwent a Valve+CABG surgery (pTnI = 33.5 ± 78.7 g/l; 35.5 ± 83.8 g/l and 55.6 ± 85.9 g/l for CABG, Valve and Valve+CABG respectively, p = 0.07). Thirty one patients died in the ICU (4.4 %). The pTnI level was higher in the patients who died (pTnI : 316 ± 68.2 g/l versus 146.3 ± 189.4 g/l respectively for survivors and non-survivors patients, p < 0.001). The discrimination power of the pTnI for the outcome was good (area under the ROC = 0.81) and significantly better than the discrimination power of pMBM (area under ROC = 0.63;p = 0.004).

CONCLUSION. The pTnI level has a good discrimination capacity to predict ICU outcome in patients undergoing cardiac surgery. It is superior to pMBM which has a poor discrimination power. This easy method offers a reliable tool to early distinguish patients at high risk and in turn to adapt therapeutic strategies.

CORRELATION BETWEEN INFLAMMATORY RESPONSE AND PULMONARY DYSFUNCTION AFTER CARDIAC SURGERY

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INTRODUCTION. Cardiac surgery (CS) with cardiopulmonary bypass (CPB), is a recognized trigger of systemic inflammatory response, usually related to postoperative acute lung injury (ALI). As an attempt to dampen inflammatory response, steroids have been perioperatively administered to patients. Macrophage migration inhibitory factor (MIF), a regulator of the endotoxin receptor, is implicated on the pathogenesis of ALI. We have previously detected peak circulating levels of MIF, 6h post CPB. Experimental data have shown that steroids may induce MIF secretion by mononuclear cells. This study aims to correlate levels of MIF assayed 6h post CPB with the intensity of postoperative pulmonary dysfunction, analysing the impact of perioperative steroid administration.

METHODS. We included patients submitted to CS with CPB, electively started in the morning, performed by the same team under a standard technique, except for the addition of methylprednisolone (15mg/kg) to the CPB priming solution for patients from the group MP (n=37) but not for the remaining patients – group NS (n=37). MIF circulating levels were assayed at the anesthesia induction, 3, 6, and 24h after CPB. We adopted a standard weaning protocol with fast track strategy, and registered indicators of organ dysfunction and therapeutic intervention along the first 72h postoperative.

RESULTS. Levels of MIF assayed 6h post CPB correlated directly to the postoperative duration of mechanical ventilation (p=0.014, rho=0.282) and inversely to PaO2/FiO2 ratio (p=0.002, rho=-0.265). No difference in MIF levels was noted between the groups. The duration of mechanical ventilation was higher (p=0.005) in the group MP (7.92 ± 6.0h), compared to the group NS (4.92 ± 3.6h).

CONCLUSION. Circulating levels of MIF assayed 6h post CPB are correlated to postoperative pulmonary performance. Immunosuppressive doses of methylprednisolone did not affect circulating levels of MIF and may be related to prolonged mechanical ventilation.

HLA-DR AS A MARKER FOR INCREASED RISK FOR SIRS AND SEPTIC COMPLICATIONS AFTER CARDIAC SURGERY

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INTRODUCTION. Decreased expression of the monozygotic human leukocyte antigen (HLA)-DR was shown to correlate with the occurrence of SIRS and septic complications (1). To evaluate the predictive value of a decreased HLA-DR levels for postoperative SIRS and septic complications we compared HLA-DR levels of patients with postoperative complications to those with an uncomplicated course. We hypothesised that a decrease of HLA-DR levels within the first 24 hours after cardiac surgery is not related to postoperative SIRS or septic complications.

METHODS. In a prospective, observational study the expression of monozygotic HLA-DR of 85 consecutive cardiac surgery patients was analysed by flow cytometry. Arterial blood samples for determination of HLA-DR were collected before induction of anaesthesia, immediately after admission at the ICU and on the first postoperative day. Monocytic HLA-DR expression was analysed by the quantitative test kit QuantiBRITEFM as average number of bound anti-HLA-DR antibodies expressed per monocyte (mAbCell).

RESULTS. HLA-DR expression was significantly decreased in all patients. No significant differences of HLA-DR expression within the first 24 hours after surgery were found in patients with uncomplicated course compared to those developing SIRS or septic complications.

