Poster Session
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PREVALENCE OF SEVERE HYPOXEMIA IN THE GENERAL ICU SETTING. 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 patho-physiology.

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 (T.E) and Cardiac Echo (C.E) findings. Patients with hemodynamic instability had cardiac output optimization according to their C.E 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 cmH20 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±6 and an APACHE score of 17±6 were included in the study. Among these patients, 31 were hypoxemic 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 130±30mmHg to 252±147mmHg in the VRG and from 155±33 to 241±mmHg in the CPG (p<0,001) No statistical difference was found in the extent of hypoxemia improvement between groups, but tidal volume was significantly higher in the VRG 913±166ml vs 671±160 ml and plateau pressure was lower the CPG 22±5 cmH2O vs 29±5 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. Changing position to treat hypoxemia seems to be as efficient as ventilatory recruitment with the advantage of lower intrathoracic pressures.

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BREATHING PATTERN-RESPIRATORY LOAD RELATIONSHIP DURING WEANING OF LONG-TERM MECHANICAL VENTILATION

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INTRODUCTION. Standard weaning criteria are based on the concept that during spontaneous breathing the respiratory pattern reflects the respiratory load. However these indexes lose some predictive accuracy after prolonged mechanical ventilation. We studied the relationship between breathing pattern and respiratory load variables during a T-piece trial.

METHODS. 21 intubated patients recovering from acute respiratory failure of various aetiologies who were scheduled for weaning trial were studied. Flow, airway pressure and oesophageal pressure were measured during controlled mechanical ventilation and then during a 30-min T-piece trial of spontaneous breathing. Dynamic elastance (cmH_2O/l), total resistances (cmH_2O/l/s) and PEEPi (cmH_2O) were studied before and during spontaneous breathing. In the latter period, pressure time product (cmH_2O•s/min), and respiratory pattern (Vt, RR, Ti/Ttot, RR/Vt, Vt/ti) were recorded. Weaning failure criteria were respiratory distress or haemodynamic deterioration. Values are means+SD.

RESULTS. The patients were ventilated for 12±8 days before the study. The respiratory mechanics during the T-piece trial worsened in the failure group (n=10, Ers, 31±10 to 73±42; Rrs, 22±5 to 29+12; PEPPi, 5±1 to 9+4), whereas they improved in the success group (n=11, Ers, 22±6 to 17±11; Rrs, 12±3 to 10+6; PEEPi, 2±1 to 2±4. These changes were associated with higher PTPm (641±114 vs. 348±188). Index of respiratory pattern was similar between groups (success vs. failure): RR, 28±5 vs. 29±8 bpm; Vt, 0.36±0.08 vs. 0.33±0.09; l, RR/vt, 84+30 vs. 105+85; Vt/TI, 0.47±0.10 vs. 0.55±0.13; l/s, VE, 10±2 vs. 9±2 l, except for TI/Ttot, 0.37±0.05 vs. 0.28±0.05 s (p=0.002). Only this last variable was related to spontaneous Ers, Rrs (r= - 0.6, -0.6) and can predict the weaning evolution (logistic regression).

CONCLUSION. Patients who fail T-piece weaning trials present a worsening in their respiratory mechanics during spontaneous breathing, compensated by a lower inspiratory fraction of the respiratory cycle. However, this overload was not shown with the standard weaning criteria.

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EFFECTIVENESS OF OPEN LUNG THERAPY OF ALI AND ARDS

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INTRODUCTION. Open lung is a new way of therapy ALI and ARDS. The main goal of this therapy is to open the lung using a high value of PEEP over a short period of time, and next keep up the effect using an adequate value of PEEP over a long period of time. The main effect of this therapy is equal restoration of FRC, decrease in airway resistance and improvement in pulmonary compliance, and the most significant result - improvement in pulmonary gas exchange. The main goal of our study was establishing: the effectiveness of "open lung" concept in the therapy of ALI and the first period of ARDS, limitations of this therapy, and potential contraindications for the application of this technique.

METHODS. Until the present time 7 patients were unrolled to the study. All patients had symptoms of ALI or ARDS for a period no longer than 96 hours. In X-ray examination of the lungs after at least 4 hours of classical ventilation (CMV+PEEP+Plateau) there was no sign of improvement, and significant areas of atelectasis were observed. After qualification and initial CT examination (3 scans), the "open lung manoeuvre" was carried out (PEEP 45 cm H_2O over a period of 20 – 30 second). The next CT examination was performed for control and safety reasons (especially for pneumothorax exclusion and determining the effectiveness of previous manoeuvre). If the result was insufficient the procedure was repeated up to 3 times. Next the classical ventilation (CMV) with the PEEP value at a level of 15 cm H_2O over at least 3-4 days was applied.

RESULTS. In all patients a decrease in the diameters of atelectasis areas was observed on CT scans. Simultaneously a decrease (20-40 cm H_2O) of PIP value and an increase (30-300%) of TV were observed. No hemodynamic disturbances were noticed. After 3 days one patient had subcutaneous emphysema symptoms on the neck, without pneumothorax or mediastinal emphysema signs on CT scans. The therapy was finally successful in the case of 5 patients under the age of 54. In 2 cases the unsuccessful effect of the therapy was connected with the development of Multi Organ Dysfunction Syndrome. Both of these patients were over 54.

CONCLUSION. The open lung therapy is effective method of treatment of ALI and ARDS. However, the age of the patients influences the final outcome.

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EFFECTIVENESS OF THE PRONE POSITION IN PATIENTS WITH ARDS ON CMV

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INTRODUCTION. To study effectiveness of the prone position for the patients with ARDS on CMV and determine it s 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=28), 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 5-6 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.

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OPTIMIZING MONITORING IN NON CONVENTIONAL MECHANICAL VENTILATION IN ACUTE LUNG INJURY

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INTRODUCTION. Mechanical ventilation (NCMV) using extra-tracheal continous gas insuflation (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 mesured 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(LIS)was 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/pt.

Flow/pressure differences between ventilator readouts and tracheal readouts

ETCGI Flow (l/min)	Insp. Pressure Vent. (cm H2O)	Insp. Pressure Trach. (cm H2O)	p value	Difference %
5	36±1.82	34.1±0.96	NS	5.2
10	36.66±2.05	34.8±1.67	NS	5
12	37±2.08	35.21±1.83	NS	4.8

Ventilation and oxygenation parameters

Ventilation and Oxyg Parameters (torr)	PCV or VCV	PCV + ETCGI	p value
PaO2	75.36±15.1	113.57±15.23	< 0.001
pCO2	52.31±10.18	43.57±6.56	< 0.01
ETCO2	4.99±0.68	4.13±0.55	< 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 expiratory in patients diagnosed of SDRA ventilated with strategy of pulmonary protetion (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 cmH2O in spite of the increase of the respiratory frequency.The patients had to present the six hours before the beginning of the study stability haemodynamic,without dysfunction of the left ventricle,unmethodically dialysis not hypertermia uncontrollably.We monitored the arterial pressure (PA),the cardiac output (CO) for termodilution and of constant form the PICCO sistem.We applied capnografia of the exhale gas and the Vd/Vt by Enghoff´s modification of Bohr´s equation with Douglas bag.TGI applies for Boussignac probe and ventilator TGI air liquid during the expiratory phase to flows of 3,6 y 9 lpm during 30 minutes.The Ppl is supported always minor of 30 cmH2O on having remained constant the ventilatory parameters during the study,any increase of the Ppl only can be attributed to autoPEEP caused by TGI,wich is solved diminishing extrinsec PEEP.The analyzed variables are CO, TAM, Vd/VT, Endtidal PCO2 and arterial blood gas.

RESULTS. There are included 8 patients, 7 male, middle ages 59 years.The APACHE II middle 25 and the Score Murray middle 3,They all present a relation PO2/FiO2<100.To haemodynamic level there are no big changes in needs of fluid not vasoactive drugs.The average of the obtained results was (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	6.5+/-1.53
TAM (mmHg)	76 +/- 11.9	80.2+/-6.67	82+/-5.43	77+/-5.89
Vd/Vt (%)	71+/-9	68.5+/-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 demostrated a progressive decrease of the Vd/Vt and the normalitation of the ph and pCO2 in direct relation with the TGI flows used maintaining a Ppl</=30cmH2O

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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 (HRQL) 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 72% 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 d. 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 to a mild-moderate restriction. The radiological findings with the CT-scan were important reticular morphological sequelae, as well as small airway alt. and ground glass opacific. after the 1st m. that also improved with time. In the analised 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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IN ARDS, CO2 ELIMINATION DEPENDS ON TIME FOR DISTRIBUTION OF INSPIRED GAS

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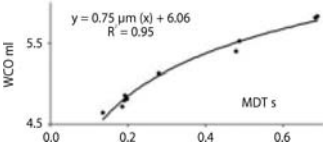
INTRODUCTION. Inspired gas is transported to the alveolar zone, where distribution by diffusion requires time. Mean distribution time (MDT), the available time for that, depends on insufflation time, post-inspiratory pause (PIP) and the ratio tidal volume to airway dead space (VDaw). In pigs, a short MDT increases VDaw and decreases CO2 elimination. We studied how MDT affects VDaw 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+0.9lnMDT and VDaw=233-24lnMDT. 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 repiratory rates if PIP is not used.

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A PROSPECTIVE, OBSERVATIONAL STUDY OF ARDS IN A COHORT 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%, GI 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 inotropes (OR 2.56, p< 0.0001). PaCO2 was not associated with a different outcome (OR 1.0, p = 0.98). Enteral 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 (SD). S: NS	Mean Min Value (SD). S: NS	Mean MeanValue (SD). S: NS
Oxygenation Index	37(23): 103(80)	139(73): 227 (135)	75(29): 153 (87)
PaO2/FiO2 mmHg	103(30): 82 (31)	301(99): 179 (99)	190(44): 124 (50)
PEEP cmH2O	4.5(2.0): 6.7 (3.1)	10.1(3.5): 10.7 (3.7)	7.2(2.1): 8.8 (2.9)
Mean Airway Pressure cmH2O	10.2(4.0): 15.5 (5.7)	21.1(6.1): 23.8 (6.7)	15.4(4): 19.6 (5.5)
Compliance ml/ 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(158): 743 (188)	599(115): 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 organ support, and invasive cardiovascular monitoring was common.

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Grant acknowledgement: AstraZeneca

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MULTIPLE INSPIRATORY-EXPIRATORY PEL/V LOOPS IN PATIENTS WITH ARDS

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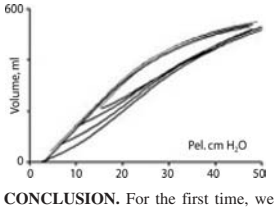
INTRODUCTION. Multiple inspiratory Pel/V curves recorded from decremental PEEP levels illustrate de-recruitment and recruitment at low and high airway pressures, respectively. Bitzén et al. demonstrated in an ARDS model that an inspiratory-expiratory Pel/V loop recorded from zero PEEP (ZEEP) yielded corresponding information (ESICM, Geneva 2001). The hypothesis that this is also the case in patients with ARDS was tested.

METHODS. A sequence of Pel/V loops at decremental PEEP levels was automatically recorded with a computer controlled ServoVentilator 900C in 7 sedated and paralysed ARDS patients (PaO2/FIO2 84-196 mmHg). Sinusoidal modulation of insp and exp flow allowed determination of resistance in relation to volume and subtraction of resistive pressure to obtain Pel. Insp and exp Pel/V curves were aligned to a common volume axis.

RESULTS. A model with constant resistance was valid for inspiration, while resistance increased much during expiration. The multiple expiratory curves follow a common trajectory from which the inspiratory curves recorded from different PEEP levels start, fig. All inspiratory curves merged at a pressure of 35-40 cm H2O. De-recruitment at low PEEP levels was observed in all patients. De-recruitment occurred mainly at high pressures in 2, at low pressures in 2, and evenly at all pressures in 3 patients.



CONCLUSION. For the first time, we show that an inspiratory-expiratory loop recorded from ZEEP describe the envelope curve in which multiple inspiratory curves take place. One loop can therefore be very useful for titration of the PEEP level needed to maintain recruitment.
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USE OF THE DESATURATION CURVE TO ADJUST PEEP DURING MECHANICAL VENTILATION ON PATIENTS WITH ARDS

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INTRODUCTION. The purpose of this study was to determine the utility of the Desaturation Curve(1)to adjust PEEP during mechanical ventilation on patients suffering from ARDS.

METHODS. Ten ARDS patients were included. We used our previous procedure(1,2)to obtain either, the desaturation curve and the Desaturation Index(DI). Then, a Lung Recruitment Manoeuvre (LRM) was performed; during LRM and after reaching 100% of arterial saturation by pulse oximetry (SpO2) the FiO2 was decreased from 100% to 21 % in steps of 20% each. Then, Peak pressure and PEEP were decreased to a level enough as to obtain a SpO2 above 90% at FiO2 of 21%. At any moment that SpO2 reached 85% the FiO2 was increased to obtain a SpO2 above 95%, and PEEP adjusted to a superior level. The final FiO2 was freely set as to obtain 95% of SpO2. A non parametric test was performed to determine statistical difference between variables before and after LRM.

RESULTS. All patients completed the study and no complications were observed. Seven patients reached a SpO2 higher than 90% and three patients had SpO2 of 87% at FiO2 of 21%. PEEP was about ll.10±4.07 cmH2O before LRM and 13.70 ± 2.87 cmH2O after LRM (NS). The DI was of 38.80±14.70 before LRM and 32.00 ± 12 after LRM (NS). SpO2 at FiO2 of 100% was of 97.70± 3.06 before LRM and 99.10±1.29 after LRM (NS). After decreasing the FiO2 at 21% the SpO2 was of 85.9% ± 1.91 before LRM and 91.10% ± 3.73 after LRM(P<0.003).The PaO2/FiO2 index was of 133.20 ± 64.53 before LRM and 285.70 ± 37.35 after LRM (p< 0.001).

CONCLUSION. The results show that it is possible to optimize mechanical ventilation by adjusting PEEP after a LRM with the information derived from the desaturation curve.

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Grant acknowledgement: Consejo Nacional de Ciencia y Tecnología, México

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INITIAL CONTINUOUS DISTENSION PRESSURE AND EFFECT OF HFOV IN EXTRAPULMONARY AND PULMONARY ADULT ARDS

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INTRODUCTION. 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 (PaO_2/FiO_2<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 (s=19) and gender F/M=14/14, was involved. Initial HFOV parameters (SensorMedics 3100B) were: f=5 Hz, Ti/T=0.5, initial continuous distension pressure CDP=conv. P_{mean}+0.5 kPa, $FiO_{2\ HFOV}=FiO_{2\ conv}$ and bias flow=40-60 l/min. The pressure amplitude $DeltaP_{HFOV}$ and tidal volume $V_{T\ HFOV}$ were set according to arterial gases. The following parameters were recorded: $V_{T\ HFOV}$, airway resistance R_{AW}, $FiO_{2\ HFOV}$, CDP, PIP, PEEP and arterial gases. The following parameters were recorded before and after HFOV: Lung Injury Score (LIS), SOFA score, survival rate, $PaO_2/FiO_{2\ conv}$, blood gases and duration of conv. ventilation. Two values of oxygen gain were calculated: Gain 1 as a difference between the average $PaO_2/FiO_{2\ HFOV}$ and the latest $PaO_2/FiO_{2\ conv}$ values divided by the latest $PaO_2/FiO_{2\ conv}$. Maximal value of $PaO_2/FiO_{2\ HFOV}$ was used instead of the average one for Gain 2 calculation.

RESULTS. Survival rates were: total 56%, in P group 57%, in E 55%, total conventional ventilation period before HFOV in P was 11.5 days, in E 5.08 days. Period of HFOV was in both groups 23.5 hours (s=6.5). Initial parameters before HFOV were $PaO_2/FiO_{2\ conv}$=125 Torr (s=52) in the whole group, in P 133 Torr (s=48), in E 117 Torr (s=57), LIS in P was 3.1 (s=0.56), in E 3.34 (s=0.35). The significant changes (p<0.05 between the groups) of PaO_2/FiO_2 between conventional and HFOV periods were Gain 1=4% (s=27) in P, 104% (s=156) in E; Gain 2=39% (s=38) in P and 156% (s=102) in E. The significant difference (p<0.01) between the first optimal CDP during HFOV and P_{mean} before HFOV was observed: 0.12 kPa in P and 0.62 kPa in E. No significant difference in $V_{T\ HFOV}$ for normocapnia was observed (2.14 ml/kg in P, 2.07 ml/kg in E).

CONCLUSION. We found the significantly higher improvement of PaO_2/FiO_2 values in severe extrapulmonary ARDS patients in comparison with pulmonary ARDS patients. Therefore HFOV is more efficient in ARDSexp. Suitable initial setting of CDP in comparison with P_{mean} during conventional ventilation is significantly higher in ARDSexp patients.
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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 compliances 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 V_T 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 value 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 V_T 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:J04/98:210000012 and GA CR 305/00/0651.

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BEST-PEEP CHOICE GUIDED BY PAO2/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)4ml/kg, PEEP5 cm H_2O and FIO2 100%.Those who presented P/F<200mmHg were submitted to alveolar recruitment with CPAP 40cmH_2O for 40sec(CPAP40/40),and ventilated with VCV for 2 min- VT4 ml/kg, PEEP25cm H_2O, RR 15-20 bpm without autoPEEP on flow-time curve and FIO2 100%. Patients who did not achieve P/F>300 were recruited with CPAP50cmH_2O for 40sec (CPAP50/40). Those who still failed were recruited with pressure control ventilation (PCV), plateau pressure(PP) 60cm H2O, PEEP50 cm H_2O, RR 5bpm and I:E 1:1 - 1:5,for 60 se (PCV60/60).When P/F >300 mmHg,we reduced PEEP by 2cmH_2O 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 13(46.5%) had secondary ARDS. Twelve patients were recruited succesfully 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 35.4cm H_2O. The P/F rose significantly from a median of 137 before procedure to 323.5 twenty four hours later (p=0.005). Static compliance imediately 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

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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 accordingly to the NIH 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/m^2, PaO2/ FIO2 214.7±61.6 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 0	Time 120
Chest wall (L)	27.5±5.2	27.3±5.3
Cst,rs (ml/cmH20)	39.6±15.2	33.7±10.7*
Cst,cw (ml/cmH20)	166.4±74.5	138.3±57.9
Cst,L (ml/cmH20)	55.4±22.4	46.7±17.4*
PaO2 (mmHg)	77.5±19.0	85.6±16.7
PaCO2 (mmHg)	55.2±10.1	58.0±11.8

** P<0.05 vs Time 0*

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, IL-6, and IL-8 were determined by ELISA at Entry and 2, 4, and 6 hours after randomization and after 6 hours in broncho-alveolar lavage fluid. Statistical analysis included MANOVA after log transformation.

RESULTS. TNF in BAL fluid was higher with higher VT compared to lower VT (50±111 pg/ml versus 1±7 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>0 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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VENTILATORY STRATEGY IN ACUTE BRAIN INJURED PATIENTS WITH AND WITHOUT ACUTE LUNG 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 was1.96±0.35, Chest X ray score (N quadrant) was 2.32±0.58. The lung CT scan showed only the presence of consolidation in the most dependent lung. Vt =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
Vt/PBW (ml/kg)	10±1	11±1	n.s.
PEEP (cmH2O)	4±3	5±4	n.s.
Cst,rs (ml/cmH2O)	49±12	47±11	n.s.
PaO2/FiO2	282±84	177±77*	<0.0001
Vasoactive drugs (y/n)	36/28	13/6°	n.s.

CONCLUSION. Patients with severe hypoxemia and bilateral infiltrates on the chest X ray had no reduction in Cst,rs 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.
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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 FETN2 were calculated as 1-FIO2 and 1-FETO2-FETCO2, respectively. Gas and spirometry measurement synchronisation problems were circumvented by using end-tidal and inspiratory O2/CO2 concentrations and corresponding tidal volume measurements. CO2 output was determined as expired minute ventilation x mixed FECO2. Alveolar tidal ventilation, TVA, was taken as tidal VCO2 divided by FETCO2. The volume of nitrogen was calculated as the sum of tidal nitrogen inspired or expired during the washout/in. Metabolism was assumed to be stable during measurements. FRC was calculated as the washout/in volume of nitrogen divided by the difference in nitrogen concentration at start and end of the washout/in period. Washout/in was achieved by an increase and subsequent decrease in FIO2 with 10, 20 or 30 % units. This sequence was repeated, resulting in two washout and two washin measurements for each change in FIO2.

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 when decreasing FIO2 was 4, 3 and 3 % 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.

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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 (VILI) 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 (VT) 10 ml/kg, positive end-expiratory pressure 0 cmH_2O, respiratory rate to obtain normocapnia and inspirated oxygen fraction (FiO2) 0.4) for 30 minutes. After 60 minutes ventilated with FiO2 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 later. Groups were compared with ANOVA for repeated measures.

RESULTS. Data are expressed as mean ± SD.

