Poster Sessions
Resource management 0793-0802

0793

EVALUATION OF COSTS DUE TO DELAYED PLACEMENT OF A DEFINITIVE PACEMAKER AFTER A TRANSITORY PACEMAKER.

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INTRODUCTION. Intensive medicine services have just 5-10% of hospital beds but they consume some 30% of available resources. The expenditure involved in a 13-bed Spanish ICU is estimated as follows: monthly cost of personnel, 153000 euros; other fixed costs, 7200 euros; variable costs (drugs and disposable material), 35000 euros. This gives a monthly total of 195 200 euros, or 6500 euros per day, or 500 euros per patient/day, 20.8 euros per patient/hour of ICU stay.1 Our objetive were evaluated the costs associated with the placement of transitory pacemakers in ICU patients awaiting a definitive pacemaker.

METHODS. We undertook a prospective, observational, cohort study at Carlos Haya Regional University Hospital, Malaga, Spain, of patients who required emergency placement of a transitory pacemaker between January 2001 and December 2006. The clinical variables studied included the incidence and type of complications. We analysed the costs associated with fixed expenditure and specific disposable material under the usual protocol: blood, coagulation and biochemical assays; chest radiography; disposable material, venous introducer, transitory pacemakers; peripheral line; drugs, including antibiotics, DVT prophylaxis, gastric protection and sedation agents.

RESULTS. A total of 182 pacemakers were implanted. The mean age of the patients was 78 years, with 63% men. The indications for implantation were: third degree AV block (64%), second degree AV block (10.4%), sinus disease (9.3%), drug intoxication (12%), hydroelectrolytic alterations (1.6%) and acute myocardial infarction (2.2%). The mean time to implantation of a definitive pacemaker was 50.7 hours (range, 8-150). Mortality was 2.7%. The 34% had complications the type were: haematoma 13%, infections 2,7%, pacemaker dysfunction 12%, cardiac rupture 1,6%, pacemaker mobilization, agitation 45%. The incidence of agitation is more frequently in old patients and was associated with an increased mean stay ($p<0.05$).The estimated cost mean stay were: 50.7h/patient * 20.8 euros per hour * 182 patients = 191.930 € and the cost special disposable material were: venous introducer 65.92 * 182 + transitory pacemaker 151.75 * 182 = 11.997 € + 27.618 €. This made a global cost of 231.545 € in our study.

CONCLUSION. Delay in the placement of a definitive pacemaker is associated with considerable cost. The cost of this delay in our patients was calculated to be 231.545 €. Implantation of transitory pacemakers was associated with 45% of agitation, which are more likely the age and the longer the delay to implantation of a definitive pacemaker ($p<0.05$).

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0794

THE COSTS OF INTENSIVE CARE IN THE NETHERLANDS WITH A SPECIAL FOCUS ON MECHANICAL VENTILATION

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INTRODUCTION. Until now, there was neither an accurate estimate for the costs of intensive care nor for the costs associated with mechanical ventilation for the Netherlands. To fill these gaps, we calculated the actual costs of intensive care in mixed adult ICUs of three hospitals in the Netherlands with and without mechanical ventilation.

METHODS. A retrospective cost analysis of 242 consecutive patients admitted to a 32-bed ICU at a university hospital was conducted. Furthermore, detailed data from two general hospitals were obtained: one 10-bed ICU (general hospital 1) and one 22-bed ICU (general hospital 2). A micro-costing methodology was applied, i.e. all relevant resources were identified and valued at a detailed level (in prices of 2006), from a hospital perspective. Data on resource use of diagnostics, drugs, fluids, materials, admission and discharge was acquired from computerized Patient Data Management System while the hotel- and nutrition costs were collected from the respective financial departments. Patient record forms were used to prospectively collect the time for consultations of medical staff whereas the NEMS or TISS scores were applied to calculate direct nursing time per patient per day. Labour costs of ICU staff (specialists, fellows and nurses) were based on standardised costs per minute. They were estimated by dividing the normative income of the respective group divided by the number of workable minutes per year. The costs of medical specialists were based on the labour costs and the number of ICU days per year. Capital and overhead costs were appointed to patients using a marginal mark-up percentage.

RESULTS. The costs per ICU day were € 2,176 at the general hospital 1, € 1,753 at the general hospital 2, and € 1,805 at the university hospital ($P < 0.001$). Based on the average of these three costs estimates, average daily costs of € 1,911 (SD 230) per ICU day were determined. Labour as well as capital plus overheads represented the most important cost drivers, each accounting for approximately 33% of total costs. Mechanically ventilated patients caused 29% higher costs than non-ventilated patients.