CONCLUSION. In cardiac surgery patients the predictive value of decreased HLA-DR levels within the first 24 seems to be low in predicting an increased risk for postoperative SIRS or septic complications.

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HYDRIC BALANCE AND ENDURING TIME IN VENTILATORY SUPPORT: IS THERE ANY RELATION IN CARDIAC SURGERY?

INTRODUCTION.
There’s no agreement in literary medicine regarding the volemic reposition and the weaning of the mechanical ventilation in patients that have gone through a cardiac surgery. Our purposes were evaluate whether the hydric balance (HB) can interfere in the enduring time in the ventilatory support (ETVS) during the surgical procedure.

METHODS.
After having gone through a miocardic revascularization surgery and a valvar replacement, 65 pts have been evaluated prospectively and divided in two groups: A - volemic replacement > 8ml/kg/h of surgery - 21 pts (43%), average age of 59,8 ± 14,9 years, 20 pts (68,9%) of the male sex.; B - volemic replacement < 8ml/kg/h - 37 pts (57%), average age of 55,8 ± 12,6 years, 28 pts (75,6%) of the male sex. In both groups, the ETVS (hours) has been analysed. From the 65 pts that have been evaluated, 50 pts (77%) have presented normal ventricular function against 15 pts (23%) with ventricular disfunction. The criteria that have been used were: no emergency surgery, normal creatinin and albumina plasma level and normal PaO2/FiO2 relation in the pre-surgical procedure. Extracorporal perfusion (EP) in 29 pts (44%) has been used.

RESULTS.
A group: HB was 11,23 ± 2,30 ml/kg/h. A group - ETFS was 6,24 and B group was 6,35 ± 5,38 hours (p=0,93). In the pts with normal function, the HB was the 7,01 +/-3,96 ml/kg/h and ETFS was 6,40 ±4,70 h, whereas in the pts with disfunction, the HB was 8,20 +/- 4,95 ml/kg/h and the ETFS was 7,59 + 6,60 hours (p=0,33 and p = 0,44, respectively). Patients with EP, the HB was 4,57 +/- 3,31 and without EP, the HB was 9,50 +/- 3,53 ml/kg/h (p=0,0001). Patients with EP, the ETFS was 6,30 +/- 5,04 hours and without EP, the ETVS was 6,70 +/- 5,18 hours (p=0,75).

CONCLUSION.
The hydric balance during the surgical procedure has not interfered in the enduring time of the ventilatory support even when we analysed patients with or without ventilatory disfunction. By evaluating patients with and without EP we have noticed that the enduring time in ventilatory support has been the same in both groups, in spite of the higher hydric balance in pts without EP.

NEUROLOGIC COMPLICATIONS AFTER CARDIAC SURGERY. CONTRIBUTION OF BRAIN MAGNETIC RESONANCE IMAGING

INTRODUCTION.
Neurological complications (NC)after cardiac surgery (CS) remains a problem. We analyzed neuromaging studies performed in these patients and the contributions of magnetic resonance imaging (MRI)

METHODS.
Prospective, observational study of patients undergoing CS who had a NC, in the period between may 1, 2002 and march 31, 2003. We collect the selected information from the records and from the Postoperative Unit Database. We performed an initial CT scan in the first 48 period between may 1, 2002 and march 31, 2003. We collect the selected information from the records and from the Postoperative Unit Database. We performed an initial CT scan in the first 48 hours of surgery. We studied 478 patients undergoing CS; 38 with NC (7.95%). Mean age: 66±11, female 55%. Mechanical ventilation: 94±179 h, ICU stay: 11±16 days. Procedure: 26 valvular replacements, 5 CABG, 1 traspastulation, 3 aorta graft replacement, 1 atrial septal defect and 2 pulmonary endarterectomy. Clinical Presentation: 20 ACV patients (focal motor deficit), 4.2% of CS patients. The hydric balance during the surgical procedure has not interfered in the enduring time of the ventilatory support even when we analysed patients with or without ventilatory disfunction. By evaluating patients with and without EP we have noticed that the enduring time in ventilatory support has been the same in both groups, in spite of the higher hydric balance in pts without EP.

RESULTS.
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PROGNOSTIC FACTORS FOR MECHANICALLY VENTILATED PATIENTS AFTER LUNG RESECTION FOR PRIMARY CARCINOMA

INTRODUCTION.
Mechanically ventilated patients after lung resection surgery for primary lung carcinoma will die. Therefore we evaluated post-operative prognostic parameters in this group of patients.