	CF FiO_2 1	CF 1 h	CF 3 h	DF FiO_2 1	DF 1 h	DF 3 h
PaO_2,mmHg	420.7 ± 35.5	422.5 ± 46.0	421.4 ± 41.2	394.3 ± 31.7	346.3 ± 53.6	330.1 ± 72.0
$PaCO_2$*,mmHg	39.2 ± 2.9	40.9 ± 4.3	42.6 ± 6.9	37.9 ± 2.2	43.0 ± 5.5	51.3 ± 6.4
VT*,ml/kg	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*,ml/cmH_2O	2.6 ± 0.1	2.7 ± 0.1	2.5 ± 0.2	2.5 ± 0.3	2.4 ± 0.2	2.1 ± 0.3

*$p<0.05$

CONCLUSION. Under these experimental conditions DF impaired gas exchange and lung mechanics suggesting that DF may contribute to VILI inducing lung collapse.
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ASSESSMENT OF EXPIRATORY FLOW LIMITATION IN EXPERIMENTAL ACUTE LUNG 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 kgs) 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 FIO2 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 DeltaRL (table 1). The Est,w/Est,L ratio was less than 1 at T0 and further decreased after injury, specially in the SL model.

variables mean (SEM)	* P<0.05 versus T0	T0 AO	T0 SL	T110 AO	T110 SL	T200 AO	T200 SL
Rint,L	cmH2O/L/s	13±3	5±1	22±7	6±1	27±8	7±3
DeltaRL	cmH2O/L/s	4±0	3±1	15±3*	20±2*	15±2*	22±2*
Est,L	cmH2O/L	20±2	18±3	42±1*	47±4*	44±3*	55±5*
Est,w/Est,L	%	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 Est,w and Est,w/Est,L ratio should maintain small airways patency.

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ASSESSMENT OF EXPIRATORY FLOW LIMITATION IN METACHOLINE CHALLENGE IN PIGS

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

METHODS. In 6 female pigs (35-38 kgs) anesthetised, tracheostomised and mechanically ventilated, acute bronchoconstriction was induced by subcontinuous nebulisation of MCH (FDC 88, Mediprom, Paris, France). The objective was maximal inspiratory pressure (Pmax) of 40 cm H20. 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 (PEEPt), 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.

*p<0.05 vs T0 total MCH dose	**T0 no FL (n=2)** 0	**T1 no FL (n=2)** **29.3±1.8 mg**	**T0 FL (n=4)** **0**	**T1 FL (n=4)** **10.8±4.7 mg**
Pmax cmH2O	18±4	51±4	20±1	52±4*
PEEPt cmH2O	0.4±0.1	1.9±0.3	0.1±0	3.4±0.8*
Rint cmH2O/L/s	10±4	29±7	10±2	50±7*
DeltaR cmH2O/L/s	7±1	41±1*	9±1	40±8*
Est cmH2O	33±2	100±15	35±2	46±5

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

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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/cmH20)= tidal volume/(plateau pressure - PEEP). The M/F ratio was 1/1, BMI 25.8±5.3, age 66.1±14.5, APACHE-II 27.7±9.8, SAPS-II 60.2±13.3, MODS 7.4±3.2, and SOFA 10.3±3.5.

RESULTS. The IAP was significantly higher in the anti-trendelenburg and upright position versus the supine, and significantly lower in the trendelenburg position vs the supine ($p<0.0001$, one-way Anova). Table 1 lists the mean values for IAP and Cdyn in the different positions. The Cdyn was lowest in the upright position vs the supine ($p<0.0001$, 2-tailed paired student's t test). There was only in the upright position a poor but slightly significant correlation between IAP and Cdyn ($p=0.05$). In 11 patients with a BMI > 25 (mean BMI 30.2±3.4) the increase in IAP in the upright position vs the supine was significantly greater compared to patients with a BMI < 25 (mean BMI 21.3±1.8): 9.4±4.4 vs 7.5±5 ($p=0.03$), but the lowering effect on Cdyn was the opposite 4.4±8 versus 5±5.2 (p=NS).

	Supine	**Anti-Trend**	**Trend**	**Upright**	**Total**	**p-value**
IAP (mmHg)	8.5±3.9	12.8±4.6	4±3.9	16.7±5.8	10.5±6.6	<0.0001
Cdyn(ml/cm)	40±18.2	39.7±17.6	37.9±18.8	35.3±17.5	38.3±17.5	NS

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 upright 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.

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A NOVEL EXPERIMENTAL MODEL OF ARDS INDUCED BY REPEATED AIRWAY LAVAGE AND NEEP-VENTILATION IN PIGLETS

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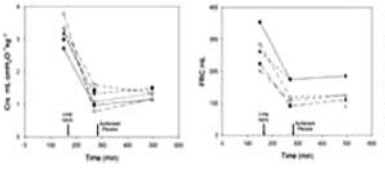
INTRODUCTION. Experimental models of ARDS have some inherent problems: sepsis induces a systemic response, oleic acid lung injury worsens with time, and lung dysfunction after saline lavage may recover spontaneously. As part of a pilot study of ARDS and surfactant treatment, we investigated if the combination of repeated airway lavage with saline followed by injurious ventilation with negative end expiratory pressure (NEEP) would produce a stable lung injury (LI).

METHODS. In 6 anaesthetised and mechanically ventilated piglets, static compliance of the respiratory system (Crs), functional residual capacity (FRC), arterial blood gases, and cytokines in plasma and bronchial alveolar fluid were measured before and after LI and 3 h after surfactant instillation. LI was induced by 7 repeated lavages with 30 mL/kg saline. Lavage was followed by 45 min of: PCV 33/5 (I/E), RR 15, PIP 40 cmH2O, NEEP -5 cmH2O. After instillation of surfactant/placebo, 3 h of normal ventilation was resumed. The animals were then killed, the lungs removed, and samples of the left lung were frozen for cytokine analysis. The right lung was sent to histological analysis.

RESULTS. See figures below.



The figures show Crs and FRC from individual piglets. Histology showed an inhomogeneous inflammatory ARDS-like lung injury. PaO_2 decreased by 68±17%, pH was 7,30 ±0,07, and hempdynamics was stable.

CONCLUSION. The combination of lung lavage, high pressure ventilation, and derecruitment by NEEP produces a stable model of atelectotrauma lung injury, which can be used for evaluating the effects of different ventilation modes on lung mechanics and on the release of inflammatory mediators.

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ALVEOLAR RECRUITMENT MANOEUVRES REDUCE OXYGENATION IMPAIRMENT DURING ONE LUNG VENTILATION.

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INTRODUCTION. Aim of this study was to investigate the effects of a protective ventilatory strategy during one lung ventilation for open lobectomies. Arterial oxygen deterioration, due to partial dependent and total nondependent lung collaps, may be counteracted by alveolar recruitment manoeuvres.

METHODS. Six patients(4M/2F), undergoing elective open lobectomies, were studied, after informed consent, at five time points: T_0= during two-lung ventilation (TLV), T_1= during one-lung ventilation(OLV)before and T_2,T_3= after two consecutive alveolar recruitment manoeuvres (ARM), performed at one hour interval; T_4= at the end of the procedure, before extubation. At these time points blood samples were drawn for blood-gas analysis with the patient turned on one side. All the patients were ventilated using a Servo 900 C ventilator in a volume controlled mode at a VT of 10ml.Kg^{-1}, at a rate of 10-12 bpm, with no PEEP and with a Ti/Ttot= 0,33. Minute ventilation and FiO_2 were adjusted in order to maintain $etCO_2$ within 32-35 mmHg and SaO_2 above 0,95, respectively. ARM consisted of a PEEP application (10 cm H_2O) after a brief pulmonary inflation of the dependent lung at 35-40 cm H_2O peak pressure.

RESULTS. Mean values(±SD)of PaO_2/FiO_2 resulted: 449(±146)at T_0, 221(±124)at T_1, 299(±110)at T_2, 450(±66)at T_3 and 515 (±104) at T_4. These results were analysed with ANOVA test for repeated measures. Oxygenation values were normalized to the different FiO_2 levels used; $p<0.05$ was taken as significant. T_1 vs T_0 PaO_2/FiO_2 values showed a significant decrease ($p<0.05$), while no significant change was found when comparing T_2 with T_1 values. On the contrary a statistically significant difference ($p<0.05$) was found between T_3 and T_2 oxygenation parameters testifying the usefulness of the ARM in terms of oxygenation improvements.

CONCLUSION. Arterial oxygen deterioration demonstrated to ameliorate at least at T_3 thanks to ARM; the improvement was also further confirmed, in terms of PaO_2, during OLV at constant FiO_2 (T_2,T_3).

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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. 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.

METHODS. Ten patients ventilated with the same VT at 0 and 5 cmH_2O of PEEPe, by using randomly either PCV or ACV. Resistance (Rrs), compliance (Crs) and PEEPi were obtained 1) by fitting the equation Paw=RrsxV'+VT/Crs+PEEPi (LSFM), both during inspiration and the whole breath 2) by conventional method based on expiratory (PEEPi,st) and inspiratory occlusion (Cdyn,rs = VT/(P1-PEEPtot); Rmax,rs = Pmax-P2/V'), where P1 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; Rmax,rs: 25 ± 11cm H_2O. l-1.s-1; Cdyn,rs: 35 ± 12 ml.cmH_2O-1; PEEPi: 4.5 ± 4.1 cmH_2O 2) LSFM allows calculation of reliable data both during ACV and PCV. 2) This result is not influenced by PEEPe. 3) Data weighted on whole breath exhibited higher bias and decreased precision; this was due to EFL (3 pz). 4) PCV exhibited more precision than ACV. 5) The use of PEEPe 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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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 is difficult. We hypothesized that the flow waveform during T-piece trial may be related to abnormal respiratory mechanics.

METHODS. In 21 intubated patients recovering from acute respiratory failure of various aetiologies who were scheduled for weaning attempt, flow, airway pressure and oesophageal pressure were measured during controlled mechanical ventilation (mv) and then during a 30-min T-piece trial of spontaneous breathing (sb). Dynamic elastance (cmH_2O/l) and total resistances (cmH_2O/l/s), PEEPi (cmH_2O), pressure time product (cmH_2O•s/min), and the respiratory pattern were studied. Power spectrum of the flow signal during spontaneous breathing was obtained by Fourier transform, and deviations from sinusoidal waveform were measured as the quotient between the first harmonic and the integral of the power spectrum of the complete signal expressed in percent. Weaning failure criteria were respiratory distress or haemodynamic deterioration. Values are means+SD.

RESULTS. The patients were ventilated for 12±8 days before the study. There were statistical differences between failure (n=10) and success (n=11) of weaning: Ersmv 31±10 vs. 22±6; Rrsmv 22±5 vs. 12±3; PEEPimv 5±1 vs. 2±1; Erssb 73±42 vs. 17±11; Rrssb 29±12 vs. 10±6; PEEPisb 9±4 vs. 2±4; PTPmin 641+114 vs. 348+188; Ti/Ttot 0.28+0.05 vs. 0.37+0.05; first harmonic 56+13 vs. 80+11. Ti/Ttot was related to first harmonic (r=0.9) and both were related to spontaneous elastance and resistance (Ti/Ttot, r=- 0.6.-0.6 and Fh, r=- 0.7,- 0.6, p=0.001).

CONCLUSION. Patients who fail T-piece weaning trials present a worsening in their respiratory mechanics, and these changes are related to the degree of deviation of the flow waveform from a sinusoidal shape. Monitoring flow shape could be a convenient and easy method for the early detection of respiratory load effects during weaning.

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PARTITIONING OF RESPIRATORY MECHANICS IN INTRA-ABDOMINAL HYPERTENSION (IAH)

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INTRODUCTION. IAH above 15mmHg causes restrictive lung disease due to diminished chest wall (CW) static compliance (Cstat)(1-3). This study will look for a correlation between IAP-Ppleural and IAP-LIP (lower inflection point) by partitioning total respiratory system (TRS) mechanics in lung and CW in pts with(out) 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/F ratio: 1/4, age 72.8±5.3, APACHE-II 30.4±4.3, SAPS-II 62.4±7.3.

RESULTS. The values for IAP were 13.7±5.5mmHg vs 12.6±5.2mmHg for Ppl with significant correlation (n=864): Ppl(mmHg)= 0.92xIAP (R2=0.88, p<0.0001). Bland and Altman analysis showed a good agreement: IAP was almost identical to Ppl with a bias of -0.8±1.9 (SD) mmHg (95%CI –1to-0.7); the limits of agreement (LA) were –4.6to3 (95% CI –4.8to–4.3 for the LLA and 2.7to3.2 for the ULA). There was a good correlation between IAP (15.4±6.7cmH_2O) and LIP (14.5±5.2cm H_2O): LIP (cmH2O)= 0.5xIAP + 2.6 (R2=0.93, p<0.0001) and there was an inverse correlation between IAP and Cstat (56.3±17.3ml/cm H_2O): Cstat= -1.2x IAP + 74.4 (R2=0.2, 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 Cstat was solely due to the increase in IAP and concomitant increase in Ppl with flattening of the CW-PV curve while the lung-PV curve remained unchanged.

CONCLUSION. IAP-Ppl and IAP-LIP are strongly correlated. This has important implications in daily clinical practise. The mean LIP was around 14.4cmH_2O. IAH dimishes TRS Cstat due to a dimished CW-Cstat while lung-Cstat 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<35. We would advise to use DeltaPplat (=Pplat-IAP) instead, otherwise lung protective ventilation in IAH becomes impossible.

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A PULSE PRESSURE-TIME METHOD OF MEASURING LUNG INFLECTION POINTS DURING MECHANICAL VENTILATION

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INTRODUCTION. Lower and Upper Inflection Points (LIP and UIP, respectively) determined by Pressure Volume Loops have been utilized by some clinicians to guide setting PEEP and tidal volumes during ventilator management. However, current methods for determining inflection points are cumbersome and technique dependent. A new technique utilizes delivery of small consecutive pulses of gas to the lungs for 10-15 seconds and simultaneous measurement of pressure changes. The LIP and UIP are determined by pressure-time analysis. The aim of this study was to compare the inflection points obtained by the Pulse Pressure-Time (PPT) method to the Super Syringe on a previously validated mechanical lung model of ARDS.

METHODS. Three separate measurements each of the LIP and UIP were conducted with the PPT method and the Super Syringe utilizing three different PEEP levels to simulate different lung conditions. Compliance was held constant at 0.05 L/cmH20.
Data are reported as mean ± SD. Pearson product-moment correlation coefficients were calculated to determine the strength of association between measurements. Results were considered significant if p< 0.05.

RESULTS. Data from each measurement session is shown in the table below (mean ± sd) . Correlation between the PPT method and the super syringe was highly significant (r = >0.95)

	PEEP + 5 PPT METHOD	SUPER SYRINGE	PEEP + 10 PPT METHOD	SUPER SYRINGE	PEEP + 15 PPT METHOD	SUPER SYRINGE
LIP	17.1±.4	16.8±.3	19.4±1	16.5±1	31.4±.2	30.3±1
UIP	30.2±.1	32.1±.8	34.3±.08	35.5±1	40.6±1	40.3±.3

Data reported as mean ±SD

CONCLUSION. Our results indicate that the Pulse Pressure-Time method of measuring LIP and UIP is comparable to measurements utilizing the Super Syringe technique. The PPT method appears to offer the clinician an easy, reliable method of determining inflection points to guide PEEP and tidal volume settings during ventilator management. Additional clinical studies are required to determine the clinical utility of the PPT technique.

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TIME COURSE OF SIALIC ACID METABOLISM ALTERATIONS IN AN ANIMAL MODEL OF SEPSIS

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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 cecal perforation (T0). Sheep were fluid resuscitated for 20 hours (T0-T20) and there 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; $p < 0.01$). Lactate also rapidly increased (T1; $p < 0.01$). Total SA decreased (0.55 ± 0.11 versus 0.45 ± 0.07 mg/dL at T1;$p < 0.05$) and free SA significantly increased at T 15 (0.018 ± 0.015 mg/dL versus 0.067 ± 0.04; $p < 0.05$).

CONCLUSION. In septic shock, an increased sialidase activity is probably responsible of the early increase in free SA concentration. As SA plays an important role in the half-life of RBCs and proteins, blockade of sialidase activity may represent an interesting therapeutic option in sepsis.

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ENDOTOXIN IMPAIRS THE HYPOXIC VENTILATORY RESPONSE IN ANAESTHETIZED ADULT RATS

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INTRODUCTION. Hypoxemia occurs commonly post-operatively. The hypoxic ventilatory response (HVR) consists of an increase followed by a CNS-mediated decline in ventilation (1). Inflammatory mediators may influence the ventilatory response to hypoxia. The hypothesis that systemic inflammation impairs central respiratory drive has been tested.

METHODS. All studies were conducted in accordance with UK Animals (Scientific Procedures) Act 1986. Six adult Sprague-Dawley rats were anaesthetized (pentobarbitone 60mg/kg i.p. followed by propofol 20-30mg/kg/hr iv) and mechnically ventilated under neuromuscular blockade (gallamine). PaO2 was maintained at 15.8±0.4kPa. Core temperature was maintained at 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 (112±4 to 95±11mmHg) and HR increase (25±13bpm). HVR 2 response was variable, with RO (35±13%; p=0.15) and HR (13±10bpm; 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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CYCLOPENTENONE PGJ2 TO INHIBIT NF-KB IN LONG TERM HYPERDYNAMIC PORCINE ENDOTOXEMIA

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

METHODS. Up to now 12 anesthetised, 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 micg/kg/min for the remainder 11h). Before and at 12, 18 and 24h of LPS we assessed systemic and hepato-splanchnic hemodynamics and metabolism. Hydroxyethyl 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.

		Baseline	12h LPS	18h LPS+6h PGJ2	24h LPS+12h PGJ2	time effect P
MAP	Controls(n=7)	84 (80-95)	97 (71-106)	73 (64-100)	68 (56-108)	0,025
[mmHg]	PGJ2 (n=5)	83 (73-94)	88 (80-90)	90 (66-94)	77 (58-97)	0,338
CO	Controls(n=7)	89 (62-124)	159 (105-199)	146 (82-205)	157 (125-191)	0,005
[ml/min/kg]	PGJ2 (n=5)	103 (85-125)	173 (140-201)	171 (124-182)	166 (125-236)	0,014
PCO2 gap	Controls(n=7)	32 (12-69)	45 (25-124)	47 (27-135)	60 (36-89)	0,077
[mmHg]	PGJ2 (n=5)	28 (13-45)	39 (30-92)	47 (27-141)	57 (36-87)	0,241
Liver Lactate						
Balance	Controls(n=7)	8 (1-16)	2 (-8-7)	-2 (-9-9)	-1 (-9-12)	0,172
[umol/min/kg]	PGJ2 (n=5)	10 (8-11)	2 (1-5)	-1 (-3-1)	-3 (-10-2)	0,004

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

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SINGLE BOLUS OF ENDOTOXIN INDUCES SUSTAINED HEMODYNAMIC AND METABOLIC CHANGES IN HEALTHY VOLUNTEERS

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INTRODUCTION. Intravenous lipopolysaccharide (LPS) induces marked systemic, metabolic and inflammatory changes, mimicking some aspects of the physiological response to acute inflammation in critically ill patients. This study aimed at assessing the sequence of the physiological changes after LPS administration in healthy subjects, focused on systemic and metabolic 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), bioimpedance for cardiac output determination and clinical observation in a 10 h experimental model. Subjects were investigated twice: once with 2 ng/kg bacterial LPS and another time with saline control. Results were analysed by ANOVA for repeated measurements, $p<0.05$ was considered as significant. Time (T) is indicated in min before/after LPS.

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 cardiac index (+34%) increased, starting from T60 to T120 min; peak at T240 min. Calculated systemic vascular resistances first increased (+26%), then decreased (-44%). Glycemia was stable in control experiments, but showed also a biphasic pattern after LPS (see table). Sustained increases in energy expenditure (+36%). Fasting led to increased free fatty acids (+81%). The rise of FFA after LPS (+181%) was sustained. Respiratory quotient decreased continuously in both groups from 0.85 at T0 to 0.78 at T390 ($p<0.001$), indicating fat utilization. Blood oxygen saturation was stable in both groups (>95%).

	MAP	vasc. res.	vasc. res.	EE	glycemia	glycemia	FFA
peak	max at	max at	min at	max at	min at	max at	max at
after	T240	T90	T240	T150	T120	T390	T390
LPS - Contr	+ 22.5 %	+ 25.5 %	- 44.2 %	+ 35.7 %	- 7 %	+ 15.3 %	+ 66.9 %
signif.	T75 ->	T75 ->	T135 ->	T90 ->	T90 ->	T180 ->	T120 ->
for	end	T90	end	end	T120	end	end

CONCLUSION. The systemic and metabolic responses to LPS are extensive, involving the overall energy metabolism in a complex fashion. The full metabolic response is delayed until 120-180 min after LPS and is sustained thereafter. The increased metabolic rate is mainly fuelled by a stimulation of fat oxidation, like in septic patients.