CONCLUSION. The magnitude of overall costs per ICU day is comparable for university and general hospitals in the Netherlands. The increase in costs attributable to patients with mechanical ventilation versus patients without mechanical ventilation is substantial. Its size seems to be similar in the Netherlands (about 29%) and the US (about 32%)(a).

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0795

HOW CLINICAL ANALGO-SEDATION APPROACH COULD REACH THE ECONOMIC INTEREST IN INTENSIVE CARE? A PROSPECTIVE RANDOMISED STUDY.

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INTRODUCTION. Optimal sedation regimen in critical ill patients reduces hospitalisation time and has financial benefits. We compared morphine (Mo), sufentanil (S), fentanyl (F) and remifentanil (Re) analgesia added to a propofol (P) sedation regimen preventing Narcotics Induced Hyperalgesia (NIH) by the simultaneous use of ketamine (K) and Magnesium (Mg).

METHODS. 180 critical ill intubated patients (Severity Acute Physiologic Score: 28+/-16 SD; mean age 58y, +/-14 SD; 28% female), suffering from acute renal and liver impairment, needing sedation for more than 7 days (+/-2d) were prospectively randomised in 4 groups (G). Sedation (P: 0.5-2 mg/kg/h; K: 0.5-1 µg/kg/min; Mg: 0.06 g/kg/d) was adjusted every hour in order to reach a Ramsay Score of 3 and to keep the patient calm, comfortable and cooperative. We added in GMo, Mo (50-250 µg/kg/h), in GS, S (0.15-0.75 µg/kg/h), in GF, F (1.5-7.5 µg/kg/h) and in GRe, Re (0.05-0.25 µg/kg/min) keeping a Visual Analogic Scale (VAS) below 3. Weaning time and global hospitalisation time were evaluated. NIH was checked by naloxon testing 4 hours after extubation (1). Sedation cost / day and the global drug cost / stay were calculated. For statistical analyses a Shapiro-Wilk test, Wilcox and a Student T-test were performed.

RESULTS. The mean ventilation times were comparable in all groups (168+/-50 h SD). Per day, optimal analgo-sedation (Ramsay = 3; AVS<3) was achieved during 20h (+/-2) in GRe compared to 16h (+/-4) in GF, 15h (+/-5) in GS and 12h (+/- 4) in GMo. This was performed with fewer infusion rate adjustments in GRe (0.20 changes/h, +/-0.1) than in GMo (0.85, +/-0.30), GS (0.48, +/-0.22), and GF (0.35, +/-0.20). Weaning Time in GRe was reduced (5min, +/-6) compared to GF (8h, +/-4), GS (10h, +/-5), and GMo (22h, +/-6) ($p<0.05$). Global hospitalisation time in GRe was reduced compared to all groups: -2.8 d (+/-0.8) vs GMo ($p<0.05$), -1.8 d (+/-0.2) vs GS and -1.6d (+/-0.2) vs GF. 4 hours after extubation, NIH was higher in GMo (mean AVS 8, +/-2) than in GS and GF (5, +/-2) and than in GRe (3, +/-2) ($p=0.05$). Sedation cost/day (€100 +/-12/day) were in all groups comparable. Global drug cost/stay was higher in GMo (€3193, +/- 125) than in GS (€3080, +/- 55), GF (€2939, +/- 45) and GRe (€2650, +/-28) ($p<0.05$).

CONCLUSION. The choice of remifentanil permits a high flexibility while sedating the ICU patient. Remifentanil has no risk of accumulation in case of renal and liver dysfunction and has a high synergy with propofol. Therefore, remifentanil reduces weaning time and global hospitalisation time saving money.

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0796

EVALUATION OF A STANDARDIZED PRESCRIPTION PROTOCOL OF ROUTINEBLOOD TESTS AND BEDSIDE CHEST X-RAYS IN AN ICU: FINANCIAL IMPACT

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INTRODUCTION. There are no defined rules for prescribing routine blood tests (RBT)in ICU patients. Frequent tests induce anaemia (1), patient discomfort, increased nurse workload and additional cost. The interest of daily routine chest radiography is debated (2). We performed a prospective study to assess the financial impact of an RBT and bedside chest X-rays protocol.