METHODS.
From 1995 - 2001 we identified all patients who needed mechanical ventilation (MV) after lung surgery for primary carcinoma. We recorded demographic data, pre-operative lung function, tumor type, type of surgery, post-operative complications and ICU related data including prognostic scores (SAPS 2, Apache 2) and intensity of MV.

RESULTS.
In 62 patients (52 men, 10 women, age 69 +/- 6) we performed 34 pneumonectomies, 24 (10-) lobectomies and 4 non-specific resections. 33 patients (53.2%) survived (median duration of MV 6 days, 25th percentile 2, 75th percentile 11) and 29 patients (46.8%) died (median duration of MV 8 days, 25th percentile 3, 75th percentile 15). Only 3 parameters were significantly different between survivors and non-survivors: PaO2/FiO2 ratio for the first 7 days, the cardiovascular SOFA-score and plateaue pressures during MV. Multiple logistic regression analysis showed that only the PaO2/FiO2 ratio and the cardiovascular SOFA-score were independent predictors for outcome. Using a combination of a PaO2/FiO2 ratio < 200 mm Hg and the need for inotropic agents, it is possible to identify a small group of patients with a dismal prognosis on the first day of ICU admission.

CONCLUSION.
Mechanically ventilated patients after lung surgery for primary carcinoma have a high mortality risk especially in case of severe acute physiological derangement i.e. PaO2/FiO2 ratio < 200 and the use of inotropic agents.
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VENTILATING CRITICALLY ILL PATIENTS IN THE RECOVERY ROOM
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INTRODUCTION. The impact of ICU bed shortage due to excessive demands places the hospital under daily siege. We use the recovery room as a short term solution but the impact on elective work has not been recognised.

METHODS. In a 30 month period from July 2000 - December 31st 2002 a prospective study of all admissions to ICU requiring initial management in the recovery rooms of the central operating suite, due to lack of availability of an ICU bed were recorded.

RESULTS. In the 30 month study period the recovery room cared for 38,601 patients of which 186 were critically ill patients (0.5%), and there were 2 deaths (1%). The ICU in the same time period looked after 1,456 patients, of which 11% were initial treated in recovery. There was no statistical difference in delay to transfer to ICU (mean 3 hours) whether the patients were a planned admission to ICU or if this was a new emergency arising, but the delay was reduced if they arrived after 5pm, p<0.05. The principle source of critically ill patients nursed in recovery was from operating theatres 66% (123), the emergency admission suite 19% (35), and Level 2 HDU/CCU 8% (15). The majority of these cases were transferred to our own unit in 82% (153), or our own HDU 3% (9) but a sizeable minority 10% (19) had to be transferred to another ICU in another hospital.

CONCLUSION. The shortage of critical care resources required an interim strategy to solve the immediate problem of how to resuscitate and ventilate critically ill patients when there is no ICU bed. The use of routine recovery facilities causes considerable disruption to elective surgical lists. The lack relatives accommodation plus problems with privacy, noise, documentation and patient safety have been highlighted by others. We are fortunate to have senior ICU trained nurses in charge of the recovery which may explain low death rate in such critical patients. The problem is yet to be solved but it is at least recognised that our shortfall in resources is requiring us to compromise other aspects of our clinical commitment.

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SHOULD CHILD VISITATION OF THEIR CRITICALLY ILL PARENT BE STANDARD PRACTICE IN ICU
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INTRODUCTION. The issue of permitting young children the opportunity to visit their critically ill parent in the ICU, is a controversial issue. Very often our nursing staff is asked by the well parent how to cope with the young children’s anxiety to their critically ill parent and how to deal with the children’s demands to visit their parent. Our ICU believes in holistic practice, we felt a strong need to develop a program to enable child visitation in the ICU.