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EFFECTS OF SINGLE INTRAVENOUS BOLUS OF ENDOTOXIN ON SYSTEMIC RESPONSES AND LACTATE METABOLISM

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INTRODUCTION. Hyperlactatemia 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 lipopolysaccharid (LPS) administration in healthy subjects.

METHODS. We investigated the metabolic and inflammatory responses in 14 healthy male volunteers in an experimental model simulating an acute inflammatory syndrome. Subjects were investigated twice: once with 2ng/kg bacterial LPS and another with saline (control). In the first group (n=6) we assessed the contribution of skeletal muscle to lactatemia from the gradient between interstitial skeletal muscle (microdialysis) and arterialized blood lactate concentrations. In the second group (n=8), during continuous infusion of lactate, lactate clearance (LC) and endogenous lactate production (ELP) were calculated from plasma lactate levels, using a pharmacokinetic model. The measurements were performed before and 270 minutes after LPS (T270). Results were analysed by ANOVA for repeated measurements; significance-level $p<0.05$.

RESULTS. Body temperature, heart rate, energy expenditure and lipid oxidation increased starting at T60-T120, reaching plateau at T240-T360 and remaining significantly elevated till the end of test. In the first group without exogenous lactate infusion, the muscle-systemic lactate gradient was positive but remained unchanged after LPS, being not different from values observed in the controls. LPS induced a peak of plasma lactate and TNF-alpha at T90. IL-6 peaked at T120; all values returned to baseline within 60 min following the peak. In the second group, combining LPS and lactate infusion, hyperlacatemia persisted till the end of test, while returning to baseline in controls. Compared to initial values, both, LC (+31%, p=0.03) and ELP (+75%, p=0.04) were increased after LPS. Exogenous lactate infusion without LPS did not change LC (p=0.32) or ELP (p=0.55).

CONCLUSION. Muscular microdialysis results suggest that LPS-induced hyperlactatemia does not originate from muscle. The main mechanism explaining hyperlacatemia is increased ELP rather than decreased LC.

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CAP37 DURING CARDIOPULMONARY BYPASS. INCREASE IN PLASMA LEVELS UPON HEPARIN AND LMWH.

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INTRODUCTION. Cationic antimicrobial protein of 37 kDa (CAP37) is a multifunctional inflammatory mediator mainly stored in polymorphonuclear leukocytes and able to induce endothelial hyperpermeability (1). It was questioned whether an alleged increase of CAP37 during cardiopulmonary bypass could be causative in systemic inflammatory response syndrome sometimes seen in these procedures. We report both on the time course of CAP37 plasma concentration during coronary artery bypass grafting and the CAP37 releasing effect of unfractionated and fractionated heparin.

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 measured during and up to 24 hrs after the surgical procedure. In a slightly modified second protocol, the impact of routine antagonisation of heparin by protamin on plasma CAP37 concentration after cessation of the cardio-pulmonary bypass was investigated in another 5 patients. To evaluate whether fractionated heparin has the same CAP37 releasing effect of (unfractionated) heparin, CAP37 plasma levels in 14 consecutive patients of an internal medicine ward anticoagulated with subcutaneously administered low molecular weight heparin were studied.

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, CAP37 plasma concentrations further increased to 3470ng/ml 5min. after opening of the aortic clamp. 15min. after administration of protamin, CAP37 plasma levels dropped significantly to a median of 241ng/ml corresponding to 8.9% of the CAP37 concentration measured immediately before protamin had been given. Moreover, a significant increase of the median CAP37 plasma concentration from 3.3ng/ml at baseline to 11.7ng/ml 3 hrs after subcutaneus administration of low molecular weight heparin was seen.

CONCLUSION. Beside the cardiopulmonary bypass procedure, unfractionated and fractionated heparin represent a stimulus for CAP37 release in humans. Protamin seems to be a strong enhancer of CAP37 clearance from human plasma.

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ADMINISTRATION OF RECOMBINANT HUMAN PAF ACETYLHYDROLASE PROTECTS MICE AGAINST LETHAL SEPSIS

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INTRODUCTION. Sepsis is a major concern in intensive care units. Strategies to block or control inflammatory mediators such as cytokines and biologically active lipids are currently being investigated as possible new adjuvant therapies for sepsis. In the present work, we investigated if inactivation of platelet-activating factor (PAF) and PAF-like lipids by administration of recombinant PAF-acetylhydrolase (rPAF-AH) protects mice from endotoxemia and/or sepsis induced by cecal ligation and puncture (CLP). We also investigated the activity of PAF-AH in the plasma of septic animals and patients.

METHODS. In order to do that we used the CLP (cecal ligation and puncture) model or an endotoxemia model in Swiss mice and treated those animals with PAF-AH (1mg/kg, i.p.). Moreover, this study enrolled 54 septic patients hospitalized in the critical care unit of the University Hospital at the Federal University or at the Spanish Hospital, RJ, Brasil. 37 patients were diagnosed with septic shock and 17 patients suffered from sepsis (Bone et al., 1992). Twelve healthy volunteers served as controls

RESULTS. In this study we observed significant decreases in the PAF-AH activity in the plasma of patients diagnosed with septic shock and in mice that had been either submitted to the CLP procedure or that had been injected with LPS. Administration of rPAF-AH increased PAF-AH plasma activity and significantly protects mice submitted to CLP from death (from 40% survival rate in the control group to 80% in the group treated with PAF-AH). Similarly, when animals were injected with LPS the survival rate increased in PAF-AH treated group. A combination therapy that included both the antibiotic Imipenem and rPAF-AH was more protective of animals undergoing experimental sepsis than single treatments with either of these agents. In addition, the combined therapy resulted in reduced IL-6 levels in mice subjected to CLP.

CONCLUSION. We conclude that inactivation of PAF and/or PAF-like lipids by exogenous administration of rPAF-AH is an effective way to reduce hiperinflammation and mortality during sepsis and endotoxemia.

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DIC AND SYSTEMIC INFLAMMATION INTERACTIONS IN SEPSIS CONTRIBUTES TO MODS AND POOR OUTCOME

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INTRODUCTION. 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 in sepsis.

METHODS. Forty-five patients with sepsis, severe sepsis, and septic shock were studied. The patients were subdivided into two groups, 27 with DIC and 18 without DIC.?@Serial levels of soluble L-, P-, and E-selectins, intercellular adhesion molecule-1 (sICAM-1), vascular cell adhesion molecule-1 (sVCAM-1), thrombomodulin (sThrombomodulin), and neutrophil elastase 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. Acute Physiology and Chronic Health Evaluation II scores were identical between the two groups. In the DIC patients, higher DIC scores, lower platelet counts, and more maximum numbers of SIRS criteria were observed compared with the non-DIC patients. The incidence of MODS and the number of the dysfunctioning organs were higher in the patients with DIC than those without DIC, and the DIC patients had poor outcome. Soluble L-selectin (sL-selectin) levels in both groups tended to be lower than those in the control subjects. All other parameters both in the two groups were continuously higher than those in the control subjects during the study period. The levels of sE-selectin, sICAM-1, sVCAM-1, neutrophil elastase, and sThrombomodulin were elevated in the DIC patients than those in the non-DIC patients. There were no differences in the sP-selectin levels between the two groups, however, more increased sP-selectin levels per platelet were found in the DIC patients compared with the non-DIC patients. Maximum DIC scores in the DIC group positively correlated with the peak levels of neutrophil elastase and sThrombomodulin, and the number of the dysfunctioning organs.

CONCLUSION. Systemic inflammation caused by neutrophil-endothelial cell interactions contributing to endothelial injury in DIC give rise to MODS and poor outcome in patients with sepsis, severe sepsis, and septic shock. The result suggests a strong critical link between inflammation and thrombosis in septic patients

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LABORATORY COAGULOPATHY IN THE CRITICALLY ILL - PROTEIN C AND ANTITHROMBIN 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±2.72 (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 septic shock (sevSep-SS) 38.1±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 thrombo-plastin time (0.55), PTT (0.68) and fibrinogen (0.61), and highest for platelet count (0,71). 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 specifity of PC / AT III must be taken into account when these markers were used in guiding therapy of pts with sevSep-SS.
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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[1]. 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[1].

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 (Total dose was 6,000 units). Concentrations of AT, interleukin (IL)-1Beta, -6, and -8 and tumour necrosis factor (TNF)alpha were measured before surgery, at the end of surgery, one and two days after surgery.

RESULTS. Results are summarized in the table as mean values (AT group/Control group). *: P < 0.05 between the two groups, $: P < 0.05 vs. the value before surgery. IL-1eta and IL-8 could not be analyzed statistically because of the values less than the detection limit.

	Before surgery	End of surgery	One day after surger	Two days yafter surgery
AT (mg/L)	201 / 187	293$ / 153$,*	302 / 149$,*	324$ / 151$,*
IL-1Beta (pg/mL)	< 0.4 / < 0.4	< 0.4 / < 0.4	< 0.4 / < 0.4	< 0.4 / < 0.4
IL-6 (pg/mL)	1.48 / 1.73	82.3$ / 141.5$,*	268.1$ / 280.1$	113.5$ / 251.4$,*
IL-8 (pg/mL)	< 15 / < 15	18 / 17	16 / 17	< 15 / < 15
TNFalpha (pg/mL)	10 / 12	14 / 21$,*	16$ / 17$	13 / 16$,*

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

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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 menigoccocal 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. Sepsis 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.
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DROTRECOGIN 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 Hemostasis (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 >or= 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. Serious bleeding rates over 28-days for DrotAA compared to placebo were 4.7% vs. 2.7% in patients with overt DIC and 3.0% vs. 1.8% 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.

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STEROID USE IN PROWESS PATIENTS WITH SEPTIC SHOCK

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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 (PBO) plus standard therapy (p=0.005). Low dose steroid therapy in patients unresponsive to ACTH stimulation (75% of those meeting Annane enrollment criteria) had prolonged survival, but not significantly improved 28-day mortality of patients with septic shock (Annane, JAMA 2002;288:862). This abstract examines intravenous steroid use in PROWESS patients meeting Annane 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 Annane enrollment criteria (AEC)[treatment with study drug within 8 hours of onset of shock, infection, fever or hypothermia, tachycardia, systolic blood pressure <90 on vasopressors, 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): PBO 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): PBO 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): PBO mortality was 33% (10/30); DrotAA mortality was 26% (7/27); and RR was 0.78 (0.34-1.76). AEC without Requiring the Time Window (AEC-NT) (N=612): PBO mortality was 38% (118/313); DrotAA mortality was 29% (88/299); and RR was 0.78 (0.62-0.98). AEC-NT with Steroids at Baseline and/or Infusion (n=224): PBO mortality was 43% (50/115); DrotAA mortality was 33% (36/109); and the RR was 0.76 (0.54-1.07). AEC-NT without Steroids (n=379): PBO mortality was 34% (65/193); 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 Annane 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). Annane 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 US, Europe (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 vasopressors 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%, n=242 vs. 54.9%, n=260, or 71.5%, n=236; p=0.001 or 0.02) while more patients in US discharged to a skilled nursing facility compared with EU or OT (39.1%, n=186 vs. 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

Poster Session
Markers of sepsis – 334-347

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HIGH CONCENTRATION OF ASYMMETRICAL DIMETHYL-ARGININE IS AN INDEPENDENT RISK FACTOR OF ICU MORTALITY

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INTRODUCTION. Accumulation of asymmetrical dimethylarginine (ADMA) has been linked to endothelial dysfunction, and is an important risk factor for cardiovascular disease. Its elimination from the body is dependent on urinary excretion and degradation by the enzyme dimethylarginine dimethylaminohydrolase. This enzyme is highly expressed in the liver, and in rat studies a high net hepatic uptake of asymmetrical dimethylarginine was found. In critically ill patients, we investigated the relation between indicators of renal and hepatic dysfunction and plasma ADMA concentration, and tested the association between ADMA concentration and outcome.

METHODS. We prospectively collected blood samples from a cross-section of critically ill patients (n=52) with clinical evidence of dysfunction of more than two organs. We identified correlates of plasma ADMA concentration with laboratory values, organ failures score and outcome by univariate and multiple regression analyses.

RESULTS. In critically ill patients, plasma ADMA concentration was independently related to the presence of hepatic failure (b=0.334, 95% CI: 0.207-0.461; p<0.001), and to lactic acid (b=0.395, 95% CI: 0.230-0.560; p<0.001) and bilirubin (b=0.121, 95% CI: 0.031-0.212; p=0.009) concentration as markers of hepatic function. Twenty-one (40%) patients deceased during their ICU stay. In a logistic regression model, plasma ADMA ranked as the first and strongest predictor for outcome, with a 17-fold (95% CI: 3-100) increased risk for ICU death in patients who were in the highest quartile for ADMA.

CONCLUSION. In critically ill patients, plasma ADMA concentration is a strong and independent risk factor for ICU mortality, and hepatic dysfunction is the most prominent determinant of ADMA concentration in this population.
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CELLULAR IMMUNE FUNCTION - EX VIVO WHOLE BLOOD STIMULATION IN COMPARISON WITH FLOW CYTOMETRY

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INTRODUCTION. The cellular immune function is closely related to patient outcome in sepsis (1). It can be studied using the ex vivo whole blood stimulation with LPS which includes the capacity of all leukocytes. The method had been shown to be associated with mortality and morbidity (2). In this study we investigated the capability of the ex vivo stimulation to predict outcome in comparison to flow cytometric parameters.

METHODS. We investigated 40 septic patients (ACCP/SCCM) from 2 operative and a medical ICU and 25 healthy volunteers for determination of normal values. Ex vivo stimulation was performed using 500 pg/ml LPS and an incubation time of 4 hours. Production of TNFalpha was detected by a semiautomatic ELISA system (DPC Biermann, Bad Nauheim, Germany). Human Leukocyte Antigen (HLA)-DR expression was assessed by flow cytometry as quantitative analysis (MFI). Daily differential blood counts were performed using a Sysmex XE2100 cell counter (Sysmex, Norderstedt, Germany). Patients were followed up for a maximum of 14 days on ICU and for ICU-mortality.

RESULTS. Overall mortality was 15%(6/40). Mean APACHE II on admission was 16.5(SD: 5.4) and differentiated well between survivors (15.5(4.5)) and nonsurvivors (21.8(6.7))(p<0.05). A reduced capability to produce TNFalpha after stimulation below 200 pg/ml for more than 48h was associated with a 4.5 fold relative risk to die. Association with mortality was significant for ex vivo stimulation and for HLA-DR expression (ex vivo: p<0.05, HLA-DR: p<0.05; Pearson chi^2). Sensitivity and specificity for the ex vivo stimulation were 0.67(4/6)and 0.77(23/30) and for HLA-DR expression 1.0(6/6) and 0.47(16/34), resp. The parameters showed a low correlation coefficient (CC)(0.38; Spearman). Regarding the differential blood count, TNFalpha ex vivo production was significantly correlated with monocyte numner: percentage (CC=0.5), count (CC=0.4); p<0.001).

CONCLUSION. In our study cellular immune function as assessed by stimulated TNFalpha ex vivo production showed a close correlation to survival. The same was true for monocytic HLA-DR expression. TNFalpha ex vivo values are positively correlated with the number of monocytes. The data give further evidence for the importance of the monocyte system in human sepsis.

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Grant acknowledgement: Biotest AG, Dreieich, Germany

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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. 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 [1]. 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-permeabilsed 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 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 of septic patients was 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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HLA-DR EXPRESSION ON MONOCYTES; A PROGNOSTIC MARKER FOR PATIENTS WITH RUPTURED AORTIC ANEURYSMS

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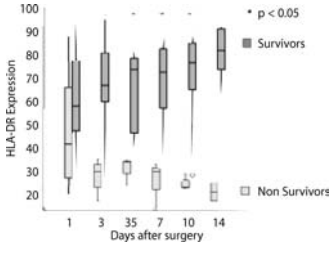
INTRODUCTION. Mortality in patients after surgical repair of ruptured abdominal aortic aneurysms (RAAA) remains high. Downregulation of HLA-DR expression on monocytes is associated with sepsis and mortality in surgical patients. The prognostic role of HLA-DR expression in non-infectious disease after ischemia-reperfusion injury remains unknown. We studied the role of HLA-DR expression on monocytes on outcome in RAAA patients.

METHODS. Patients with RAAA were prospectively analysed. Blood samples were collected on day 1, 3, 5, 7, 10 and 14 and analysed the same day. The percentage of CD-14 positive monocytes expressing HLA-DR was measured by flow-cytometry.

RESULTS. Nineteen patients with a mean age of 71 (+/-7) years were included. There were 17 (91%) men. Five patients died because of multiple organ failure, 14 patients survived. The figure shows the postoperative course of HLA-DR expression on monocytes.



CONCLUSION. Low HLA-DR expression on monocytes is associated with a high mortality in RAAA patients. The prognostic value of HLA-DR expression on monocytes might have important implications to improve survival in these patients.

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CLINICAL EVALUATION OF THREE METHODS TO MEASURE THE MONOCYTIC HUMAN LEUKOCYTE ANTIGEN-DR EXPRESSION

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INTRODUCTION. The human leukocyte antigen-DR expression on monocytes (HLA) significantly characterizes the immune function. The clinical impact of the HLA has been proven before. Common methods to measure the HLA are either not standardised or not evaluated clinically. We therefore investigated the performance of two common and of one standardised method in septic patients.

METHODS. We investigated 59 consecutive ICU patients with sepsis (ACCP/SCCM) and 25 healthy donors for determination of normal values. The HLA was assessed by flow cytometry in three ways. The mean fluorescence intensity (MFI) and the percentage(%) of HLA-DR positive cells were calculated on monocytes identified by FITC-labelled anti-CD14. HLA was determined with PE-labelled anti-HLA-DR (all Becton Dickinson(BD), Heidelberg) in $CD14^+$ gated cells using the histogram and quadrant statistics, resp. (FACS Calibur, BD; CellQuest). The antibodies bound per cell (ABC) were assessed on PerCP-Cy5.5 labelled cells (BD, QuantiBrite™). Patients were followed up for a maximum of 14 days and for ICU mortality.

RESULTS. Overall ICU mortality was 24% (14/59). Mean APACHE II was 17.5(SD:6.5). Prolonged decrease of HLA was associated with increased mortality using all 3 methods. MFI<200 over a period of at least 48h (>48h) showed a 5.6-fold relative risk to die. HLA-DR+ (<75%>48h) and ABC (<10,000>48h) were associated with mortality. Sensitivity(sens), specificity(spez), and p-values were as follows: MFI <200>48h sens: 0.86 (12/14), spez: 0.58 (26/45), p=0.004; Percentage <75%>48h: sens: 0.79 (11/14), spez: 0.67 (30/45), p=0.003; ABC <10,000>48h: sens: 0.86 (12/14), spez: 0.44 (20/45), p=0.042; Pearson chi^2). Parameters showed good correlation coefficients (CC)(MFI vs ABC CC:0.66, MFI vs % CC:0.82, ABC vs % 0.76, all p<0.000; Spearman).

CONCLUSION. Depression of monocytic HLA-DR is strongly associated with mortality in this population of patients. Although there are different methods to assess this parameter with varying reliability, the MFI method showed the highest values for sensitivity and specificity for ICU mortality. The results of the different methods correlated well with each other. Determining an optimal and standardized method to assess HLA-DR expression needs to be subject of further clinical studies.

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LIPOPROTEIN AND ACUTE PHASE PROTEIN MEASUREMENTS AT ICU ADMISSION: ASSOCIATIONS WITH OUTCOME

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INTRODUCTION. Studies have shown that lipoprotein abnormalities exist in critically ill patients versus normals. Lipoproteins play a key role in the transport of lipids, and have been shown to be involved in lipopolysaccharide sequestration and clearance, scavenging of reactive oxygen and nitrogen species, as well as interacting with plasma proteins involved in coagulation. In this study we evaluated lipoproteins and other biochemical parameters upon ICU enrollment in relationship to outcome in a critical care setting.

METHODS. Observational study of 20 consec. adult ICU patients w/ expected stay of >72 hours. Analysis of lipids, markers of acute phase and coag parameters was performed. NMR analysis was carried out to quantify lipoprotein particle numbers, sizes and surface areas. SOFA scores were calculated daily. Diagnosis of sepsis was by physician adjudication.

RESULTS. 15 of 20 patients were adjudicated as septic. Upon enrollment, there was a significant decrease (P<0.05) in total plasma protein, total, LDL and HDL cholesterol, number of HDL particles, HDL and total lipoprotein surface area and in LDL size from patients who were septic versus those not septic. 10 of 20 patients experienced 2 or greater organ failures at some time during their ICU stay. Upon enrollment, there was a significant decrease (P<0.05) in total plasma protein, total triglycerides, surface area from beta lipoproteins, HDL particle size and in ATIII values from patients who experienced >= 2 organ failures versus those with one or less organ failures during the ICU stay.