METHODS. Setting: 15-bed ICU in a university hospital. A help guide for prescribing RBT and bedside chest X-rays was definded according to the most frequent and usual clinical situations; it was displayed in each room since 01/2006. Physicians prescribed next day RBT and chest X-rays accordingly, with possible adaptation to each clinical situation. Assessment: we compared the total number and cost of each RBT and chest X-rays during years 2006 and 2005, year before guide redaction.

RESULTS. Results are shown in Table 1.

TABLE 1.

	2005	2006	p
Patients (n)	541	639 (+17%)	/
Mean age (years)	55,7	55,9	/
Mean SAPS II	45,9	44,4	/
Mortality (%)	25,3	24,8	/
Haematological RBT (n/€)	16215 / 103019	7834 / 55078 (-47%)	/
Biochemical RBT (n/€)	58286 / 382926	28243/175247 (-54%)	/
Chest X-rays (n/€)	3778 / 80396	2203 / 46880 (-42%)	/
Global annual cost (€)	566341	277205 (-52%)	/
Cost per patient (€)	1046	433 (-59)	<0, 01

CONCLUSION. The protocol-driven prescription of RBT and bedside chest X-rays was responsible for a more than 50% drop in the number of exams prescribed and a 300,000€ reduced cost in year 2006 compared to 2005. Apparently, no adverse effect was linked to this protocol. Such a standardization is very cost-effective and could be implemented in ICUs.

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0797

COST-CONSEQUENCE ANALYSIS OF REMIFENTANIL VS. CONVENTIONAL SEDATION FOR PATIENTS WITH AN ANTICIPATED MECHANICAL VENTILATION DURATION OF 2-3 DAYS

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INTRODUCTION. We estimated the duration of mechanical ventilation (MV), the length of stay (LOS) in the ICU and the direct medical costs of remifentanil-based sedation (RS) compared to conventional sedation (CS) in ICU patients with an anticipated MV time of 2-3 days.

METHODS. A Markov model was developed based on UltiSAFE, a Dutch centre-randomised, open-label trial which included patients with an anticipated MV duration of 2-3 days. Patients received CS according to Dutch guidelines (predominantly fentanyl or morphine combined with midazolam or propofol) or RS (remifentanil, combined with propofol if required). Time at which the patient was eligible for weaning, extubation and discharge as well as the actual time of weaning, extubation and discharge, plus all study drugs with all adjustments in dosage were recorded. The model describes the patient flow in the ICU. 8 model states are distinguished: MV - maintenance, MV- eligible start weaning, MV - actual weaning started, MV- eligible for extubation, ICU - extubated, ICU - eligible for discharge, Discharged from ICU, and Death. At every hour, patients either stay at the current state, move to the next state or die. Transition probabilities and the costs of the study drugs were derived from UltiSAFE. All other costs were estimated in a Dutch microcosting study conducted in one university and two general hospitals in 2006. Only costs in the ICU were measured, from the hospital perspective with 2006 as reference year. According to the UltiSAFE target population, we only included those patients in the analysis who started weaning within 72 hours of treatment start. A probabilistic sensitivity analysis was performed to calculate confidence intervals (CI).

RESULTS. In the remifentanil group the duration of MV and the LOS in the ICU were 23% and 12% shorter than in the conventional group, respectively. The savings associated with the shorter LOS more than offset the additional drug costs rendering approximately € 1,300 savings per patient.

TABLE 1.

	Conventional sedation (CS)	Remifentanil-based sedation (RS)	Difference CS vs RS (95% CI)
Duration of MV	3.55 days	2.75 days	0.8 (0.5 - 1.1) days
LOS in the ICU	6.44 days	5.69 days	0.8 (0.4 - 1.1) days
Total costs	€ 12,332	€ 11,007	€ 1,325 (606 - 2,044)

Mean values, all differences are statistically significant as shown by the 95% CI

CONCLUSION. Remifentanil-based sedation dominates conventional sedation for patients with an anticipated MV time of 2-3 days: It decreases the LOS in the ICU, the total costs per patient and the duration of MV which is a risk factor for ventilator-associated morbidity. In addition, the shorter LOS in the ICU enables a 12% increase in ICU capacity.

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0798

DAILY COST OF ANTIMICROBIAL THERAPY IN CRITICALLY ILL PATIENTS WITH NOSOCOMIAL SEPSIS

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INTRODUCTION. Nosocomial sepsis is associated with excess in morbidity, mortality, and economic burden, particularly in ICU patients. Although longer hospital stay is reported to be the major socioeconomic consequence of nosocomial sepsis, data regarding extra costs due to antimicrobial treatment are scarce. This study analysed daily antimicrobial costs of nosocomial bloodstream infection (BSI) per infected patient.