METHODS. During a staff meeting, we distributed a short questionnaire in order to assess the staff’s knowledge, and willingness to accept the ICU policy change. A child psychologist at the staff meeting gave the staff pertinent information. At this point we developed structured guidelines to implement this new practice. When a parent is admitted to the unit, the nursing staff introduces the issue to the well parent. After the well parent approaches the staff with an affirmative response, we show them the photograph, explaining the visual elements in the picture. We assure the child that even though the parent can’t talk with them, they can touch and talk, we discuss the time limit of the visit. We accompany the child into the unit continually answering all questions that arise. Afterwards we conduct a short debriefing with the child to process the impact of the visit on him. RESULTS. We have implemented a new nursing strategy. 10 children in the age range of 3- teens have been introduced to this program. The feedback is varied, for some one visit was enough, for others they needed more. The well parents have reported a significant reduction in anxiety symptoms. They expressed relief that the subject has been opened. They themselves were in great need for support and guidance on how to cope with their children. There was also a significant improvement in the confidence that the children felt when their well parent had to leave the home for many hours at a time.

CONCLUSION. This ongoing project has been beneficial to the children and the entire family in the coping process. Also beneficial to the staff by addressing a challenge to an intervention that became a unique process to our professional growth.

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SURVEY OF NURSES’ OPINIONS ON AN ELECTRONIC PRESCRIBING AND INFORMATION MANAGEMENT SYSTEM
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INTRODUCTION. In April 2002 CCIPS, an electronic prescribing and clinical information management system was introduced to 26 critical care beds in the Trust. The system is capable of using information from the patient’s clinical details, laboratory results, drug prescriptions and administrations to provide real time decision support. This report represents the views of nurses on the system’s impact on them and their patients.

METHODS. A questionnaire was developed asking the following 4 questions and for suggestions to improve the system: 1) Does CCIPS improve safety of drug and fluid administration? 2) Does CCIPS protect your professional accountability more than paper drug charts? 3) Would you prefer to stop CCIPS and return to paper charts? 4) Does electronic prescribing have a future in critical care? The questionnaire was anonymous and distributed to 110 qualified nurses of all grades over a 3 week period 6 months after CCIPS was introduced.

RESULTS. 100 responses were received (91%). The results are tabulated below.

| Percentage | 1) Safety | 2) Accountability | 3) Paper | 4) Future |
|------------|-----------|--------------------|----------|----------|
| 100%       | 60        | 57                 | 14       | 13       |

CONCLUSION. These results must be seen in the context that they represent the views of a large group of staff who have been exposed to CCIPS for a maximum of 6 months. Many of these staff were not computer literate at the start of the training period and were highly apprehensive about the move away from paper records. CCIPS is a highly flexible system which continues to develop. The suggestions received from staff in this survey have been used to guide this process. It is likely that the staff’s feeling that they can influence the way the system behaves helps create ownership which is a major contributor to the success of its introduction. Data presented elsewhere demonstrate a number of benefits of CCIPS on quality of patient care, safety and reduction in drug errors. These data demonstrate clearly that the system is popular with the vast majority of staff who believe that it delivers benefits to them and their patients.

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CRITICAL INCIDENTS IN A PEDIATRIC INTENSIVE CARE UNIT

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INTRODUCTION. Pediatric Intensive Care Units (PICU) are environments with complex patient management. They provide a fertile ground for critical incidents that can produce serious patient morbidity and mortality. Several studies have demonstrated that iatrogenic complications can cause many deaths and disabilities resulting in low confidentiality about the health care system, increasing health care costs. The objective of this study was to identify the critical incident and analyze its relation among PRISM and NEMS in a PICU.

METHODS. This descriptive and correlative study was conducted in an university hospital in the city of São Paulo, Brazil. The sample comprises 113 critical incidents identified in 38 children of the 76 in PICU. The ethics committee approved the research execution. The parametric test (T-test, ANOVA) was used for statistical analyses. It was also used non parametric Kruskal-Wallis, with confidence interval of 95%.

RESULTS. The results showed an average of 2.9 incidents per child. It was verified that 32.74% occurred due to medication procedures, 29.20% due to mechanical pulmonary air way/ventilation, 16.81% related to nursing procedures, 14.16% due to catheters, tubes and drains, 4.43% due to equipment and materials and, 2.66% related to other reasons. The children's PRISM average was 4.04 with a predictive mortality risk ranging from 0 to 5% (64.6%). There was no relation with the type of occurrence (p=0.85) and PRISM. The average of NEMS was 35.10 points and there was no relation to the type of occurrence (p=0.18) indeed.

CONCLUSION. The data demonstrated that there was no relation to the different types of incidents with severity of the children's health and the nursing workload of those admitted in the investigated PICU.