CONCLUSION. In this pilot study, enrollment lipoprotein abnormalities between critically ill patients were observed in relationship to the outcome measures of sepsis and organ failure. For septic and >=2 organ failures, significant decreases were seen in certain lipoprotein classes and with serum lipid concentrations. Though all 20 patients showed significant hypolipidemia in comparison to a normal population, this study has shown that even among the critically ill population, differences between lipoprotein measurements may indicate or may potentially show the role played by lipoproteins in the occurrence of specific clinical conditions. A study involving a larger cohort of patients more representative of the total ICU population is necessary to validate and to expand upon these observations.

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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 immunoassay system (DPC Biermann, Bad Nauheim, Germany). The ULN for LBP is 12 ug/ml.

RESULTS. The incidence of inflammtory 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 29.78±3.63 (7.2-109.7) ug/ml, SIRS: 29.6±1.27 (3.8-103.0), sepsis: 33.98±2.11 (8.8-75.7) severe sepsis or septic shock (sevSep-SS): 52.83±5.81 (8.1±204.0)ug/ml; p<0.0001 for differences between SIRS and sevSep-SS; p<0.008 between sepsis and sevSep-SS. Differences in procalcitonin (PCT) levels were significant between all categories (p<0.0001), 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 were 23.8 (3.9-109.7) mg/ml, compared to 29.5 (3.8-134.0) 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 were found for PCT and IL-6 levels, (p<0.0001). LBP but not CRP levels were higher in non-survivors of sevSepsis-SS, than in survivors (p<0.001). Max PCT levels correlated most with sepsis-related death (p<0.00001). 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 strongly 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.
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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-septic 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-10 (>24 pg/ml; p<0.001) and IL-6 (>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, septic complications.
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ANTI-INFLAMMATORY RESPONSE AS PREDICTOR OF SEVERITY AND OUTCOME IN BLAST TRAUMA

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INTRODUCTION. Severe trauma and sepsis are the major sources of morbidity and mortality despite the rapid development of intensive therapy. Studies have indicated that there are marked alterations in immune response in patients exposed to major trauma or prolonged surgical procedures, including altered pro- and anti-inflammatory mediator/cytokine release (1). Traumatic injury results in profound immunosuppression which predisposes the patients to sepsis and/or multiple organ dysfunction syndrome (MODS). Aim of this study was to assess the prognostic value of anti-inflammatory cytokines: interleukin (IL)-1 receptor antagonist (IL-1ra) , IL-4, IL-10 and transforming growth factor (TGF)-beta 1 regarding severity and outcome in patients with blast trauma complicated with secondary sepsis.

METHODS. Thirty patients with blast trauma (air-strikes and bomb explosions) who developed sepsis, 15 patients with blast trauma without sepsis and 15 patients with severe sepsis were enrolled in this study. Forty-seven patients developed MODS), 42 died. Blood was drown on the day 1, 3 and 5. Concentrations of IL-1ra, IL-4, IL-10 and TGF-beta 1 were determined in plasma using ELISA assays.

RESULTS. When compared MODS group with group without MODS, we found significant difference (p<0.01) in IL-1ra and IL-10 concentrations; mean values of IL-1ra were 8-fold and IL-10 90-fold higher in MODS patients. When compared non-survivors with survivors, we found significant difference (p<0.01) in IL-1ra and IL-10 concentrations; mean values of IL-1ra were 5.3-fold and IL-10 8.4-fold higher in non-survivors; When compared trauma+sepsis group with trauma group, we found significant difference (p<0.01) in IL-1ra and IL-10 concentrations, they were higher in trauma+sepsis group (IL-1ra 7.7-fold, IL-10 53-fold). IL-4 and TGF-beta 1 were not different (p>0.05) in any case.

CONCLUSION. IL-1ra and IL-10 are excellent predictors of severity and outcome of severe trauma and sepsis; higher concentrations were found in MODS group and in non-survivors. IL-4 and TGF-beta 1 had no significance as predictors of severity and outcome what so ever.

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PROCALCITONIN AS A MARKER OF SEVERITY OF SEPSIS AND ITS RELATIONSHIP WITH CLINICAL FEATURES

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INTRODUCTION. Procalcitonin (PCT) is indicated for use as a diagnostic parameter for bacterial infections and plasma levels are correlated with the severity and type of systemic infection. This prospective study was designed to investigate plasma levels of PCT in siystemic inflamatory response syndrome (SIRS), sepsis, severe sepsis and septic shock in medical intensive care unit(ICU). Also we evaluated relationship between PCT and IL 6, TNF, CRP, WBC, APACHE II score, ionizied calcium(iCa), microbiologicaly documented enfection and ICU mortality.

METHODS. 87 patients with sign of SIRS were enrolled in the study with mean age of 51,03+18,8 and mean APACHE II score of 23,22+8,8 . Patients were classified as SIRS(n=30), sepsis(n=14), severe sepsis(n=27) and septic shock(n=16) acording to ACCP/SCCM criteria based on culture , clinical findings and laboratory data except PCT.Blood samples were taken within 12 hours after admission to the ICU. Patients with malignancy , chronic renal failure and parathyroid disfunction excluded from study while evaluating relationship between PCT and iCa.

RESULTS. PCT levels were significantly higher in patients with sepsis (3,81+6,19) , severe sepsis (33,21+59,5) and septic shock (84+163,93) than those of SIRS (1,39+1,50). There was no correlation between PCT and age, IL6, TNF, WBC, iCa , but significant correlation was found between PCT , CRP (r=0,471 p<0,001) and, APACHE II score (r=0,275 p=0,01) There was no significant difference in PCT levels between survivors and nonsurvivors and also between culture positive and negative patients in sepsis, severe sepsis and septic shock patients.

CONCLUSION. Increase in plasma levels of PCT are closely associated with the severity and type of systemic inflammation.

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PROCALCITONIN SERUM LEVEL AS A PREDICTOR OF MORTALITY IN CRITICALLY ILL PATIENTS IN ICU

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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), „long" surgery (>6h) (group C) and „short" surgery pts (<6h) (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=26.75g/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>26.75g/mL). With a PCT cutoff of 2.65ng/mL, sensitivity was 87.5%, but specificity reached 77.8%.

Patients characteristics

	Group A N=28	Group B N=40	Group C N=31	GroupD N=10	Survivors	Non-survivors
PCT (ng/mL)	5.4 (72)	0.47 (4.2)*	0.44 (15.5)*	0.6 (4)*	0.6 (39)**	15.4 (39)**
CRP (mg/dL)	18 (11)	1.15 (7)*	3.4 (3.7)*	2.4 (3.5)*	3.1 (8.7)**	19.2 (10.6)**
LBP (g/mL)	43.5 (33)	18.2 (19.4)*	10.7 (8.4)*	11.3 (6.3)*	17.8 (25.6)**	35.9 (35.3)**

** P<0.0001 group A> groups B, C, D ** P<0.05 survivors vs non-survivors*

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.

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DIAGNOSTIC ACCURACY OF PROCALCITONIN AND C-REACTIVE PROTEIN IN PATIENTS UNDERGOING CPB

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INTRODUCTION. Procalcitonin (PCT) levels have been described as being superior to C-reactive protein (CRP) in the diagnosis and monitoring of patients with severe sepsis and septic shock (sevSep-SS). However, the diagnostic accuracy of PCT may be limited in the early course of pts undergoing CPB due to non-specific PCT-release.

METHODS. We performed a 21-months prospective study in a 28-bed surgical ICU in 996 critically ill patients for 9275 days, 504 (50.6%) of whom had undergone CPB previously. Procalcitonin (PCT) serum concentrations were measured in daily routine using a commercially available assay (Brahms AG, Berlin, Germany). The LLN for PCT is 0.1 ng/ml in healthy humans, and <1.0 ng/ml for critically ill patients.

RESULTS. Distribution of patients (with/without CPB): SIRS < 1 day: 4.4/2.0%, SIRS > 2 days: 30.5/17.9, sepsis: 6.2/13.4%, and severe sepsis or septic shock (sevSep-SS): 4.3/11.5%. ICU mortality was 13.0%, with an atributable mortality rate for severe sepsis of 9.1% and 59.6% for septic shock. The AUC´s for PCT/CRP to discriminate SIRS from sevSep-SS were 0.57/0.54, and 0.82/0.61 if prior CPB was excluded from the analysis. The corresponding AUC´s of PCT/CRP for discrimination of sepsis vs sevSep-SS were 0.86/0.60 and 0.89/0.59, respectively.

CONCLUSION. Accuracy of PCT to differentiate SIRS from sevSep-SS is limited in the early course following CPB but is superior to CRP to differentiate sepsis from sevSep-SS in the later course.
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ESTIMATION OF PROCALCITONIN LEVELS IN PATIENTS WITH ACUTE AND CHRONIC RENAL INSUFFICIENCY

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INTRODUCTION. Setting: Procalcitonin is a 116-aminoacids propeptide of calcitonin and has been found in high concentrations in septic conditions. With a low molecular weight of 13600 Dalton procalcitonin is ultrafiltrable. Therefore procalcitonin elimination could be impaired and levels might be elevated in renal insufficiency.

METHODS. We determined procalcitonin and C-Reactive-Protein in patients with different degrees and treatments of renal insufficiency

RESULTS. Procalcitonin in serum (reference value in healthy controls: <1microg/l) is moderately elevated in patients with continuous ambulatory peritoneal dialysis (median of 1.18 microg/l). Short and long term-hemodialysis is not associated with elevated procalcitonin levels (median of 0.25 microg/l and 0.61microg/l) and does not limit the use of procalcitonin for the diagnosis of infections. In contrast, C-Reactive-Protein (reference value under healthy conditions: <5mg/l) is markedly increased in patients undergoing short- and longterm haemodialysis patients (medians of 14.5 and 51.1 mg/l).

CONCLUSION. Continuous Ambulatory Peritoneal Dialysis influences serum procalcitonin levels; however, the underlying mechanisms remain unknown

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THE IMPORTANCE OF PROCALCITONIN SERUM LEVEL DECLINING KINETICS AFTER LIVER TRANSPLANTATION

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INTRODUCTION. Elevated procalcitonin (PCT) serum levels were observed in the early phase after liver transplantation (OLTx). The aim of this study was to analyse the decrease of the serum PCT levels in the early postoperative phase of OLTx.

METHODS. The relationship between the changes of the inflammatory response parameters (especially PCT) and the APACHE II, SAPS II scores, liver function tests, and renal function tests were studied in 57 patients who underwent OLTx. The measurements were done before surgery and in the first five postoperative days. The patients were divided into three groups: Group A (n=13) patients with ultra rapid declining PCT serum levels, Group B (n=25) patients with declining PCT serum levels according to the elimination half-life time of PCT, and Group C (n=19) patients with slowly declining PCT serum levels according to postoperative complications. Statistical analysis was performed with Wilcoxon rank test, paired t test and chi square test.

RESULTS. The maximum PCT serum concentrations occur 24-hours (Group A, C) - 48 hours (Group B) after the end of surgery, but significant differences were found only on the first postoperative day. (Group A: 21.3±7.9 vs. Group B: 6.6±1.5 ng/ml, p=0.01). Concomitant with the ultra rapid declining of the PCT serum levels which occur in the first two postoperative days, significant differences between the groups were found at the renal function tests (serum creatinine: Group A: 152±22 vs. Group B: 118±8 micromol/l, p<0.01; serum BUN: Group A: 10.6±1.7 vs. Group B: 9.2±1.3 mmol/l, p<0.04) and in APACHE II and SAPS II scores (p<0.04). Higher PCT urine levels were measured in Group A (0.6-5.1 ng/ml). During the 2 way interaction analysis significant correlation was found between the blood haemoglobin and the rapid drop in the PCT levels (p< 0.05) and the required of blood units were significantly higher in Group A in this period (p<0.05). The lethality was found significantly higher in patients belong to Group A (Group A: 4/13 vs. Group B: 1/25, p<0.008).

CONCLUSION. In 23 % of our OLTx patients the elevated postoperative PCT levels decreased suddenly, in parallel with worsening of the renal function or bleeding. The not bleeding cases suggest that this 13 kDa low molecular weight protein (PCT) was lost through the kidney. To confirm this hypothesis, further studies need to be performed.

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DRG-BASED REIMBURSEMENT OF SERVICES IN GERMAN INTENSIVE CARE UNITS: A NEW CONCEPT

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INTRODUCTION. The objective of this exploratory study was to develop a simple patient classification system as a model for a realistic DRG-based reimbursement of hospital intensive care unit (ICU) services in Germany. Different to those in other countries the German DRG is destined for covering 100% of hospital costs.

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, 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 43.1%, cluster 2 and 3 56.9% 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 ≤7 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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HOSPITAL COST OF SEVERE SEPSIS: CAP VS OTHER SOURCES OF INFECTION

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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. Individual hospital bills from pts admitted to the ICU with SS, and an expected survival > 3 months, were collected. Cost was determined for the entire hospital stay, from the day SS was diagnozed till discharge. Total cost, hotel, medical honorarium, pharmacy, radiology, antimicrobials, dialysis and blood products costs were analyzed. Pts were divided in 3 groups based on the primary source of SS (CAP, Intra-abdominal (IAI), Other). Survivors (S) were compared to nonsurvivors (NS)

RESULTS. 207 pts were studied (CAP:85, IAI:56, Other:67). APACHE II(AII): 22.0+/-6.4, Age: 62+/-14, male:112/207, Hospital mortality:66/207(31.8%). Mean AII was similar for all 3 groups. Mean ICU length of stay (LOS)was longer for CAP vs IAI and Other (ns) and mean Hospital LOS was sligthly longer for IAI vs CAP (p=0.04) and Other (ns). Total cost(mean+/-SD) for the 3 groups, S and NS are presented in the Table. Hotel, medical honorarium and radiology costs were similar for the 3 groups. Pharmacy, antimicrobials and blood products costs were significantly higher for IAI compared to CAP and Other. In CAP, cost of S and NS were 18,122+/-19,768 € vs 21,545+/-18,438 €, respectively (ns). Hotel, antimicrobials and radiology costs were similar between S and NS, but medical honorarium, pharmacy, blood products and dialysis costs were higher in NS compared to S.

Cost (€)	All	CAP	IAI	Other	S	NS
Mean	22,984	19,411	28,720	22,719	22,468	24,086
SD	21,144	19,239	28,209	24,746	22,479	21,541

CAP < IAI (p<0.05), CAP < Other (ns), S < NS (ns)

CONCLUSION. Despite similar severity scores, pts with SS secondary to CAP, and admitted to the ICU, have a lower hospital cost compared to other sources of infection. NS tended to have a higher hospital cost compared to S. NS are using more medical resources, despite a shorter hospital stay.

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COMPARING THE COST-EFFECTIVENESS OF DROTRECOGIN ALFA (ACTIVATED) ACROSS THREE EUROPEAN COUNTRIES

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INTRODUCTION. The PROWESS trial demonstrated that drotrecogin alfa (activated) significantly reduced all cause mortality by 6.1% (placebo 30.8%; drotrecogin alfa (activated) 24.7%, p=0.005) in adult patients with severe sepsis [1]. To inform health care decision makers if this clinical gain is also cost-effective, Swiss cost-effectiveness estimates, measured as the cost per life year gained (LYG), will be compared to those for Austria and Germany [2]. The main impacting factors on differences in cost-effectiveness results across will be assessed.

METHODS. From the (national) health service payer's perspective, cost-effectiveness was calculated using a simple decision tree. National life-tables were applied to calculate long-term survival benefits using hospital survival rates from the PROWESS trial. Trial resource use during hospitalisation including ICU and hospital stay, duration of organ support and drug costs were valued using published country-specific costs for Germany and Austria and unpublished unit costs for Switzerland. The analysis was repeated applying resource use patterns only for European patients from the PROWESS trial and country specific resource use patterns. The analysis was repeated for patients with a high risk of mortality (2 or more organ dysfunctions at baseline, ARR=7.3%)[3].

RESULTS. Cost-effectiveness of drotrecogin alfa (activated) was estimated at € 15,100 for Austria, € 14,100 for Germany and € 14,900 for Switzerland per LYG (€ 19,200, € 17,700, € 19,000 respectively when discounting LYG at 3%). Cost-effectiveness improved for patients with a high risk of mortality. The cost-effectiveness results for these patients were € 11,000 for Austria, € 10,200 for Germany and € 11,300 for Switzerland (€ 13,700, € 12,900 and € 14,300 respectively when discounting LYG at 3%). Cost-effectiveness results did not change when applying resource use from European PROWESS patients or country-specific resource use.

CONCLUSION. Drotrecogin alfa (activated) improves survival and is cost-effective in Austria, Germany and Switzerland relative to other accepted healthcare interventions.

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Grant acknowledgement: Eli Lilly & Co, Surrey, UK

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USE OF RESOURCES ON PATIENTS WHO DIED DURING THEIR STAY IN THE INTENSIVE CARE UNIT

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INTRODUCTION. Our aim was to elucidate how we used our resources on patients who died in the ICU. We studied length of stay (LOS), severity of illness, therapy limitations (withheld/withdrawn), ressource usage.

METHODS. Retrospective study of 236 patients who died over a 44 months period, median age 68 (range 3-91), 62% men, 56% unscheduled and 20% scheduled surgery, 24% medical. Severity of illness judged by Simplified Acute Physiology Score, SAPS II. Resources measured by Nine Equivalents of nursing Manpower use Score, NEMS.

RESULTS. The 73% who died within one week used 25% of the resources. The 6% who stayed five weeks or longer used 30% of the resources. SAPS were greater than 45 for most patients. Median LOS was 3 days, maximum 71 days. NEMS/patient/day did not change with LOS. Therapy limitations were used on 50% of the patients (33% withdrawn, 17% withheld). 72% of the limitations were used on patients who died within one week. Limitations were used on 11 of the 13 patients with the longest LOS.

LOS	1 Week	2 Weeks	3 Weeks	4 Weeks	5 Weeks	>5 Weeks	Total
Patients	172	26	20	5	6	7	236
Limitations	86	13	9	0	4	7	119
Days Total	433	284	339	125	195	374	1750
SAPS,Median	55	47	40	37	46	45	50
(Range)	(22-103)	(27-69)	(21-59)	(35-47)	(35-57)	(36-73)	(21-103)
NEMS Total	15080	10366	12761	4524	6786	11576	61093
NEMS/Pas/d	36.5 (0-43)	36.2 (29-43)	39.8 (32-41)	37.7 (34-41)	34.3 (33-37)	36.7 (28-42)	34.9 (0-43)

CONCLUSION. All patients who died in the ICU were severely ill the first day (SAPS II). Most resources and therapy limitations were used on patients who died within one week. The use of resources per patient per day was independent of LOS. The 6% with LOS of five weeks or more used 30% of the total resources. Reliable predictors for death should be searched for as they could enable us to earlier limit futile therapy and thus lessen the burden for patients and relatives.

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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. Indirect costs amounted to € 227-€ 569 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

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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 LYG and € 19,500 per QALY when discounting LYG 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

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CORRELATION BETWEEN 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 surrogate 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 descendant 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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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 treatments 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 10.7± 5.5, total SOFA score 82.9± 99.2, total SAPS II 565.8± 477.8. 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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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 validated in Latinoamerica.

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%, vasopressors 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.

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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).

METHODS. 12,615 pts were enrolled during 4 months of prospective, multicentre, observational study period in 89 ICUs of 12 European countries (EURICUS-I). Demographic/clinical statistics, severity at admission and a daily score of nursing complexity/workload were collected.

RESULTS. Total volume of activity was defined as the number of pts admitted per bed per year (median 42.0, IQR 29.6-57.4), high-risk volume as the number of high-risk pts admitted per bed per year (selected combining length of stay and severity of illness): median 13.2, IQR 10.1-17.3). A multi-step risk-adjustment process was planned. ICU volumes corresponding both to overall (Odds Ratio - OR 0.966) and to 3,838 high-risk (OR 0.830) pts were both negatively correlated with mortality of the whole patient population. The relative mortality decreased by 3.4% for every 5 pts per bed per year total volume increase and by 17.0% with the same increase in high-risk volume. The model identified and adjusted for several explicative variables of hospital mortality (demographic, clinical characteristics, process of care, regional, hospital and ICU characteristics). We found a direct relationship between mortality and ICU occupancy-rate over 80% (OR 1.324 and 1.351 respectively).

CONCLUSION. A measure of volume is suitable also in an environment with high variability like Intensive Care Medicine. Intensive care pts, whatever their level of risk, are best treated where many high-risk pts are treated (at least $\geq$ 13 per bed per year). Moreover, the higher the ICU occupancy-rate, the greater mortality is.
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COST TO CRITICAL CARE OF CENTRAL VENOUS CATHETER INSERTION FOR OTHER SPECIALITIES.

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INTRODUCTION. Over the past twelve months the number of requests for assistance from other specialties in sitting central venous catheters (CVCs) has increased dramatically. This may be related to the recommendation of the National Institute for Clinical Excellence (UK)_ that all elective CVCs should be sited under 2D Ultrasound guidance. Our aim was to make an assessment of this workload and the cost to our specialty.

METHODS. We carried out a prospective survey over a period of three months to examine i) the number of requests for CVC insertion made to critical care staff from other specialties, ii) the reason for these requests, iii) the specialty and iv) the time the request was made. A costing calculation for this additional workload describes, i) a costing for each insertion of a CVC, ii) time spent sitting CVCs for other specialties and iii) overall cost to the department.