METHODS. All patients (>18yrs) admitted to the ICU during a 4 year period (from 2003 through 2006), who were diagnosed with a nosocomial BSI were included. Those patients receiving no antimicrobial treatment were excluded for further analysis. Only antimicrobial agents initiated for curative indications were recorded. The daily antibiotic cost per infected patient was calculated by multiplying box prices with the number of daily doses prescribed. Costs were calculated according to: (i) focus of infection, (ii) pathogen, and (iii) antimicrobial agent. Costs are given in euros, based on the 2006 prices of antimicrobial agents provided by the hospital pharmacy.

RESULTS. Three-hundred eight patients who developed 446 episodes of nosocomial BSI (1.45 episodes/patient) were retained for analysis. Mean daily antibiotic cost was €114.25. Daily antibiotic cost was the most expensive for BSIs with unknown focus (€137.70), followed by catheter-related (€122.73), pulmonary (€112.80), abdominal (€98.00), wound (€89.21), urinary (€87.85), and other inciting focuses (€81.59), respectively. Coagulase-negative staphylococci were the most prevalent pathogens isolated. The treatment of BSIs caused by Candida spp. was the most costly. The daily antibiotic cost per infected patient with multi-drug resistant BSI was about 50% more expensive compared to those without (€82.67 vs. €165.09, P<0.001). Among the total of 880 prescriptions, beta-lactam antibiotics accounted for about one-third of the overall daily cost of antimicrobial agents. Carbapenems, and mainly meropenem, accounted for 40% of the overall beta-lactam daily cost, followed by piperacillin-tazobactam (24.3%) and ceftazidime (12.7%). Among the non beta-lactams, glycopeptides were the most frequently prescribed antibiotics. Although only prescribed eight times, caspofungin accounted for the highest overall cost.

CONCLUSION. Daily costs of antimicrobial therapy in critically ill patients with nosocomial sepsis represent an important part of healthcare costs, which can be considerably reduced by implementing infection control measures and preventive strategies.

0799

IMPACT OF A CHANGE IN PRACTICE IN FLUID ADMINISTRATION ON OUTCOMES AND COST

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INTRODUCTION. Controversy remains into which fluids should be used to resuscitate patients in critical care. The SAFE trial demonstrated fluid resuscitation with either Human Albumin Solution (HAS) or Normal Saline produced similar outcomes in a general ICU population. The ratio of albumin used to NaCl 0.9% over the first 4 days in this trial was 1:1.4, which was less than previous studies comparing crystalloids to colloids had suggested. There is also a potential cost benefit to using crystalloids. In light of these results we reviewed our current practice of using both colloids and crystalloids for resuscitation. We adopted a crystalloid-based resuscitation policy and reduced the use of colloids.

METHODS. We performed a retrospective analysis of fluids issued to the intensive care unit over a 60-month period. This consisted of two equal 30-month epochs before and after the change in practice. Proportions were compared by means of chi-square test, continuous variables by unpaired t-tests and non-parametric data by Mann-Whitney U-test.

RESULTS. Fluid resuscitation based on crystalloids resulted in a 9.3% increase in total fluid used. Renal Replacement Therapy (RRT) was similar in both groups. There was a statistically significant reduction in mortality in the group following the change in practice. There was an increase in length of stay. Total cost reduction was 57% and fluid costs per patient day was reduced by 62%.

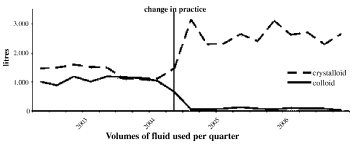

TABLE 1.

Outcomes and costs

	Before	After	p value
APACHE II	15.4±6.60	14.98±6.13	.39
ITU mortality (%)	15.3	12.9	.01
Length of stay ITU	4.32±6.61	4.38±6.42	.0001
RRT (%)	4.6	5.3	.23
Cost per patient day (£)	10.24	3.88	
Mean annual cost (£)	51135	21770	

CONCLUSION. A crystalloid-based policy for fluid resuscitation is associated with improved mortality and is cost-effective compared to using both crystalloids and colloids.

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0800

CORRELATION AMONG APACHE II, ICU OUTCOME AND COST: A ONE-YEAR RETROSPECTIVE STUDY

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INTRODUCTION. The aim of our study was to prove if there is any correlation among APACHE II, outcome and cost, in ICU patients (pts).