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NURSE STAFF EXPERIENCE WITH SOFA SCORE. CHANGING PATTERN OF ORGAN DYSFUNCTION IS RELATED TO OUTCOME.

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INTRODUCTION. The relationship between organ dysfunction and prognosis is valuable in identifying potential early changes in treatment that could improve outcome. This work aimed to assess the applicability of the original organ failure assessment (SOFA) score to a heterogeneous population of ICU patients carried out by nurse staff.

METHODS. From March to November 2001, patients admitted in the setting of a tertiary medical (24 beds) were enrolled and 193 patients with an ICU stay more than 48 hours were prospectively evaluated in a daily basis. Organ function was evaluated daily according to the sequential organ failure assessment (SOFA) score. Organ failure was considered on the presence of SOFA score > 3. It has been used a colored graphical display at bedside to illustrate the staff the changing pattern of organ dysfunction.

RESULTS. The mean age was 53 years old (12-89). The length of ICU stay was 9 days (1-68). Neurologic failure was the most prevalent organ dysfunction occurring in 25% of the patients at admission and 23% at day 3, followed by pulmonary and cardiovascular failure (24%, day 0 and 25%, day 3; 16% day 0 and 20% day 3, respectively). Non-survivors patients had significantly higher SOFA score at admission and on day 3 compared to survivors (7.7±3.0 vs 5.6±2.9, 8.2±3.9 vs 5.4±3.3, respectively, p<0.05). Importantly, patients in whom Total SOFA score decreased (n=58) or did not change (n=49) within 48h mortality rates were 25% and 26%, respectively. Patients with increasing values of Total SOFA (n=86) had significantly higher mortality rate (51%) (RR 1.89 CI 95% 1.28 - 2.78, p<0.05).

CONCLUSION. Early changing patterns of organ dysfunction are related to mortality. Evaluating SOFA score daily, especially in the first 3 days, may direct earlier strategies to prevent organ failure. Nurse evaluation of SOFA score may be a valuable tool for bedside care.

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NURSING DEPENDENCY SCORING SYSTEM: A LOCAL ASSESSMENT

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INTRODUCTION. This study focuses on the UK government’s call for the ‘flexible’ use of nursing staff in order to facilitate bed usage in critical care. To achieve this, an assessment of the nursing dependency of the patient needs to be performed. The study aimed to assess the suitability of an existing assessment tool (3) for the authors’ local needs.

METHODS. 3 critical care units of a large NHS trust were used. Two units (A and B) care for level II and level III patients, and the other (Unit C) for level II patients only. All patients admitted over a 3-week period (21/10/2002 – 10/11/02) to the three units were enrolled in the study. Each patient was assessed, both by the bedside nurse and an “expert” nurse (normally the shift manager), at the beginning (prospective) and end (retrospective) of each shift. A TISS score (single daily assessment) was available for Unit A.

RESULTS. A total of 140 patients (Unit A, n=52; Unit B, n=24; Unit C, n=64) took part in the study. This generated 2566 prospective and 2231 retrospective NDS assessments. 216 TISS assessments were made in Unit A. Non-Gaussian distributions were identified for the NDS scores (K-S p<0.001). The median scores (and interquartiles) for the three units showed that there was no significant difference (Wilcoxon Rank Sum Test) between the mean for ‘grade’ score vs. ‘expert’ score, or between ‘prospective’ vs. ‘retrospective’ score for each unit. There is good correlation (Spearman’s rho 541, 574, 588, 557 respectively) between the NDS score and the TISS score for Unit A.

CONCLUSION. Geographically isolated units (A & B) have produced near identical median scores suggesting the NDS has internal validity. The consistency of the median scores for Unit C, among the various assessors, supports this finding. The use of the NDS at the bedside was found to be simple to complete and easily obtainable on a shift-by-shift basis. The TISS correlated closely with the once daily TISS. Further work is required to identify the appropriate tool for assessing nursing workload.

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INCOMPATIBILITY BETWEEN POLYVINYL CHLORIDE AND DRUGS ADMINISTERED INTRAVENOUSLY TO CHILDREN.