RESULTS. Over the 3 month period 42 requests were made for CVC line insertion by other specialities. The surgical teams made 45% (19/42) of the total requests. Reasons for these surgical requests included, post-op TPN (36%), fluid management (26%), difficult venous access (16%), CVS instability (11%), no surgeon available (11%). Haematology teams made 17% (7/42) of the total requests. Reasons given were coagulopathy (70%), insufficient experience (30%). Medical teams made 38% (16/42) of the total requests. Reasons included difficult venous access (69%), coagulopathy (19%), fluid management (12%).60% (25/42) of the requests were made outside normal working hours. The cost for sitting a triple lumen CVC was set at € 73.59 or € 107.28. Using the figures above this represents an annual cost to our department of € 12363 or € 18023.An average CVC insertion time is 20 min. This represents a time cost for critical care staff of 56 hrs per year.

CONCLUSION. The sitting of CVCs by critical care staff for other specialities in our hospital has significant unfunded cost implications both in terms of time and money to our department. There is a need for increased funded multi-speciality training in the use of 2D US for sitting CVCs.

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THE IMPACT OF A CHANGE IN ROUTINE COLLOID ON RENAL OUTCOME AND COLLOID COSTS.

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INTRODUCTION. In March 2001, Schortgen et al compared the incidence of acute renal failure in septic patients resuscitated with either hydroxyethyl starch (HES) or gelatin. They showed that patients resuscitated with HES (Haesteril 10%, Fresenius, France) had a significantly higher incidence of acute renal failure (defined as a doubling in the serum creatinine concentration), and higher peak creatinine concentrations. As a result of this paper, we made the decision to switch from using HES as our standard resuscitation fluid, to using modified fluid gelatin (Gelofusine, B. Braun, Germany).

METHODS. Usage and cost data for both gelatins and HES were obtained from our pharmacy information system for the year preceding, and the two years following the publication of Schortgen's paper. Demographic and case-mix data were obtained from our ICU information system.

RESULTS. The results are shown in tabular form below.

	2000/1	2001/2	2002/3
Number of admissions	536	551	629
Mean APACHE II Score	16.8	16.8	16.2
ICU Mortality %	16	14.2	13.4
Haemofiltration %	6.2	8.7	6.2
HES Units/Cost	1211/€18040	524/€8208	250/€4018
Gelatin Units/Cost	298/€1381	1489/€8130	2010/€10142
Total Cost (€)	19422	16338	14161
Cost/patient (€)	36.24	29.65	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%.

REFERENCE(S). Schortgen F et al. Lancet 2001; 357:911-16

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COST OF DRUGS AND SINGLE USE MATERIALS IN ICU SINCE 1998

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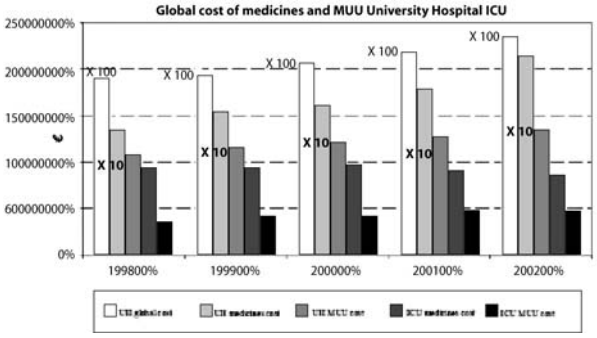
INTRODUCTION. The study reports the costs evolutions of drugs (D) and single use materials(SAM) in ICU that were rarely studied.

METHODS. Since 1998, the costs of D and SAM in 3 ICU were collected(in €). 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.

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CARDIAC TROPONIN I AFTER MAJOR NONCARDIAC SURGERY PREDICTS SHORT- AND LONG-TERM MORTALITY

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INTRODUCTION. Cardiac troponin I (cTnI) is a widely used diagnostic and prognostic marker in patients with acute coronary syndromes. However, evaluation of its prognostic value in patients undergoing major noncardiac surgery was followed up only for 6 months [1,2].

METHODS. The study protocol was approved by the local IRB, and informed written consent was obtained from each of the 173 patients (57 female, 116 men, mean age 71 years). The patients had documented coronary artery disease (CAD; 114) or high probability for it (59) and underwent abdominal aortic (59) or peripheral vascular surgery (55), laparatomy (39), major orthopedic surgery (14), or other major procedures (6). cTnI was measured in the morning of postoperative days 1 and 2. In accordance to the manufacturer of the test kit, a cTnI value of > 2.0 mcg/l was considered as elevated. All-cause mortality was evaluated by follow-up interviews after 30 days, and after 12 and 24 months. Logistic regression was used for data analysis.

RESULTS. Six patients (3%) 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/l in 146 patients, and > 2 mcg/l 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<0.0001) for 1-year mortality, and 4.5 (95% CI 1.9-11; P<0.0001) for 2-year mortality.

Number of Deaths and Mortality

cTnI	30 Days < 2 mcg/l	30 Days < 2 mcg/l	1 Year < 2 mcg/l	1 Year < 2 mcg/l	2 Years > 2 mcg/l	2 Years < 2 mcg/l
No. of deaths	1	5	16	12	25	13
Mortality (%)	1	19	11	44	17	48

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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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 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. In univariate analysis, any platelet drop, whatever the threshold considered (even 10%) is associated with death in ICU, (p< 0.001 in all groups), as well as the absolute platelet count on day 4, the SAPS II score, the presence of a chronic disease as defined by Knaus, admission for severe sepsis, and transfer from another hospital or ward (as opposed to admission from home or emergency room). In multivariate analysis, four variables are independently associated with death : SAPS II score (OR 1.052/point, IC[1.041;1.062] p<0.001), transfer from another hospital/ward (OR 1.356, IC[1.001;1.836] p=0.049), existence of a chronic disease (OR 1.532 IC[1.133;2.072] p=0.005), and a platelet drop of 30% of the initial value on day 4 (OR 1.734, IC[1.245;2.415] p=0.001). It is important to highlight that parameters such as the absolute platelet counts on admission or on day 4, are not independenlty associated with ICU death in these patients who were not thrombocytopenic upon admission.

CONCLUSION. On day 4, a drop of 30% of the initial platelet count in patients admitted in ICU with normal counts, is independantly associated with ICU mortality. This criteria should be considered in the future development of daily severity scores in ICU

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PERFORMANCE OF THE THIRD ICU DAY APACHE III IN PREDICTING MORTALITY

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INTRODUCTION. Various models used to predict mortality in the intensive care unit (ICU)are based on first day values. This study compares the performance of the first and third ICU day APACHE III in predicting mortality.

METHODS. Among 44,194 ICU admissions from 1994 through 2002, 15,063 who stayed in the ICU for 3 or more days were included in the study. Race, gender, first and third day Acute Physiology Score (APS) and probability of hospital death, and actual hospital mortality were obtained. The area under the receiver operating characteristic curve (AUC) and Hosmer-Lemeshow statistic were used to determine the performance of the mortality predictions.

RESULTS. Most of the patients (96%) were Caucasians; 58% male. The first and third ICU day mean predicted mortality rates were 16.5% and 23%, respectively. The observed hospital mortality rate was 15.1%. The differences between survivors and non-survivors are listed in Table 1. The AUC was 0.786 (95% CI, 0.780 - 0.793) for the first day predicted mortality compared to 0.845 (95% CI, 0.839 - 0.850) for the third day predicted mortality (P < 0.0001). The calibration for both predictions was poor (P < 0.0001) with Hosmer-Lemeshow statistic of 292 for the first and 213 for the third day predictions.

Differences between survivors and non-survivors

Variables	Survivors N=12,782	Non-survivors N=2,281	P-value
First day APS	36.8±21.0	57.2±26.7	< 0.0001
First day predicted mortality (%)	13.2±35.0	35.9±26.4	< 0.0001
Third day APS	29.3±16.3	56.3±28.1	< 0.0001
Third day predicted mortality (%)	17.6±20.4	53.0±30.0	< 0.0001

CONCLUSION. Compared to the first day, the third day APACHE III mortality prediction model discriminates better between survivors and non-survivors of patients in the ICU. However, both models have poor calibration.

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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 statistically significant impact on length of postoperative mechanical ventilation (table 1). Patients in prolonged postoperative ventilation group had longer ICU stay (3.3 vs 2 days).

Variable	CMV > 12 h n = 388	CMV < 12 h n = 1040	
High inotropes	18.8%	5.6%	p < 0.05
IABP	14.7%	0.72%	p < 0.05
Reexploration for bleeding	16.2%	2.1%	p < 0.05
Stroke	4.1%	0.67%	p < 0.05
Blood products used	54%	20%	p <0.05

CONCLUSION. According to our data both patient preoperative data and surgery related factors affect the lengh 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 performance of several risk models from North America (Parsonnet score, Cleveland Clinic or Higgins score, Northern New England or O'Connor score, and Ontario or Tu score) to predict mortality following cardiac surgery in an European University Hospital.

METHODS. Prospective observational study of 1187 cardiac surgery patients in a tertiary referral centre. Probabilities of hospital death for patients were estimated by applying the four models and were compared with actual mortality rates. Performance of the four systems was assessed by evaluating calibration with the Hosmer-Lemeshow goodness-of-fit test, and discrimination with receiver operating characteristic (ROC) curve.

RESULTS. Calibration: Chi-square was 3.22 for Higgins, 3.37 for Parsonnet, 4.68 for Tu and 5.01 for O'Connor. Discrimination: The area under the ROC curve was 0.894 for Higgins, 0.890 for Parsonnet, 0.835 for Tu and 0.825 for O'Connor.

CONCLUSION. In our experience several cardiac surgery risk models developed in North America perform well. Higgins and Parsonnet models demonstrate to be appropriate tools to assess mortality in this set of patients, with excellent calibration and discrimination, better than O'Connor and Tu models. Predictive models originally developed in another country should be validated in the population to which they are finally applied.

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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 elegible 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.

Results

	Number	APACHE II	SMR
ICU only	127	20.3	1.27
HDU only	275	13.3	0.9
Transfers HDU to ICU	20	23	1.44
Overall	422	16	1.07

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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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*Ó-squared 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 (7.35, 1.12 vs 6.8, 1.33) but not medical (7.67, 1.3 vs 8.55*, 1.2) (mean, SD) survivors and non-survivors. The AUC for medical patients also showed a significantly greater value in non-survivors.

AUC values are Median with 95% CI, duration of stay in days with SD

Hosptial outcome	Medical AUC	Surgical AUC Duration/stay	Medical Duration/stay	Surgical
Survivors	6.64(6.5-7.45)	6.8(6.32-7.64)	13.8(9.31)	11.7(9.3)
Non-Survivors	8.52*(6.99-9.78)	6.9(5.83-9.83)	9.2(5.67)	16.6(7.5)

*. * Denotes significance at the 5% level*

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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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 Câncer, 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 score[1] was 7.8±3.9 points and predicted mortality assessed by Cancer Mortality Model[2] 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 (11.5%); 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=0.003); cancer progression=2.99 (1.63-5.50, p<0.001); performance status 3-4=2.04 (1.11-3.74, p=0.021); leukaemia=10.58 (1.16-96.54, p=0.036); Glasgow coma scale<6=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=0.99 (0.99-1.00, p=0.037); bilirubin>2mg/dl=2.49 (1.02-6.08, p=0.046); postoperative recovery=0.38 (0.17-0.86), p=0.020); PaO2/FiO2<150=3.01 (1.29-6.99, 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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RISK OF PROGRESSION OF INFECTION OR SEPSIS TO SEVERE SEPSIS AND SHOCK: THE RISSC 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 sepsis stage and to propose a new objective definition of SIRS variables

METHODS. Prospective inception cohort of patients (n=3,443) 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 or sepsis (n=1531 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 mHg), platelet count (<150.109/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 (RISSC) 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: Educationnal 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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A PREDICTIVE MODEL FOR HIV PATIENT OUTCOME IN ICU IN THE HIGHLY ACTIVE ANTIRETROVIRAL THERAPY ERA

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INTRODUCTION. Highly Active Antiretroviral Therapy (HAART) has produced a significant decrease in mortality and morbidity from Human Immunodeficiency Virus infection. Whether this therapy resulted in changes in outcome in HIV-infected patients admitted to ICU is still controversial (1).

METHODS. We reviewed the clinical notes of HIV positive patients admitted to our ICU from 2000 through 2002. On each patient the following was collected (i) demographics (ii) admission diagnosis, (iii) 1st 24 hours APACHE II score, (iv) HIV infection epidemiological and clinical characteristics. Statistical analyses were performed using SPSS (SPSS inc. Chicago IL). For continuous variables Mann-Whitney non-parametric test was used, whereas Chi-squared test for categorical ones. A Binary Logistic Regression Model performed to estimate the effect of each considered risk factor on a death (yes/no) outcome for HIV-patients. P values < 0.05 were considered statistically significant.

RESULTS. There were a total of 54 admissions for 51 HIV-infected patients (76.5% males) with a median (IQR) 1st 24 hour APACHE II score of 21(13-24) and ICU stay of 6 days (2-12).Drug abuser was the main risk factor (51%), while respiratory failure (58.8%) the most frequent reason of ICU admission. Median CD4+ value was 150/mmc (IQR 30-400) median viral load was 52,000 (IQR 1,100-207,000). A Binary Logistic Regression Model was used, considering HIV-infected patient ICU outcome (dead/alive) as the categorical dependent variable and (i) presence/or not of organ failure (kidney, liver, CNS, heart and respiratory system); (ii) taking HAART/or not; (iii) CD4+ absolute value < or > 200/mmc; (iv) HIV status (HIV-positive/AIDS), as the independent ones. We found that taking HAART (OR = 2.7, 95% CI: 1.4-3.2, p = 0.0242)is a predictive factor of positive ICU outcome of HIV-infected patients.

CONCLUSION. In summary, our data, although retrospectively collected, suggest that a HIV patient on HAART, admitted to ICU has a significantly higher chance of survival if compared with those who are not. Future prospective studies should be designed to validate both our observation and whether starting HAART in a HIV positive critically ill patient improve his survival.

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CORRELATION BETWEEN INFUSION PUMPS, SOFA AND OUTCOME

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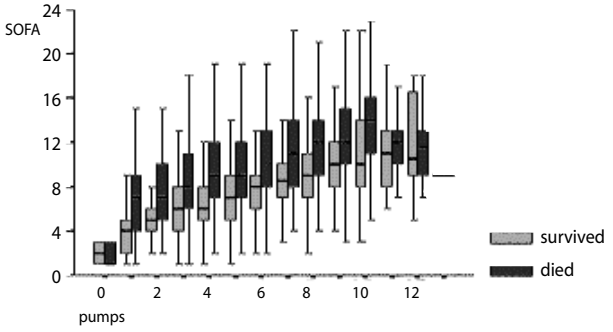
INTRODUCTION. It is "common wisdom" that the number of infusion pumps correlates with severity of illness and outcome. These relations were investigated.

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 number of pumps in survivors (S) was 4.9 (2.31) and in non-survivors (NS) 6.1 (2.22); SOFA 7.1 (3.19) resp. 10.5 (3.99). The cumulative number of pumps was 26.2 (38.97) for S and 53.3 (62.74) for NS; cumulative SOFA 38.1 (60.81) resp. 92.3 (120.87). The Pearson correlation for the daily number of pumps and daily SOFA score was 0.528 (0.537 in S and 0.393 in NS), and for cumulative number of pumps and SOFA scores 0.942(0.942 in S and 0.943 in NS). P <0.01 for all means and correlations.



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 variables significantly 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.

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Poster Session
Antibiotic therapy and resistance – 375-387

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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

	Mean	Standard deviation
Maximum concentration mg/l	12.3	2.8
Half life (beta) h	9.90	5.19
AUC mg.h/l	96.6	40.77
Clearance l/h	6.04	2.32

AUC=area under concentration-time curve

CONCLUSION. Our data and that from one other group [1] suggest that values of Cmax and AUC achieved following administration of levofloxacin to critically ill patients are at least as high as those achieved in less severely ill patients and in human volunteers. These data suggest that there is no need for an increased dose to ensure efficacy in critically ill patients.

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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 PICU. 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. Neurologically 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.

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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 and national bodies including UK, Italy and Australasia to survey antibiotic prescribing policy. SAS system was used for statistical analyses.

RESULTS. A total of 254 ICUs responded, predominantly general (77.5%)were recruited. The 60.4% of ICUs have an infection control program, while a team of infection control nurses can be found in only 28.5% of centres. An agreed prescribing policy is reported in 78.2% of cases, being restriction of an antibiotic use (73.9%) and rotation/cycling (20.5%)of first line therapy the most frequently applied, while only 15% of ICUs consider important the selective digestive decontamination. As a median routine practice ICU doctors (i) do not receive neither microbiologists nor infectious disease doctors input; (ii) routinely start (79.7%, range 43.8-100) and stop (84.1%, range 50-100) alone (Rx), although the percentage is widely varying among centres; (iii) start (Rx) occasionally together with microbiologists or infectious disease specialists, respectively in only 14.3% (range 2.9-59.4) and 8.3% (range 0-10.3); (iv) similarly, stop (Rx) in only 10.4% (range 0-50) and in 7.6% (range 0-15.8) of cases. First line antibiotic therapy was widely similar and based on using broad spectrum antibiotics for nosocomial Gram+tive (82.3%), community acquired- (79.1%) and nosocomial (83.6%) Gram -tive, but not for community acquired Gram+tive (46.9%). ICU doctors generally opt for (i) penicillin ± b-lactamase inhibitors with or without aminoglycosides (52.4%) and all cephalosporin ± aminoglycoside (25.2%), for Gram +tive community acquired (B); (ii) glycopeptides (68.8%) for Gram +tive nosocomial (B); (iii) cephalosporin ± aminoglycosides (50.2%) for Gram-tive community-acquired (B) (iv) cephalosporin ± aminoglycosides (36.4%) and penicillin ± b-lactamase inhibitors with or without aminoglycosides (23.9%)for Gram-negative nosocomial (B).

CONCLUSION. Collected data suggest us that different (Rx) strategies and practices exist between countries for treating (B) in the critically ill. Prospective studies are needed to determine optimal practice.

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PREVALENCE AND MOLECULAR TYPING OF ACINETOBACTER BAUMANNII IN AN ICU-PRELIMINARY RESULTS

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INTRODUCTION. Infections due to Acinetobacter baumannii (AB) have emerged as a prominent problem in many ICUs, dislocating other Gram - negative microorganisms. Our aim was to study the prevalence and epidemiology of A. baumannii during three periods of 21 days each, given its increasing isolation and multi – drug resistance rates from patients hospitalized in our ICU. We present here the results of the first period.

METHODS. During a period of twenty one days, we prospectively performed surveillance of patients, health providing staff and the ICU environment. Infections occurring during this period were also registered. Samples positive for AB isolated were studied for susceptibility to antimicrobial drugs by the VITEK II AST GNO4 card (bioMerieux, France), and their "DNA fingerprints" by pulsed field gel electrophoresis (PFGE).

RESULTS. During the surveillance period, 19 patients i.e.14 men (74 %) and 5 women (26%) with a mean age of 50, 4 years (range: 17 - 81) were hospitalized in our ICU. A total of 250 samples were studied. AB was isolated in 74 samples (29, 4%) originating from 14 patients and one nurse. Among the 14 patients carrying AB (2 women and 5 men), seven were colonized and seven were infected (50%). Sites of infection were blood (5), respiratory system (3), urinary tract (1), and central nervous system (1). Three patients died; two of these deaths could have been attributed to the infection.Genetic relatedness of the strains was performed by pulsed field gel elect-rophoresis. Antimicrobial susceptibility tests revealed high rates of resistance to imipenem (54%). Molecular typing by PFGE distinguished two types: A (64 isolates) further differentiated into 7 subtypes (A1 – A7) and B (10 isolates).

CONCLUSION. The cases of colonization and infection caused by AB in our unit were due to only two clones, having obviously been spread by the hands of personnel. Strict hygiene measures must be taken, in order to limit the extended appearance of AB resistant to many antibiotics in ICU patients.

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

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INTRODUCTION. Bacteremia due to A.baumannii (AB) is characteristically a nosocomial infection appearing mostly in Intensive Care U- nits (ICUs). Treatment of AB bacteremia is complicated by the wide 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 determination of isolates were performed by the VITEK II AST GNO4 card (bioMerieux, 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 (22.38%). 56/201 patients (27.8%) presented one or more episodes of bacteremia due to AB. Polymicrobial 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 aminoglycosides (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. 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.

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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]X100.

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

Increase % of recent resistance

% increase	acinetobact baum.	pseudomonas aerog.	enterobact spp	klebsiella pn	staph aureus	enterococ
ceftazidime	9.86%	46.82%	30.56%	26.62%		
amikacin	4.42%	-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%
MRSA					3%	

CONCLUSION. The increase of recent resistance for concretely high danger pathogens impose the restriction or circular use of Imipenem, Ceftazidime, Vancomycin and Amikacin

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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>1day, 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%), inmunosupression 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 (1.2 ATB d/ 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 11.8 d) 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
Amox-Cl 169	11.5	12.2	10.7	12	16.6	5.7
Piper-Tz 130	11.5	7.1	12.9	5.5	9.5	7.3
Cefepime 90	4.6	8.1	6.7	5.1	8.3	7.2
Cefotaxime 92	5,3	6.4	4.6	10.2	8.7	6.8
Ampicilline 81	6.8	6.4	3	6.5	7.9	6.3
Imipenem 52	3.5	1.7	4	5.1	5.4	9.1

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.

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VANCOMYCIN - 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 ICUs. 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 %), 23 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-lity rate was 36 %.Sites of isolation were blood (18), intravenous 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%)i.e. 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 magor 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 multi – resistant strains.

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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, tobramycine, amphotericine 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 only 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 27% 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 have been 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.

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INFLUENCE OF ANTIBIOTIC CHANGES ON THE OUTCOME OF SEVERE INTRA-ABDOMINAL INFECTIONS

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INTRODUCTION. Frequency, timing and causes of the changes of antibiotic therapy (AB) in the course of intra-abdominal infections have been minimally evaluated, both in community-acquired (CIA) or nosocomial infections (NIA). The aim of the current study was to assess the AB changes and their link with clinical success.

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, organisms 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.

Number (%) of success according to AB changes

	CIA (n=761)	NIA (n=247)
No AB changes (n=581 pts)	433/457 (95%)	108/124 (87)*
Changes before ID (n=162)	107/116 (92)	30/46 (65)**
Changes after ID (n=206)	128/151 (85)*	48/55 (87)
Changes before+after ID (n=59)	29/37 (78)*	16/22 (72)

**p<0.01 vs CIA pts ; ** 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. These results reinforce the plea for adequacy of AB from the empirical phase of treatment.
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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 over four years in our ICU.

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 ciprofloxacin 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 Enterobacteriacae, 13 Pseudomonas, 2 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).

	1998/1999	2000	2001	2002
Number of patients	13	13	16	36
Mean APACHE II	19.6	19.7	20.6	18.5
Mean APACHE II predicted mortality	0.46	0.48	0.51	0.44
Standardized Mortality Ratio	1.15	0.48	0.87	0.70
ICU Length of stay (days)	18.4	7.9	8.0	10.6

CONCLUSION. In our ICU, the number of patients with perforated gut and organ failure increases over the years. However, SMR tends to decrease under intensive antibiotic and supportive care.

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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 centers) 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 analysed: amoxycillin/clavulanic acid (A) alone or combined with aminoglycosides (AA), third generation cephalosporins+imidazoles (CI) alone or combined with aminoglycosides (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%, AI:90%, CI:95%, CIA:89%). Pts without any AB changes had similar proportions of success (A:96%, AI:96%, CI:94%, CIA:97%).

Criteria of severity and prognosis expressed in %

	A n=175	AA n=169	CI n=62	CIA 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	15	15	8	8

** p<0.01 vs A*

CONCLUSION. AB selection depends directly on the clinical severity of CP. Although AA, CI and CIA regimens were selected by the french consensus(1), no recommendation has been edited based on clinical severity, an issue probably to take into account.

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Grant acknowledgement: GSK France

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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. A one-compartment pharmacokinetic model was used to simulate concentration-time profiles following the administration of a range of loading doses and maintenance infusions to simulated patients.(1) Dosage regimens that maintained concentrations between 15-25 mg/L were chosen.(2) The characteristics of the first 20 patients treated with vancomycin following the introduction of these guidelines were compared to the previous 25 patients treated with intermittent dosing. Demographic data, diagnosis, required duration of therapy, time to MRSA infection resolution(as assessed by microbiological analysis) and pharmacokinetic data were analysed.

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=0.4). No patients in either group experienced toxic side effects.

CONCLUSION. Vancomycin can be safely and effectively 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 musle 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 alanylglutamine (AG). Euglycemic hyperinsulinemic clamps 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 ($p < 0,01$).
General characteristics of subjects at baseline

	Group C	Group AG	P
Gender (M/F)	12/8	13/7	NS
Age (y)	32±15	30±13	NS
BMI (kg/m2)	25.3±2.8	24.8±3.1	NS
ISS	40±12	41±12	NS
APACHE II	25±9	24±10	NS

Results

	Group C	Group AG	P
Insulin-mediated glucose disposal (Day 4) mg/kg/min	1.9±0.6	2.4±0.7	0.36
Insulin-mediated glucose disposal (Day 8) mg/kg/min	1.2±0.6	2.2±0.7	0.007

CONCLUSION. Nutrition with parenteral AG administration signicficantly attenuates insulin resistance in multiple trauma patients.
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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 perioperative substitution.

METHODS. The AA consumption was investigated pre- and postoperatively on 18 patients undergoing major maxillofacial surgery. The metabolic clearance (Clmeta) 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 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 Clmeta was 4.0 + 1.9 l/h (mean/SD). On the first postoperative day Clmeta (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 perioperative patients.

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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 jejunally 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, insulinlike growth factor-1 (IGF-1), and glycaemia levels were estimated in every patient under different types of n utrition: 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 continous 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 and in treatment of its late symptomatic complications.
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PROMOTILITY AGENTS FACILITATES POSTPYLORIC PLACEMENT OF NASODUODENAL FEEDING TUBES IN INTENSIVE CARE

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INTRODUCTION. To evaluate the effects of erythromycin, domperidone, and metoclopramide on postpyloric placement of nasoduodenal 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 groupped 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; erythromycine (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. Overall, 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 (9/10), domperidone (6/10), and metoclopramide (4/10) were significantly higher than with placebo (0/10) ($p<0.05$; $p=0.0007$). 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 otherside, 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 comatose (GCS<8) or noncomatose (GCS >8), mechanic ventilated critically ill patients.

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EFFECT OF AN EDUCATIONAL PROGRAM AT REDUCING PULMONARY ASPIRATION OF ENTERAL FEED

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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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ENTERAL FEEDING ACCESS IN ABDOMINAL AORTIC ANEURSYM REPAIR

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INTRODUCTION. The preferred method of nutritional support in critically ill patients is via the enteral feeding route (1). Patients who have repair of ruptured abdominal aortic aneursym (AAA) are particularly prone to gastroparesis, and often require post-pyloric feeding (2). The aim was to review our enteral feeding practices in patients who have AAA repair.

METHODS. All patients who had AAA repair and received enteral nutrition during a twelve month period were reviewed retrospectively. In addition, patients who had AAA repair and nasojejunal tube placement in the two years prior to this period were also reviewed.

RESULTS. A total of 59 patients had repair of AAA during the twelve months, 41% as an emergency procedure. Nutrition intervention and review by a dietitian was requested in 36. Enteral tube feeding was commenced in 25 patients and was initiated during their critical care stay (14 nasogastric and 11 nasojejunal). All tubes were placed during surgery and were used on average for 7 days. Four of the patients who were fed via the NG tube had gastroparesis and were referred for endoscopic NJ placement. However, their clinical condition deteriorated prior to placement (< 7 days from operation). In the two years prior to this review 19 procedures were undertaken in 15 patients who failed to tolerate NG feeding post repair of ruptured AAA. The mortality was 80%.

CONCLUSION. Gastroparesis can be a problem in AAA patients. Nasojejunal feeding tubes should be placed in patients undergoing repair of ruptured AAA, at the time of theatre to allow early enteral feeding. Continued failure to tolerate NG feeding after 7 days often relects the severity of the clinical condition, and endoscopic placement of an NJ should be considered.

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HOW TO MEASURE ENERGY EXPENDITURE IN CRITICALLY ILL PATIENTS

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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.

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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% out 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 70% of all HLC days excepted in AS (5.8%). 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.

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ISOCALORIC VERSUS HYPOCALORIC START OF ARTIFICIAL NUTRITION IN CRITICALLY ILL PATIENTS

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INTRODUCTION. Artificial nutrition (AN) is an important link between the response to injury and recovery in critically ill patients. A hypocaloric start of AN is recommended with a progressive increase over several days after ICU admission. However, an isocaloric start would 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 consecutive, 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	1283 ± 420	0.65
Day 3	1263 ± 721	1664 ± 484	0.06
Day 4	1062 ± 718	1717 ± 586	<0.05
Day 5	1290 ± 718	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.

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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 multifaith 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 teaching 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.

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OUR EXPERIENCE AS PROFESSIONALS IN COMMUNICATING WITH PATIENTS' FAMILIES

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INTRODUCTION. When a critically ill patient is taken into ICU their relatives face many difficulties. We from the ICU feel quite unprepared to deal with the emotional aspects of a relationship with patients and their relatives. In an effort to overcome this problem we tried educating professionals (i.e.ourselves) who are in contact with patients' relatives.

METHODS. In 2002 the psychiatrist who works in our department organized several 60 minutes meetings with our patients' relatives and us. The families had been chosen because the patient's illness was very serious or because the daily encounters with them had been unsuccessful. During these meetings the psychiatrist led a practical training exercise based on experience. The professional at an arranged time and place, in a harmonious atmosphere, becomes a really active listener and focuses not only on what to say but also on how and when to say it. After each meeting we discussed the results with the psychiatrist who helped us to find the key to a deeper understanding of the relatives.

RESULTS. During this practical training experience we learned how to wait and listen. 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.

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

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INTRODUCTION. In ICU, about 50% death after witholding (WH) (1). We reviewed the witholding 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. were analysed : moribund character at the admission (assessed by physician), patients with evolved cancer, with acute cerebral disease, with an age > average hope of life (82 in females, 75 in males). The managed cares after WH decision were reported (sedation, artificial nutrition, antibiotherapy, hemodynamic support, invasive ventilation, hemodialysis). The rates of informed family about WH decision, the presence of family at the time of death were plotted and the apparence of WH decision on hospitalization report was recorded.

RESULTS. 77 out of 679 admitted patients died in the Unit. 32 (42%) died after a WH decision. WH was achieved in 14 patients with an age > average of hope 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. WH was noted in 27 hospitalization report.

CONCLUSION. About 50% of death followed a WH decision, as previously reported (1). The practices of WH (sedation, withdrawns of antibiotherapy and artificial nutrition, family information, apparence of WH on hospitalization report) remain to be improved.

REFERENCE(S). 1) Ferrand E et al. Lancet 2001

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WHERE DO ICU DEAD PATIENTS AFTER WITHOLDING DECISION COME FROM?

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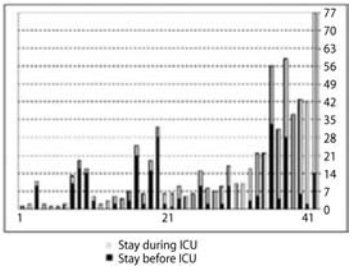
INTRODUCTION. In ICU, 50% of death follow a witholding decision (1). Their origin (home, emergency department, medical or surgical wards and other institutions) was not studied.

METHODS. From the recorded death cases in the Unit in 2001-2002, we analysed 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.

REFERENCE(S). 1) Ferrand E. Lancet 2001

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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 systematic heart rate (HR) control achieved by continuous perioperative administration of the short-acting beta-blocker esmolol might influence on perioperative 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 perioperative 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 (TnT) after induction of anaesthesia, 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 and 92.1±31.9 pg/mL; control 8.2±5.1 pg/mL and 161.2±44.7 pg/mL). Although plasma levels of ANP did not differ among the two groups, BNP release was significantly higher in the control group. TnT values remained unchanged in all patients throughout the whole study period.

CONCLUSION. Strict HR control achieved by continuous perioperative 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.
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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 $NICO_2$ device (Novametrix). 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} ,lowered 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 $NICO_2$ (CO_2CO = 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 CO_2CO 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.

	Fill rate	FR70 min^{-1}	FR60 min^{-1}	FR50 min^{-1}	FR40 min^{-1}	FR30 min^{-1}
PO L min^{-1}	7.6	5	4.5	3.6	2.8	2.2
CO_2C0/CI L min^{-1} (m^{-2})	7.8 / 3.3	7.9 / 3.3	7.1 / 3	6.8 / 2.8	6.9 / 2.9	7.2 / 3

CONCLUSION. The assessment of the adequacy of the native cardiac function with the $NICO_2$ 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). These results were further confirmed by the patient good general status after the explant of the LVAD.

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APPLICATION OF NTG RESTORES IMPAIRED MICROVASCULAR PERFUSION IN GASTRIC TUBE RECONSTRUCTION

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INTRODUCTION. Esophagectomy 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 $muHbSO_2$ 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 ($p<0.05$). $muHbSO_2$ 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 change was observed in the $muHbSO_2$, or in systemic hemodynamics.

CONCLUSION. During gastric tube reconstruction, MBF but not $muHbSO_2$ was impaired near the cervical anastomosis. This might at least partly be attributed to congestion of the venous compartment, because local application of the venodilator 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 $muHbSO_2$, whereas an exclusive arterial flow impairment would result in a decrease of $muHbSO_2$ as well. Further research is necessary to investigate the effect of perioperative administration of NTG on the microvascular oxygenation of the gastric tube tissue.

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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 10 cm H_2O 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 oxigen was added to the circuit.

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 +/- 0.08 p 0.49: FEV 1 64.8 +/- 4.6%). In the former group we found higher value of LRI (0.75 +/- 0.06), compared to health subjects (p<0.05) and mild copd patients (LRI 0.65 +/- 0.09;NS) but there were any significative difference for the other baseline parameters. In this gorup, after cpap there was a significative decrease of LRI(0.66 +/- 0.09 p

CONCLUSION. The results of this studt 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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CHANGES IN SYSTOLIC FUNCTION INDICATORS (PICCO SYSTEM) AFTER MODIFICATIONS IN VASOPRESSIVE DRUGS

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INTRODUCTION. Less invasive monitoring through PICCO system allows continous assessment of haemodynamic function with lower degrees of morbidity and mortality than than using conventional pulmonary artery catheters. Our paper´s aim is to analyze the effect of changes in vasopressive drugs infusion doses on certain haemodynamic parameters.

METHODS. We obtained 103 pairs of measurements in 15 mechanically ventilated severily ill patients (12 males) monitorized through PICCO system approach. Arterial systolic BP, CI, systolic volume and dp max were registered after changes in infusion doses of dopamine, dobutamine and / or norepinephrine (alone or associated) used for achieving an adequate circulatory and haemodynamic status according to physician opinion. Reasons for admission of these in the ICU were: 7 cases of sepsis (48 pairs of measurements), 2 severe cardiac failure (23 pairs), 1 pancreatitis (5 pairs), 2 multiple trauma (6 pairs) , 1 torathic trauma (13 pairs) and 2 pneumonias (8 pairs). Drugs doses were increased in 36 pairs, were decreased in 29, and were not modified in 38. Analysis of data was performed by SPSS/PC 11.0 with a significance level of p <0.05.

RESULTS. Only BP values changed globally and significantly after changing pressive drugs doses. In those cases with which infusion rates were increased, correlations between dp max and CI and systolic volume showed correlation coefficients of 0.267 and 0.115 respectively, while dp max-BPs correlation was 0.755. When we decreased doses, R values for same correlations were 0.204 and 0.093 in front of R for dp max-BPs of 0.797. When doses were not changed, the three R values were 0.026, 0.237 and 0.538 respectively.

CONCLUSION. In spite of global changes in BPs, CI, and dp max, as indicators of systolic function, when pressive drugs doses were modified , BPs is (through PICCO monitoring) the most reliable indicator of the induced haemodynamic effect.

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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 pharmaceutically 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 catheterized 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' of the T-piece trial. In 4 pts (2 COPD with CHF and 2 IPF 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 reintubated (GI bleeding, new infection).
Comparison between the 2 drugs showed a more pronounced effect for levosimendan in lowering Pw (p=0.0002) and VO_2 (p=0.015).

N group

	Pw	mBP	mPAP	CO	DO2	VO2
T piece 10'	14.5±7.5	91±23.03	46.5±0.57	5.8±0.8	763±322	248±104.5
T piece 60'	12±4.61	80±10.39	35±3.46[1]	6.85±0.05	962±295[2]	317±104.5

[1] p=0,015, [1]p=0,017

L group

	Pw	mBP	mPAP	CO	DO2	VO2
T piece 10'	21,5±2,88	86±9,23	39±5,77	8,05±1,44	1050±237	359,5±66,39
Tpiece 60'	14,5±8,66[1]	78,5±4,04	27±6,92[2]	9,45±4,21	1321±692	396±123,55[3]

[1] p=0,014, [2]p=0,0002, [3]p=0,007

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 (PAOP, CVP, ITBV) and dynamic (SVV) preload parameters [1].

METHODS. Six normotensive patients on CMV with low/no catecholamines and without significant cardiac dysfunction (SVI > 35 ml/m^2) 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 nipride (NIP,4 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 paired test; p<0.05 considered significant.

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

Parameter / Drug	MAP mmHg	MPAP mmHg	CVP mmHg	PAOP mmHg	ITBVI ml/m2	SVV %
Baseline	74 (71-81)	25 (22-32)	9 (8-13)	11 (6-14)	950 (664-1052)	9 (7-14)
Norepinephrin	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)*	11 (8-13)	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 vasodilation better than static parameters. Pulmonary and cardiac filling pressures increase after pure alfa1 stimulation more significantly than after combined alfa1/beta1 stimulation.

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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 splanchnic sympathicolysis, increase mHbO2, but undesired systemic side effects of TEA may counteract these desired regional splanchnic 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 vasoconstriction[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 mean±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 57±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 splanchnic 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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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 perioperative delirium and alcohol withdrawal. However, clonidine is accused to severely impair gastrointestinal function by reducing gut motility and and mucosal perfusion [1,2], but there is still a lack of conclusive data. This sudy was designed to investigate the effects of intravenously applicated clonidine on intestinal perfusion and oxygenation in an acutely instrumented pig model.

METHODS. Following approval by the local animal ethics committee 19 anaesthetized, ventilated and acutely instrumented pigs (catheter in femoral artery, pulmonary artery, sup. mesenteric vein, ultrasound transit-time flowmeter around the sup. mesenteric artery, intestinal tonometer and pO_2-electrode onto intestinal serosa and mucosa) were randomly assigned to 2 groups: Group 1: (9 pigs) received 2 mug kg^{-1} i.v. clonidine after baseline measurement and an infusion of 2 mug kg^{-1} h^{-1} clonidine 45 min after bolus injection. Group 2 (10 pigs) served as controls. Measurements of systemic haemodynamics and regional parameters of perfusion and oxygenation were repeated 1.5 h and 4.5 h after bolus injection of clonidine/vehicle. Statistics: Wilcoxon signed rank test, Mann-Whitney-U-test.

RESULTS. Clonidine induced reduction of mean arterial pressure (MAP) (10%), heart rate (20%), cardiac output (CO) (30%) and systemic oxygen transport (30%). Superior mesenteric arterial blood flow (16.5 ml min^{-1} kg^{-1} at baseline vs. 15.8 at 4.5 h), intestinal oxygen supply and intestinal oxygen uptake were not affected in both groups. Serosal (56 vs. 50 mmHg) and mucosal (31 vs. 28 mmHg) surface oxygen and mucosal carbondioxide partial pressure did not change.

CONCLUSION. Despite reduction of CO, MAP and systemic oxygen delivery after application of clonidine, intestinal oxygen supply and mucosal oxygenation were maintained. Our data do not support, that clonidine impairs gastrointestinal perfusion. Clonidine did not affect mucosal oxygenation in acutely instrumented pigs.

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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, wheter systemic sympathicolyis with clonidine (C) or regional sympathicolysis 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.
Instrumentation included PDA, tracheotomie and catheter in A. carotis. HS was induced for 60 min at a mean arterial pressure of 40 mmHg, reperfusion time was 5 hours. Sinusoidal width was measured by intravital microscopy at baseline, after 60 min HS and after 5 h reperfusion, and at corresponding times in groups without HS.

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 9.00 mum in C plus HS animals.

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

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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 and a linear regression analysis were used.

RESULTS. AVP patients had significantly higher prolactin ($p<0.001$) and AVP ($p<0.001$) serum concentrations than patients receiving NE alone. Prolactin serum concentrations significantly increased during the observation period in AVP patients ($p=0.008$). There were no significant differences in serum levels of other hormones. Concentrations of AVP at baseline were not correlated with hemodynamic effects of AVP ($p=0.584$; Pearson's Correlation Coefficient, 0.134).

CONCLUSION. In this study, a combined infusion of AVP and NE caused a significant increase in serum concentrations of prolactin. This finding might be explained by physiologic stimulation of prolactin secretion by AVP and could improve cell-mediated immunity of patients in advanced vasodilatory shock. Additionally, hemodynamic effects of AVP infusion in advanced vasodilatory shock seem to be independent of AVP serum concentrations. Further studies are needed to examine immunmodulatory effects of a combined infusion of AVP and NE in vasodilatory shock.

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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 extubatin was accomplished in 70,89% (229 of 323). Reintubatin 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 save procedure with shorter stay in intensive care unit and less complication related to mechanical ventilation.