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INTRODUCTION. During the administration of certain pharmaceuticals via intravenous (IV) therapy access devices made of polyvinyl chloride (PVC), absorption and adsortion phenomena may occur, which are classified as physical incompatibilities. PVC is a rigid polymer, and to make it flexible, plasticizing agents like DEHP (di-2-ethylhexyl phthalate) are incorporated. Incompatibility between certain drugs and PVC also causes extraction of the DEHP into the patient’s blood circulation. The objective of this study was to identify IV drugs administered to children that are incompatible with PVC.

METHODS. This was a descriptive study performed in an university hospital in the city of São Paulo, Brazil. The data collection took place through the observation of 519 administrations of IV drugs in 178 children, in which 444 IV therapy access devices made of PVC were identified. For the evaluation of IV therapy accessories made of PVC that consider the concentrations utilized in pediatrics.

RESULTS. Of the 444 accessories, 172 (38.7%) were volume control chambers, 140 (31.5%) extensions, 84 (19.0%) flow directors (small taps), 38 (8.5%) serum equipment and 10 (2.3%) puncturable lids. In the 519 administrations observed, 41 types of drugs were identified, of which 229 (44.1%) were antibiotics, 92(17.7%) anticoagulants, 36(7.0%) sedatives, 27 (5.2%) analgesics, 25 (4.6%) anticonvulsants, 21 (4.1%) anti-inflammatory, 16 (3.1%) diuretics, 11 (2.1%) antihistamines and 1 (2.1%) others. Compatibility between the PVC and the drugs investigated was identified in 328 (63.2%) instances, incompatibility in 103 (19.8%) and in 88 (17.0%) no information was identified in the literature researched regarding compatibility. The incompatible drugs were sodium heparin, chlorpromazine hydrochloride, sodium acetylcarvyl, promethazine hydrochloride, lorazepam and sodium thioptal.

CONCLUSION. An incompatibility rate between drugs and PVC of 19.8% was identified among the 519 administrations observed. There is a need to develop studies that analyze incompatibility between drugs and PVC that consider the concentrations utilized in pediatrics.

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Grant acknowledgement: FADA-UNIFESP.
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INTRAHOSPITAL TRANSPORT OF CRITICALLY ILL PATIENTS

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INTRODUCTION. The development of new technology in the improvement of therapeutic and diagnostic procedures, but it also brought along the necessity of transporting the critically ill patients to carry out these procedures. The purpose of this study was to determine the association between mishaps occurring during interhospital transport and verifying the association between mishaps and therapeutic support, physiologic alterations and illness severity.

METHODS. A prospective, descriptive and relational study was performed in patients from the critical care unit of a private hospital located in São Paulo, Brazil. Its sample comprised 35 patients. The data collected during interhospital transport were: patient’s gender, age, APACHE II score, blood pressure, oxygen saturation, cardiac and respiratory frequencies and therapeutic support used, which included ventilation, central and peripheral venous catheter and vasoactive drugs and transport destination, duration and accompanying escort team and therapeutic and/or critical care unit of a private hospital located in São Paulo, Brazil. Its sample comprised 35 occurrences of phlebitis (p=1.000).

RESULTS. Complications occurred in 37.1% of the transports. The alteration of the patient’s vital association between the variables focused on. The Pearson’s linear coefficient. Student’s “t” test and chi-square test were used to determine the association between the variables focused on.

CONCLUSION. The occurrence of complications was observed in 1/3 of the interhospital transports observed and high APACHE II scores and the use of central venous catheter and vasoactive drugs did relate with mishaps in interhospital transports.

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PERIPHERAL INTRAVENOUS CATHETER-RELATED PHLEBITIS IN CHILDREN: A PROSPECTIVE CONTROLLED STUDY.

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INTRODUCTION. Peripheral intravenous catheterization is the invasive procedure most frequently performed in hospitalized children. The use of peripheral intravenous catheters (PIC) may increase the incidence of disorders such as phlebitis and extravasation. The objective of this study was to verify the incidence and severity of peripheral intravenous catheter-related phlebitis in children.

METHODS. Prospective, controlled study, whose sample was composed by 68 children. A protocol was implemented for the standardization of care in the PICU and surgical ward of a tertiary care institution. A total of 68 PICs catheterizations were included in the study. The patients were divided into two groups: group A (n=34) and group B (n=34) in order to verify the incidence and severity of peripheral intravenous catheter-related phlebitis.