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

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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 off-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 also 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.

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OUR EXPERIENCE WITH FREBINI IN ENTERAL NUTRITION

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INTRODUCTION. Providing adequate nutritional support in children with impaired oral feeding remains a provocation for physicians. When possible most authorities recommend the enteral route as opposed to parenteral route because it is cheaper and safer and has a known superiority in preserving gut integrity and immune function.

METHODS. Evaluation of enteral nutrition with Frebini was performed in 16 patients aged between 1 and 10 years that received enteral nutrition for a period of minimum 14 days. The cases were admitted in our Intensive Care Department between 2001 and 2003. The reasons for prolonged nasogastric enteral nutrition were: severe oral-motor incoordination with impaired deglutition (5 cases), gastrointestinal surgery (3 cases), neurological impairment (5 cases) and severe malnutrition with refusal of oral feeding (3 cases). The parameters used to evaluate the nutritional therapy were: clinical and neurological examination, gastric residue, body weight, number and consistency of stools, hemoglobin and hematocrit, serum protein concentration and protein fractions, nitrogen balance, blood glucose, serum electrolytes, liver enzymes, direct and indirect bilirubin, serum creatinine and uric acid, blood gases and pH.

RESULTS. Enteral nutrition with Frebini was well tolerated and no withdrawal of enteral feeding was necessary. High gastric residue and vomiting were notice in 20% of cases, especially at the beginning of enteral nutrition. Supplementation with a prokinetic agent and switching from bolus to continuous feeding was needed in these patients. Body weight and body composition improved in all patients with no disturbances in serum electrolytes, liver or renal function. Blood gases and pH were in concordance with the underlying disease.

CONCLUSION. Administration of Frebini through a nasogastric tube in children proved to be safe and well tolerated even in patients with malabsorption. Patients with malnutrition showed a marked improvement in their nutritional status. Implementation of an organized home enteral nutrition program for handicapped child is required in order to augment the results achieved in the hospital.

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CORRELATION OF SIMULTANEOUSLY OBTAINED CAPILLARY, VENOUSAND ARTERIAL BLOOD GASES OF PATIENTS IN PICU

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INTRODUCTION. Capillary (C) and venous (V) blood gas samplings may be useful alternatives to arterial blood gas sampling. The purpose of this study was to investigate the correlation between simultaneous A, V and C blood gases values, to determine the correlation between patients with diverse pathologic conditions.

METHODS. Patients admitted to the Paediatric Intensive Care Unit (PICU) in Çukurova University between August 2000 and February 2002 were enrolled in the study. If the patient had a central venous or arterial line, they were used for arterial and venous blood sampling. If not, arterial and venous blood vessels were punctured using a needle without a tourniquet in place. Capillary blood gases were sampled without warming the extremity. Samples were analysed using an automated analyser located in PICU within five minutes after getting the blood sample. pH, PO2, PCO2, BE and HCO3 were recorded.

RESULTS. A total of 116 simultaneous venous, arterial and capillary blood samples were obtained from 116 patients. The mean age of the patients was 56.91± 49.09 months range 15 days to 160 months). Eight (7 %) were neonates. Sixty- six (57 %) were males. pH, PCO2, BE and HCO3 were all significantly correlated in A, V, C blood gases. Correlation in PO2 was also significant, but less strongly. Correlation in pH, PCO2, PO2, BE, HCO3 was similar in the presence of hypothermia, hyperthermia and prolonged capillary refilling time. In hypotension correlation in PO2 between V and C blood gases was similar but disappeared in A-V and A-C blood gases;

CONCLUSION. These data reflect a significant correlation in pH, PCO2, PO2, BE and HCO3 among A, V and C blood gas values, except for a poor correlation in PO2 in the presence of hypotension. Capillary and venous blood gas measurements may be useful alternatives to arterial samples for patients who did not require regular continuous blood pressure recordings and close monitoring of PaO2.

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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 are 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 (VPAPIIST® Resmed Ltd North Ryde-AU, Synchrony® Respironics Murrysville-USA, PV102® Breas Medical AG Mölnycke-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 VPAPIIST®, 0.16 sec for Synchrony® and 0.14 sec for PV102®. VPAPIIST® response time was significantly shorter than Synchrony® ($p < 0.0001$) and PV102® ($p = 0.0001$). Mean response volume of VPAPIIST® (5.2 ml) was significantly shorter than Synchrony® (14.1 ml, $p < 0.0001$) and PV102® (10.2 ml, $p = 0.0001$). Mean response flow was 6.54 L/min for VPAPIIST®, 9.99 L/min for Synchrony® and 8.70 L/min for PV102®. It was significantly smaller than Synchrony® ($p < 0.0001$) and PV102® ($p < 0.001$). The change of circuits did not interfere with these results.

CONCLUSION. In this bench test, the VPAPIIST® had the shorter response time, the smaller response volume and the lowest response flow when compared to the Synchrony® or the PV102®. 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.

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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 became 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.

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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 cardiophaty and polyhydramnios.

METHODS. A newborn female, at 35th week G.A kg.2 b.w. with immediate respiratory distress, with no audible cry, is described. The endotracheal intubation was impossibile, in spite of visible and normal vocal cords. We achieved tracheal intubation with fibroscopy through the oesophagus, until the main carina and bronchi were visibile. The successive laryngoscopy revealed a subglottic stop, with posterior laringeal schisis. A Foley tube was positioned in this wide oesophagus to protect mainstem bronchi and lungs. The first 3D 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 1013 x 4= 50 mm) at the carina for airways control, gastro-entero anastomosys and Meckel's resection. The patient underwent a definitive correction of a cardiophaty consisting of TAPVR and DORV. The last 3D CT scan showed 2 tracheal rings next to carina, arising from the anterior wall of the oesophagus; tracheal gap was 67 mm.

RESULTS. Our patient's conditions are good: b.w.kg.5.7, spontaneus breathing with minimum O2 support. A tracheal armed tube, assembled with tracheostomy cannula obtains airways control; another artificial stent would be auspicable. 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 life2.

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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 intraqvascular cogulation (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 assay, into negative (n = 14) and positive (n = 36. All cases also presented with overt DIC were also studied (n = 30. All these groups were evaluated on admission for theirprothrombin time (PT), activated partial thromboplastin time (APTT), fibrin degradation products (FDP), plasma ferrinogen, and platelet count and presence of schistocytes.

RESULTS. The correlation of D-dimer and FDT assay showed the best correlation for early pre-DIC diagnosis (r = 0.9048). FDP was the best parameter for follow up of progress of DIC condition in PICU. The least least mortality was in negative D-dimer, followed by positive D-dimer and overt group (28.6%, 77.8% and 93.3%). Among the positive D-dimer group the least mortality was encountered with the subgroup with plasma, heparin,and tranexamic concomitantly (33%) while the subgroups treated for the original condition only, plasma only or plasma and heparin showed higher mortality (100%, 80% and 100% respectively)The deceased subgroups of the positive D-dimer cases showed significantly higher number of patients presenting with multiple organ failure on admission compared to the discharged group.

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 RESUSLTS

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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 craniocerebral 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 neurodevelopment disorders (1). The role of perinatal factors and intensive care volume on 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 hypocapnia and metabolic acidosis (100% vs. 65% and 36,4% vs. 10,4% accordingly) were at higher risk for CP(2). The VLBW neonates with severe periventricular/interventricular 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, hypocapnia, metabolic acidosis 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 compartement syndrome.

METHODS. We analyzed five babies who had repair of omphalocele (2), gastroschisis (2) and diaphragmal 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 are first acquired in the oropharynx followed 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 E/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 13-48.5], there were 18 lower airway infections and 7 blood stream 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.
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ORGANOPHOSPHATE POISIONING CAN ELECTROPHYSIOLOGICAL MONITORING PREDICT INTERMEDIATE SYNDROME

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INTRODUCTION. : Organophosphate Compund (OPC) poisoning often has two phases. 1) An immediate phase of respiratory depression, cholinergic symptoms and coma requiring ventilatory support, oximes and anticholinergics. 2) After initial recovery some patients have resurgence of weakness, paralysis, twitching and increasing cholinergic symptoms due to redistribution of the poison. This lasts 4-9 days requiring continued ventilatory support and is termed intermediate syndrome (IMS)[1]. OPC poisoning results in irreversible blockade of the enzyme acteylcholinesterase(AChE) with excess acetylcholine causing persistent depolarisation of the motor end plate. During IMS, prolonged suppression of AChE could progress to phase II block[2]. However peripheral nerve stimulation using TOF/ Tetanus has failed to show a characteristic fade. We elected to study whether electro physiological monitoring might show a decremental response during IMS.

METHODS. This was a prospective blinded study done from April 2002 to March 2003 in our ICU. 43 consecutive patients of OPC poisoning admitted during this period were included in this study. Repetitive nerve stimulation (RNS) using train of ten at 3 Hz at the ulnar nerve was done on all patients on day 1, 4, 7 and every 4th day thereafter until discharge. Patients were ventilated until weanable as per our usual protocol. The results of the RNS study were not revealed to the intensivist.

RESULTS. 7 out of 43patients required ventilation for more than 6 days and showed overt 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.

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TOXIC ECSTASY SERUM LEVELS: DISCREPANCY BETWEEN LABORATORY FINDINGS AND CLINICAL OUTCOME

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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 psychic and psychiatric damage is rarely known. In addition, may occur potential life-threatening rhabdomyolysis, disseminated intravascular coagulation, liver cell necrosis, renal failure, cardiac arrhythmias, disorders in water and electrolyte metabolism and aplastic anemia. World wide there are already about a hundred fatal casualties reported. A threshold for these problems is unknown.

METHODS. We report about two cases in our cohort with toxic serums levels and different outcome.

RESULTS. Case 1: 23 year old male was admitted in deep unconsciousness after he was found in front of a discotheque. He had after a drug-free period taken ecstasy again. When the emergency crew arrived blood pressure was 80/60 mmHg, pulls frequency was 170 beats per min with narrow QRS-complexes in ECG. Oxygen saturation was 99%, he was breathing normally. Blood sugar was 76 mg/dl, Glasgow-coma scale 3 points, eye pupils were mid wide without reflexes to light. In the ambulance the patient developed seizures which stopped after injection of diazepam. The ecstasy serum peak was 1.4g/ml. Thereafter, he had gasping with the necessity of mechanical ventilation and resistance to therapy multiple organ failure with DIC, lever and kidney malfunction. Exitus letalis occurred on day 4. Case 2: 19 year old male had take nearly every two hours since two days one tablets of ecstasy. In addition, he ingested 20 tablets of diazepam a 5 mg, 20 caffeine tablets, two liters of „Red bull“ plus Vodka, 3 g cocaine and 5 g „Speed“. Apart of an impressive psychic alteration there were found normal vital signs and laboratory values and a high toxic potential lethal ecstasy serum peak of 1.5g/ml.

CONCLUSION. In both cases, a serious ecstasy intoxication was found with potential lethal MDMA-Serum peaks. The serum levels seem to be just one parameter with prognostic impact. Adaptation processes in chronicle abuse may have potential protecting properties against toxically effects.

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EARLY AIRWAY PROTECTION REDUCES INTENSIVE CARE LENGHT OF STAY IN SEVERE ACUTE POISONING

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INTRODUCTION. Delayed airway protection in severe acute poisoning had previously been linked with respiratory morbidity in the Newcastle upon Tyne Hospitals NHS Trust. Recommendations for intubation (based on previously published guidelines) were therefore introduced to facilitate the management of such patients. They emphasised the need to assess the airway, ventilatory sufficiency and level of consciousness as judged by the Glasgow Coma Scale.

METHODS. To determine whether intubating severe acute poisoning patients according to established guidelines resulted in reduced duration of intubation and length of stay on intensive care in a prospective analysis of severe acute poisoning patients aged over 16 years, between September 2000 and August 2001. Statistical analysis was performed using the Mann-Whitney U-test for unmatched parametric data.

RESULTS. Thirty-two patients met specific intubation criteria, (age range: 16 to 74 years; median age 38.5 years.) Failure to intubate on initial assessment in Accident and Emergency (n=6) resulted in longer average intubation times (28 hours versus 14 hours: p=0.125) and a longer average length of stay on intensive care (52 hours versus 23 hours: p=0.04.)

CONCLUSION. The study had limitations: small sample number, lack of controls, uncertainty over the types of poisons ingested and the possibility of medical co-morbidities contributing to illness severity. However, early intubation in severe acute poisoning (according to specific criteria) resulted in a significant reduction in length of stay on intensive care in a UK patient population.

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THE HUMAN PLASMA IN THE TREATMENT OF ORGANOPHOSPHATE POISONINGS

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INTRODUCTION. The treatment of organophosphate (OP) poisonings, including atropine and oximes, may be failed to improve mortality and morbidity in some cases (1). Human plasma may be potentially source of acetylcholinesterase (AChE) (2).We want to determine the effects of human plasma on AChE levels in patients with OP poisoning.

METHODS. The study was performed at our ICU. 28 patients were admitted for OP poisoning. The diagnosis was based on history and plasma AChE levels. Atropine was given until control of hypersecretion occurred, and was discontinued 24 hours after all signs of atropinisation. Pralidoxime was administered as 4 g daily divided to four doses. We obtained pralidoxime from the offices of the Ministry of Health, but it is sometimes not available. Frozen plasmas were given 9 patients who received pralidoxime and 1 patient did not receive. Plasma therapy was started after day 2 in 8 patients and after developing IMS in a patient. AChE levels were measured before and after therapy. Two bags of plasma (300-400 ml/bag) were given daily until the patients were not needed to atropine. The study was approved by the Ethical Committee of Medical School, and verbal informed consent was obtained from the patients or their relatives.

RESULTS. Seventeen patients received pralidoxime, 8 patients pralidoxime+plasma after day 2, one patient plasma after developing IMS, one patient only atropine and 1 patient atropine+plasma. While IMS had developed in 29.4% (5/17) of patients received pralidoxime, there was no any IMS cases in patients received plasma (0/8 cases). The mortality rates were 11.8 % in pralidoxime group, and 0%in plasma group. Patient receiving atropine+plasma therapy did not have IMS, and this patient survived.
Mean amounts of plasma given were 4.9±3.5 bags, and AChE levels of human plasma were 3944.1±538.1 IU/L. Every two bag of plasma provided an increasing in plasma AChE approximately 414.0±85.6 IU.

CONCLUSION. We found that human plasma could increase AChE levels in patients with OP poisoning. Plasma+atropine with/without pralidoxime therapy appear to be more effective than atropine+pralidoxime therapy. This approach may also prevent the developing of IMS and related mortality. Thus, plasma therapy may be suggested a treatment method in OP poisoning. But, this must be supported by other study.

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COMPARATIVE MORTALITY OF POLYTRAUMA PATIENTS IN FRENCH AND ANGLO-SAXON MANAGEMENT SYSTEMS

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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.

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

	ISS 3-25	ISS 26-40	ISS 41-75	SCT Patients
n	469	88	51	115
Mortality (TRISS)	2 %	36.6 %	81 %	60 %
Observed Mortality	2 %	28.4 %	80 %	48 %
p	NS	< 0.05	NS	< 0.001

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.

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PCT IN EARLY SEVERE TRAYMA

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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 injuried, 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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HYDROGEN PHOSPHIDE POISONING

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INTRODUCTION. Rodenticides containing hydrogen phosphide-releasing compounds became more readily available for public use in recent years. Intoxication with hydrogen phosphide may lead to deleterious organ dysfunction and death. A detailed determination of the circumstances of exposure and appearing symptoms is crucial for adequate treatment.

METHODS. Explorative data analysis of the Poison Control Center Mainz/Germany database looking for poisoning circumstances, occurrence and severity of symptoms.

RESULTS. 250 hydrogen phosphide poisonings were reported from 1982 to 2002. 60% of these were accidental, 30% suicidal, 6% industrial accidents and 4% indeterminable. In the majority of suicidal attempts the poison was ingested, whereas in accidental poisoning of adults inhalation exposure dominated. The accidental poisonings resulted from inappropriate self-protection from the hydrogen phosphide gas formation under humid conditions during usage. The five most frequently observed symptoms in accidental poisonings were nausea, vomiting, dizziness and dry cough. Poison Severity Score (PSS) distribution in accidental poisonings: 39% PSS 0, 52% PSS 1, 8% PSS 2, 1% PSS 3. The five most frequently observed symptoms in suicidal hydrogen phosphide poisoning were nausea with vomiting, somnolence, tachycardia, seizures and shock. In 11% of the suicidal attempts intubation and mechanical ventilation were necessary. Gastric lavage with sodium bicarbonate enriched lavage fluid was performed in 60% of the suicidal attempts. Activated charcoal was administered in 66% of the cases following gastric lavage or alone. PSS distribution in suicidal attempts: 36% PSS 0, 20% PSS 1, 24% PSS 2, 13% PSS 3, 7% PSS 4.

CONCLUSION. Adequate assessment of patients poisoned with hydrogen phosphide-releasing rodenticides is crucial since the route of exposure, severity of symptoms and the necessary treatment differs substantially between accidental and suicidal poisoning.

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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±13.1 vs. 25.1±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 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 (haemo-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.

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REMIFENTANIL 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), needed of supplemental analgesia, ICU stay and mortality. Level of sedation was evaluated using Cook and Palma 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 Palma) 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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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 „Pirogov", Sofia, Bulgaria. The study includes 25 patients in the phase of thermal shock, 14 of them are children (from 2 to 9 years olds) 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. Following parameters were measured: oral-skin temperature gradient (OSTG), rectal-skin temperature gradient (RSTG) and rectal-oral temperature gradients (ROTG).

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 remains under 37oC, but the mean skin temperature is between 24 - 26oC. 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 10oC to 14oC till the end of the 3-rd 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.

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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 (nTU), 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, 41.1±20.2; nSP: 289 (1.38±0.42), 142 (2.22±0.61), 147 (1.03±0.09); nPD: 0.52±0.11, 0.46±0.06, 0.55±0.13; nTU: 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 ($p <0.00$). 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).

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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 objetive 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 gathered 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 chi_2 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 (37.9%) and chest trauma (22.1%). Cranial CT was carried out on 76% of the patients in the first 24 h, while a quarter of patients underwent chest and abdominal CT; 100 abdominal ultrasound studies were done. The most frequent surgical interventions were neurosurgical. Severity index scores were: ISS, 25±11 points; APACHE II, 13±7 points. There were 42 episodes of ARDS (7%), 80 of early pneumonia and 76 of late pneumonia. Mechanical ventilation for >24 h was required by 40.2%. The median ICU stay was 7 days and the hospital mortality was 22.2%. Patients over 60 years old showed a higher mortality in comparison with the younger patients (44.5% vs 17.8%; p<0.05).

CONCLUSION. Traffic accidents constitute the commonest cause of severe trauma in Andalusía. These patients are usually young males, who develop respiratory complications in the ICU, have a long ICU stay. There is a greater mortality among the elderly.
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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 Andalusía (Spain) during a 6-month period.Patients with severe trauma (RTS <12 and/or ISS>15) and abdominal injury (ICD-9 diagnostic categories 863-868) were included. Data were collected on demographic variables, 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 chi_2 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±15 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. Localisations of injuries were: spleen, 45; liver, 35; 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. Sixty-one patients underwent surgical treatment. Severity scores: ISS=34±12. RTS=9.2±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 - Ultrasounds	ER - DPL	ER-CT	ER-Surgery
Delay time (min)	56 (30,103)	45 (15,114)	45 (17, 172)	75 (35, 171)	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 analysis may be of interest for the quality management of these patients.
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PROCALCITONIN AS A PREDICTOR OF MORTALITY AFTER HEART AND LUNG TRANSPLANTATION

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INTRODUCTION. Procalcitonin (PCT) has been established as a marker for infectious inflammation with systemic reactions and/or organ dysfunction. Several studies reported about a good correlation between high PCT levels and the risk of mortality in inflammatory conditions. 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 125±68min in VV and 3±4 vs 114±62min in CABG, both p<0.00001). This resulted in earlier introduction of heparin in the POC-group (7±23 vs 13±78h in VV and 11±57 vs 14±101h in CABG, p=0.01 and p=NS respectively). During ICU more Lab-aPTT results were in the desired range in VV of the POC-group (47% vs 34%, p=0.007) and they received more heparin/24h (15±8 vs 9±6 [1000 UI], p=0.01). The cumulative mediastinal blood loss during ICU was higher in the Lab-group (992±647 ml) compared to the POC group (630±300ml) (p<0.01, Bonferroni) in VV but not CABG (1099±621 vs 1076±868 ml, p=NS). At ICU discharge, the hemoglobin was similar in the POC- and Lab-group (9.8±1.2 vs 9.3±1.4g/L in VV and 9.7±1.3 vs 9.7±1.0.5g/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 1/21; 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±33sec) 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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COLLOIDS AND CRYSTALLOIDS 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 oedema 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, Hemohes 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 Hemohes (6% hydroxyethyl starch, MW 200.000, substitution 0.45-0.55), 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 ^{67}Ga-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, were 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 $14 \cdot 10^{-3} \cdot min^{-1}$ 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.
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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 cardiac failure (2). We hypothesised that postop cTnI levels due to perioperative ischaemia would predict adverse outcomes such as prolonged ventilation, ICU stay, use of multiple inotropes and intraaortic balloon pump (IABP) support. We also tried to correlate high cTnI levels with intra and postop 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 inotrope usage, time to extubation and the use of IABP were recorded. RWMAs were assessed by echocardiogram on the day after surgery.