RESULTS. The 68 studied children had ages ranging from 18 days to 12 years (median 1.2±3.2) and received 150 Teflon® PIC, of which 136 (90.7%) were continuously maintained. Seven (4.7%) occurrences of phlebitis were observed, of which four (57.1%) of degree 1 and three (42.9%) of degree 2. No statistically significant difference was found regarding age (p=0.076), nutritional state (p=0.236) and gender (p=0.703) of children who presented phlebitis, however, regarding race of insertion. It was verified that antibiotics administration (70.0%) by PIC had no influence on the occurrences of phlebitis (p=0.038) of insertion.

CONCLUSION. The incidence of peripheral venous catheter-related phlebitis was 4.7%. There was a significant association with phlebitis and race of children, PIC site and insertion degree. No statistically significant difference was found regarding age, nutritional state and gender. The use of PIC with antibiotics administration, however, was not observed regarding the professional category (p=0.448). The results demonstrated that phlebitis were not related to PIC gauge (p=0.100), limb immobilization (p=0.504) and type of maintenance (p=0.100), but was significantly related to blood vessels (p=0.003) of site (p=0.038) of insertion. It was verified that antibiotics administration (70.0%) by PIC had no influence on the occurrence of phlebitis (p=0.038).

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THE EXPERIENCE OF AGENCY NURSES WORKING IN A LONDON INTENSIVE CARE UNIT

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INTRODUCTION. There is a paucity of research into the use of agency nurses in intensive care. With the increasing numbers of nurses leaving full time employment, and the lack of critically care qualified nurses in intensive care units, it is timely to understand alternate forms of nursing employment.

METHODS. This Heideggerian hermeneutic phenomenological study explored the lived experience of eight full time agency nurses working in the environment of intensive care in London. In-depth interviews were used to ascertain the participants' experience of full time agency nursing in intensive care. Colaizzi’s (1978) method of data analysis was utilised. Thematic analysis identified four principal themes and these provided the framework for presentation of the results. The four identified themes were: Performance Issues, Attitudes of Staff, Allocation, and Education.

RESULTS. For the theme of performance issues, participants in this study identified the importance of support and understanding of agency nurses in the environment of intensive care. The theme of attitudes of staff identified that often agency nurses did not feel as though they ‘belonged to a team’. Under the theme of allocation of agency nurses, the participants expressed concern at not having the opportunity of looking after higher acuity patients. Finally, the theme of education addressed the need for agency nurses to attend annual Basic and Advanced Life Support updates and the positive impact of on-going education on nursing care.

CONCLUSION. The findings of this study identify the need for managerial recognition of potential agency nurse deskilling and also maximising the agency nurse’s clinical ability in the intensive care unit. The findings support the need for the implementation of clinical protocols within the intensive care setting, the provision of performance feedback for the agency nurses and on-going education for agency staff. This untapped area of nursing warrants further investigation.

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PATIENT’S SLEEP: ICU’S „BLACK BOX”

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INTRODUCTION. Sleep is a vital component of health that affects quality of life. Adults spend approximately 1/3 of their lives sleeping. Critical patients, admitted into the ICU, frequently require for intensive treatment and monitorization during the 24-hours of the day. This can be one of the reasons for sleep disturbances. The incapacity to rest and to sleep can induce negative outcomes in critical patients. ICU nurses can and must promote the quality of treatment and the healing of patients providing them the opportunity to sleep.

METHODS. Retrospective study, during the first term of 2003, with data analysis from two questionnaires: one made to ICU staff nurses, that worked in rounds, and another to patients admitted in the same setting. The objective of this study is to determine the existence of disturbances in the quality of sleep on ICU patients.

RESULTS. In this survey a total of 60 patients, admitted into the ICU during the same period, answered a questionnaire, as well as 26 nurses working in the same ICU. 79.5% of patients referred to have suffered from sleep disturbances during the time they were being treated on the ICU. 90% of nurses referred that a significant portion of patients have sleep disturbances. Agitation and disorientation were observed on most of the patients as the night falls.

CONCLUSION. Our data analysis supports that psychological stress and fear are associated with the ICU environment and severity of illness, causing in patients a difficulty on relaxation and falling asleep. The majority of patients referred that the quality and duration of sleep were deficient during the ICU period. Nightmares, hallucinations and agitation were referred on 60% of the observed patients. Sleep is a state of relaxation necessary to all human beings: it is a universal and natural process of life. It is a state of serenity that reestablishes the body and mind.