RESULTS. cTnI levels correlated with time to extubation, ICU days, duration of inotropic support and number of inotropes used (Table1). Signifcantly higher mean cTnI levels were seen in patients with intra and postop STchanges, IABP support (p<0.0001) and new RWMA (p<.001) by unpaired t test. cTnI levels of >6.0ng/ml were significantly associated with ventilation for >24 hours (Odds ratio = 6.325, Chi-square=16.04, p <0.0001).

	r	p
Extubation time	0.215	<0.01
ICU days	0.21	<0.01
Postop inotrope duration	0.205	<0.01
Postop inotrope no:	0.210	<0.01

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 postop RWMA are also associated with high cTnI levels.

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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 comorbidity and increased mortality. Delivery of cardioplegia in on-pump coronary artery bypass grafting (CABG) patients is not standardized. High volumes of cardioplegia, however, may impair ventricular function and cause arrhythmia. The purpose of this study was therefore, to analyze the possible influence of cardioplegic volume on evolvement of Afib in the intensive care unit (ICU).

METHODS. In 2,251 consecutive patients operated on three-vessel coronary artery disease, distribution of cardioplegic volumes (crystalloid cardioplegia, Custodiol TM) was determined. Two groups matched by demographic data (age, weight, sex, body surface area, history of myocardial infarction or previous Afib, NYHA status) and separated by the median cardioplegic volume, were further analyzed for development of Afib in the ICU. Statistical testing used Maentel-Haeuszel Chi-Square, Fisher's exact test and logistic models.

RESULTS. Volumes of cardioplegia used during CABG were: 1789.0, 601.9, 1900.0, 12.7 ml (mean, standard deviation, median, SEE) representing 0.09, 0.03, 0.09, 0.0006 ml/cm2 (mean, standard deviation, median, SEE) body surface area. Incidence of Afib was significantly higher in the high-volume-cardioplegia group (n=56 vs. 43 at the first, n=59 vs. 38 at the second postoperative day, p=0.01). Respective overall relative risk (Odds ratio) for development of Afib was 0.85 (logit 0.85).

CONCLUSION. In comparable CABG patients, the use of a higher amount of crystalloid cardioplegia seems to result in higher incidence of Afib. In the ICU setting, those patients at risk should therefore be closely monitored for development of Afib. Mofidied protocols may enhance early detection and therapy of Afib in the future, reducing comorbitiy and mortality following primarily successful CABG.

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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=645) 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 mumol/l and plasma urea >8 mmol/l and/or urine output <800 ml/24h. Acute RF syndrome (ARFS)= creat. >240 mumol/L and urea >16 mmol/l and and/or urine output <400 ml/24h). Severe ARFS = need of RRT. A/C indicates the presence of chronic RF.

RESULTS. Incidence of non complicated patients was 64.2%, 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 impairement (32.6 ±30.7 hours vs 75.9 ±84.5 vs 141.9 ±116.9 vs 289.5 ± 126.5, respectively, all with p<0.01 at t test). Mortality rates were 0.5%, 2.3%, 3.7% and 25.9%, respectively (p<0.01 severe ARFS vs ARI and no complic. and p=0.05 vs ARFS, chi2 test)

EUROScore	Low Risk	Interm Risk	High Risk
No Renal Complic.	31.6%*	41.4%*	27.0%*
ARI+ARI A/C	9.7%	40.2%	51.8%
ARFS+ARFS A/C	7.7%	19.2%	73.1%
Severe ARFS	3.8%	7.7%	88.5%

**p<0.01 No Renal Complic. vs ARI, ARFS, and Severe ARFS, chi square test*

CONCLUSION. Acute postoperative renal changes were more frequent for higher preoperative risk category. Increasing degrees of renal impairement were associated with longer ICU stay without affecting mortality. Adverse outcome may be explained by more severe levels of multi organ impairement. 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 TROPONIN 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 : 31,6 ± 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.

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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 terapeutic 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=0.0021, 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.

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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 monocytic 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 monocytic 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 QuantiBRITETM as average number of bound anti-HLA-DR antibodies expressed per monocyte (mAb/cell).

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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CLINICAL PROFILE AND OUTCOME IN NEUROLOGICAL COMPLICATIONS AFTER CARDIAC SURGERY

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INTRODUCTION. Neurological complications (NC) in the immediate postoperative period after cardiac surgery (CS) remains a feared problem with an important morbi-mortality. We analyzed the incidence, clinical presentation and outcome.

METHODS. Prospective, observational study of patients undergoing CS who had a NC, in the period between may 1, 2002 and march 31, 2003. We collected the selected information from the records and from the Postoperative Unit Database. We analyzed incidence, clinical data: 1. Preoperative, 2. Intraoperative: type of intervention, CPBT, ACCT, 3. Postoperative: associated complications and outcome, comparing these with patients without NC

RESULTS. We studied 478 patients undergoing CS. We observed 38 NC, that's 7.95% incidence. Mean age: 66.5±11 (r: 38-83), being female 55%. Preoperative factors: Hypertension 63%, Diabetes 26%, peripheral arterial disease 15.8%, carotid disease 10.5%, atrial fibrillation 47%, previous cerebrovascular (ACV) disease 15.8%, Procedure: 26 valvular replacement (11 aortic, 10 mitral, 5 both), 5 CABG, 1 trasplantation, 3 aorta graft replacement, 1 atrial septal deffect and 2 pulmonary endarterectomy. Clinical Presentation: 20 ACV patients (focal sensitive-motor deficit), 4.2% of total. 29 showed different grades of encephalopathy, 6% of total, 14 patients associated low consciousness level with motor deficit. 15 patients developed seizures: 3.14%. death brain in 2 patients: 0.42%. Posterior fossa hematoma in 1 case: 0.2%. Procedure times Neurologic vs no: CPBT 120±60 min vs 98±43 (P=0.007), ACCT 90±49 min vs 84±43(P=NS),Circulatory arrest in 4 pts (mean 53 min) Associated complications: ventricular failure in 52.6%, with perioperative infarction in 16%, being necessary IAoBP in 18%. Mechanical ventilation, ICU stay and exitus, comparing neurologic with no NC patients: 94±179 vs 10±28 hours (P=0.0001), 11±16 vs 2.8±17 days (P=0.01), 13% vs 5% (P=0.06) respectively. In all patients (except the 2 brain deaths and 1 persistent vegetative state) we observed improvement in consciousness level and partial or total (7) recuperation of mobility at the moment of ICU discharge. Exitus in 4: 2 brain deaths and 2 without relation to the NC

CONCLUSION. 1. NC in the immediate postoperative period of CS have a high incidence. They are more frequent in patients undergoing valvular or aorta graft replacements. 2. Usually are presented as ACV or low consciousness level, being haemorrhage infrequent, 3. They had a prolonged CPB times, 4. NC led to a prolonged MV, ICU stays and mortality

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

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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 suport (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 group - volemic replacement > 8ml/kg/h of surgery - 28 pts (43%), average age of 59,8 + 14,9 years, 20 pts (68,9%) of the male sex.; B group - 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. Extracorporeal perfusion (EP) in 29 pts (44%) has been used.

RESULTS. A group: HB was 11,23 and B group: HB was 4,69 +/- 2,30 ml/Kg/h; A group : ETVS was 6,24 and B group was 6,35 +/- 5,38 hours (p=0,93). In the pts with normal function, the HB was 7,01 +/-3,96 ml/Kg/h and ETVS was 6,40 +/- 4,70 h, whereas in the pts with disfunction, the HB was 8,20 +/- 4,95 ml/Kg/h and the ETVS 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 ETVS 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 suport even when we analysed patients with or without ventricular disfunction. By evaluating patients with and without EP, we have noticed that the enduring time in venticlatory suport has been the same in both groups, in spite of the higher hydric balance in pts without EP.

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

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INTRODUCTION. Neurological complications (NC)after cardiac surgery (CS) remains a problem. We analyzed neuroimaging 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 hours. Control CT was performed if remained the neurological symptoms or the initial CT was normal. If patient had focal motor deficit and normal CT scan we also performed a MRI

RESULTS. 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 trasplantation, 3 aorta graft replacement, 1 atrial septal deffect and 2 pulmonary endarterectomy. Clinical Presentation: 20 ACV patients (focal motor deficit), 4.2% of total. 29 showed different grades of encephalopathy: 6% of total, 15 developed seizures: 3.14%. death brain in 2 patients. Posterior fossa hematoma in 1 case: 0.2%. Brain CT scan: Initial CT scan in 33 patients. We didn´t performed CT in 1 patient with partial seizures and 4 with low conciousness level but a quick recuperation. In 22 studies (66%) we didn't observe any finding. Brain MRI was performed in 8 patients with focal motor deficit and normal CT scan. In all but one patient MR showed areas of acute or subacute infarctions, mainly of watershed distribution; that appeared hyperintense in FLAIR and T2 weighted images. In 2 patients with severe ischemic encephalopathy MRI revealed multiple cortical infarctions in one and diffuse cortical necrosis in the other, that appeared as global cortical hyperintensity with gyral swelling

CONCLUSION. 1. NC in the postoperative CS patients are more frequent in patients undergoing valvular or aorta graft replacements. 2. Usually are presented as ACV or encephalopaty, being haemorrhage infrequent. 3. Brain CT scan could be normal, with any finding, in a high percentage of patients. 4. In selected patients, MRI could contribute, showing areas of infarction not detected with CT. These images may help to a better physiology, clinical and outcome understanding

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NONINVASIVE VENTILATION (NIV) AFTER THORACIC SURGERY

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INTRODUCTION. NIV has proven to be effective in acute exacerbation of COPD. The role of NIV in the post-op course after thoracic surgery (TS) is less clear.

METHODS. Retrospective analysis of all patients (pts.) with NIV after TS between 2000 and 2002. Charts were reviewed for APACHE-II-score, blood gases, reason for and duration of NIV, causes of failure and outcome.

RESULTS. A total of 2250 TS were performed. 1377 patients stayed after TS in our ICU. 50 pts. (3,6%) (mean age 64,2 years, mean APACHE-II-score 19,4) needed NIV after extubation. Reasons for NIV were: anaesthetic hangover (AH) in 42%, pneumonia in 32%, post-op ARDS in 16%, pulmonary embolism (PE) in 2% and OSAS in 4%.
The blood gases before NIV was: pCO2 57,8+/-13,0 mmHg, pO2 70,7+/-24,1 mmHg and pH 7,28+/-0.1. NIV was performed with a full-face mask, ventilator BiPAP Vision, Mode S/T in 92%, PAV in 4% and CPAP in 4%, mean IPAP 20,5 mbar, mean EPAP 6,5 mbar, mean duration 17,8 hours in all pts. and 4,2 hours in pts. with AH. In 11 pts. the NIV failed, mainly because of pneumonia/post-op. ARDS. Only 1 pt. with AH didn´t tolerate the mask. 7 pts. died, mainly from pneumonia and ARDS. 6 of the 7 pts. were switched to invasive ventilation (IV) before death. There was no emergency intubation. Mortality was 14% of all pts. with post-op NIV.

CONCLUSION. The main cause for NIV after TS is AH in 42%. The success rate is near 100%, and the duration of NIV ist short. Mask intolerance was the reason for switch to IV in 1 pt., and severe side effects were not noticed. Other indications for NIV were post-op ALI/ARDS, pneumonia and PE. Although the mortality in this group is high (24% compared to 1,8% mortality for all thoracic surgeries), there was no emergency intubation and no unexpected death during NIV. We conclude, that in such pts. a trial of NIV is justified, under the condition of experience in NIV and not delaying intubation when latter is more appropriate.

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

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INTRODUCTION. Allmost fifty percent of all mechanical ventilation dependend patients after lung resectional 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 (bi-) lobectomies and 4 non-specified 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 plateau 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 5% (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 where to resuscitate and ventilate critically 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 [1,2]. We are fortunate to have senior ICU trained nurses in charge of the recovery which may explain are 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 CRITICAL 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 staffs' knowledge, and willingness to accept the ICU policy change. A child psychologist at the 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 then photograph the sick parent in the unit. We then meet with the child and we discuss with him the situation and answer questions. At this point if the child requests to visit his parent, we show him 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.

	1) Safety	2) Accountability	3) Paper	4) Future
Percentage yes	80	73	16	95

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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EPIDURAL ANALGESIA - PROMOTING BEST PRACTICE

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INTRODUCTION. Managing acute pain effectively requires appropriate prescribing [1], in addition to accurate assessment and documentation of pain, adverse effects and analgesia related interventions by skilled nurses [2]. We describe a multidisciplinary approach to promoting best practice in the Intensive Care Unit (ICU) - outlining the development and piloting of a document that streamlines epidural prescribing, combining troubleshooting guidelines with assessment tools and standard infusates.

METHODS. In response to an unfavourable audit of epidural infusion prescribing in the ICU a multidisciplinary working party critically appraised the published literature and reviewed the function and content of current epidural related documentation. This led to the development and introduction in March 2003 of a pilot colour epidural prescription, troubleshooting and assessment document. A new presentation of local anaesthetic (LA) to complement the existing low dose opioid-LA mixture was introduced. A targeted education programme was provided. Evaluation of this pilot project continues using a questionnaire and unstructured interviews to evaluate staff response and adverse incident reporting.

RESULTS. Offering prescribers pre-printed infusate choices has streamlined ICU stock and decreased the number of reported epidural analgesia adverse effects. The positive effects related to infection control are difficult to quantify. Initial findings of the ongoing evaluation suggest that the majority of prescibers are in favour of the new document as it reduces time and provides adequate choice. All nurses questioned welcomed legible prescriptions, easily accessible troubleshooting guidelines and the professional design of the document.

CONCLUSION. Improving epidural care, documentation and prescribing practices related in the ICU is complex and time consuming. Our initial results suggest that comprehensive epidural documentation can facilitate safe, streamlined, evidence-based epidural analgesia practice in the ICU.

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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[1]. Several studies have been demonstrated that iatrogenic complications can cause many deaths and disabilities resulting in low confidentiality about the health care system, increasing health care costs[2]. The objective of this study was (a) to identify the critical incident and (b) analyse 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 incidence (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 sequential organ failure assessment (SOFA) score[(1)] 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 to 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 dysfuction 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 [1,2,]. 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<=.001). The median scores (and interquartiles) for the three units show 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 ho .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 NDS 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 accessories made of polyvinyl chloride (PVC), absorption and adsorption 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.[1] 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 accessories made of PVC were identified. For the identification of incompatibility, the lengths of contact time between the PVC and the drugs identified were considered.

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, 27 (5.2%) H^+ blockers, 25(4.8%) vasoactive amines, 24(4.6%) anticonvulsants, 21 (4.1%) anti-inflammatories, 16 (3.1%) diuretics, 11 (2.1%) antithermals 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 acyclovir, promethazine hydrochloride, lorazepam and sodium thiopental.

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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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 identifying both the mishaps occurring during intrahospital transport and verifying the association between mishaps and therapeutic support, physiologic alterations and illness severity.

METHODS. The 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 intrahospital 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 diagnostic procedures delivered at the referral center and occurrence of complications. The Pearson's linear coefficient, Student's „t" test and qui-square test were used to determine the association between the variables focused on.

RESULTS. Complications occurred in 37.1% of the transports. The alteration of the patient's vital signs was not statistically associated with his/her APACHE II score. However, the higher this score, the more frequent the occurrence of mishaps (p=0.015). The use of central venous catheter was significantly associated with adverse occurrences (p=0.020) and so was the use of vasoactive drugs (p=0.007).

CONCLUSION. The occurrence of complications was observed in aproximately 1/3 of the intrahospital transports observed and high APACHE II scores and the use of central venous catheter and vasoactive drugs did relate with mishaps in intrahospital 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.[1] 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 university hospital in Brazil. There were selected control variables related to children, professionals, and intravenous therapy characteristics. Phlebitis was analyzed according to four severity levels.[2] The ethics committee approved the research execution. To the statistical analyses were applied Chi-Square, ANOVA and Kruskal-Wallis tests, with a significance level of 5%.

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 a difference was found (p=0.031) with predominance in Caucasians/white. Significant level was not observed regarding the professional category (p=0.448). The results demonstrated that phlebitis were not related to PIC gauge (p=1.000), limb immobilization (p=0.504) and type of maintenance (p=1.000), but was significantly related to blood vessel (p=0.003) and site (p=0.038) of insertion. It was verified that antibiotics administration (70.0%) by PIC had no influence on the occurrences of phlebitis (p=1.000).

CONCLUSION. The incidence of peripheral intravenous catheter-related phlebitis was 4.7%. There was a significant association with phlebitis and race of children, PIC site and insertion vessels.

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A COMPETENCE MODEL FOR INTENSIVE CARE NURSES. FROM NOVICE TO EXPERT.

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INTRODUCTION. Benner's Model of Expert Practice was introduced in the University hospital in Uppsala in 1997. In our Intensive Care Unit (ICU), we wanted to modify this model to fit critical care nurses. Aim: To implement a competence model in the ICU in order to 1) Stimulate nurses to develop their competence and remain in clinical work 2) Empower nurses to influence, develop and increase their competence.
3) Highlight nursing tasks in intensive care 4) Plan their own career development 5) Give possibility for evaluation of the competence of each individual nurse.

METHODS. A working group of seven nurses in the ICU was formed to develop the competence model which was based on recommendations for specialised educated intensive care nurses issued by the National Board of Health and Welfare. The group met regularly over two years. All staff nurses in the ICU (n=40) participated continuously in discussion and meetings.

RESULTS. The competence model was implemented in 1999 and includes the following parts: 1) Introductory program, 2) Five-level "ladder" of competence, 3) Criteria for assessment of competence 4) Dialogue once a year with the head nurse.
The competence ladder contains of critical care nursing, leadership, teaching/coaching and quality improvement/nursing research.

CONCLUSION. Today, the competence model is integrated as a natural part in the organisation of the ICU. All nurses are positioned according to their level of competence. This facilitates to allocate patients to a nurse with adequate competence. It is also possible to give training to nurses in a specific competence level. The competence model highlights the competence level of each individual nurse as well as the whole unit, which is used for example in the recruiting process of nurses. In the future we would like to connect the competence model with the salary discussion.

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THE DEVELOPMENT OF A MULTI-DISCIPLINARY TEACHING PROGRAMME ON A GENERAL, ADULT INTENSIVE CARE UNIT

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INTRODUCTION. This teaching programme was developed on a 14 bedded general intensive care unit/high dependency unit (ICU/HDU) in a South Manchester teaching hospital in response to national and local issues, namely the Workforce Development Confederation and Intercollegiate Boards initiatives on competency based training, and locally changing shift patterns and workload which were affecting our ability to provide quality teaching.

METHODS. The authors reviewed the training needs of medical and nursing staff with particular attention paid to core competencies. Multi-disciplinary key topics were identified and a twelve week rolling programme developed. An ICU consultant and senior nurse were allocated to each topic and encouraged to develop and review the sessions. These sessions are designed to be flexible to reflect the learning needs of the individuals present. A range of interactive teaching methods are used.

RESULTS. Seven of the rolling teaching programmes have now been completed. An audit was undertaken after the second programme. All staff who had attended agreed that multi-disciplinary teaching was of benefit to both medical and nursing staff. The sessions ensure that medical staff is guaranteed their protected teaching time. However, there is some inequality as the nurses can only attend the session if the workload on the ICU permits this. Feedback from visiting speakers and participants suggests that there is improved communication between themselves and the ICU staff. In addition, there is some anecdotal evidence that sharing teaching sessions has promoted a greater understanding of the respective roles of the medical and nursing staff and improved teamwork. Interestingly, team working features as a key topic.

CONCLUSION. The development of a multi-disciplinary teaching programme does not meet all our educational needs but does go some way towards them. The topics cover a wide range of subjects which can be offered to other staff groups and may be used to develop an outreach facility. Finally, despite being innovative, the multi-disciplinary teaching programme is cost neutral.

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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 phenomenolgical 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 lifes sleeping. Critical patients, admited 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 questionnairies: one made to ICU staff nurses, that worked in rounds, and another to patients admited 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, admited into the ICU during the same period, answered a questionnaire, as well as 26 nurses working in the same ICU. 79,5% of patients refers to have suffered from sleep disturbances during the time they were being treated on the ICU; 90% of nurses refered that a significant portion of patients have sleep disturbances. Agitation and desorientation 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 enviroment and severity of illness, causing in patients a difficulty on relaxation and falling assleep. The majority of patients referred that the quality and duration of sleep were deficient during the „ICU period". Nightmares, hallucinations and agitation were refered 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 restablishes the body and mind.