METHODS. Design: Retrospective cost-accounting analysis of each patient stay in ICU and correlation with ICU outcome and Acute Physiology and Chronic Health Evaluation (APACHE) II score. Setting: A 5-bedded medical/surgical adult ICU. Patients: 152 consecutive pts over 1-yr period (January-December 2006). Measurements: Demographics were collected, including age, gender, type of ICU admission, APACHE II and Predictive Death Rate (adjusted), ICU length stay, outcome (mortality 22,4%), cost/day/pts (€1211,69±70), mean cost/stay for all pts (€9330,01±500), and total cost in ICU (€1.417.677,3). Costs were collected for human (medical, nursing, and support staff) and capital (laboratory examinations, drug/fluid/blood, equipment, supplies, diagnostic imaging) resources. Cost information was available on all 152 pts (88 male-64 female) and was calculated by the financial service. The pts were divided into three groups, according to primary reason for ICU admission: a) medical b) surgical (emergency) c) surgical (elective). The statistical analysis was performed with the statistical package of SPSS 14.0.

RESULTS. 1) There is strong correlation (p<0,001) among APACHE II, Predicted Death Rate (adjusted), ICU outcome and cost. 2) The correlation among cost/day/pts, mortality and APACHE II, is statistically significant (p<0,005) with logarithmic increase 3) 53,01% of the per day cost of ICU patients was the human resources cost.

TABLE 1.

Type of admission	Number of pts	Mean Age (range)	Mortality % (n)	APACHE II (mean)	Predictive Death Rate	Mean length of stay (days)	Cost per day (€)
Medical	58	59,93(14-93)	39,6%(23)	20,26	42,22%	11,19	1169,57
Surgical (emergency)	37	67,52(30-88)	24,3%(9)	13,24	24,73%	7,79	1318,6
Surgical (elective)	57	69,53(37-89)	3,5%(2)	8,93	10,96%	3,11	1031,44
Total	152	65,73(14-93)	22,4% (34)	14,52	26,82%	7,7	1211,69

CONCLUSION. 1) APACHE II score is directly correlated to the ICU outcome and the per patient cost. 2) APACHE II score helps calculate the ICU cost, the length of stay and predict the outcome. 3) Although medical pts present with a higher APACHE II score than the surgical (emergency) pts, their ICU cost per day is significantly lower and their mortality is significantly higher (see table).

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0801

ARE DAILY ROUTINE CHEST RADIOGRAPHS USEFUL IN CRITICALLY ILL, MECHANICALLY VENTILATED PATIENTS?

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INTRODUCTION. Whether chest radiographs (CXRs) in intensive care unit (ICU) mechanically ventilated patients should be routinely obtained or only if an abnormality is anticipated remains debated. Our aim was to compare the diagnostic, therapeutic and outcome efficacy of a restrictive prescription of CXRs to that of a routine prescription, focusing on delayed diagnoses and treatments potentially related to the restrictive prescription.

METHODS. All patients admitted to the ICU of the Avicenne teaching hospital (Bobigny, France) and requiring mechanical ventilation (MV) were eligible. After 48 hours of MV, patients were randomly allocated to have daily routine CXRs (routine prescription group) or clinically indicated CXRs (restrictive prescription group). For each CXR performed, a questionnaire was completed addressing the reason for the CXR, the new findings, and any subsequent therapeutic intervention. The endpoints were the rates of new findings, the rates of new findings that prompted therapeutic interventions, the rate of delayed diagnoses in the restrictive prescription group, and mortality.

RESULTS. Twenty-nine patients were included in the routine prescription group and 26 in the restrictive prescription group. Baseline characteristics were well balanced between groups. The rates of new findings and the rates of new findings that prompted a therapeutic intervention in the restrictive prescription group and in the routine prescription group were 62 % vs 8 % ($p < .0001$), and 56 % vs 5.5 % ($p < .0001$), respectively. The rate of delayed diagnoses in the restrictive prescription group was 0.7 %. There was no difference in mortality.

CONCLUSION. A restrictive use of CXRs in ICU mechanically ventilated patients was associated with better diagnostic and therapeutic efficacies without impairing patients' outcome.

0288

ARE MECHANICALLY VENTILATED PATIENTS A SUITABLE TARGET FOR DECREASE BLOOD TRANSFUSIONS?

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INTRODUCTION. Blood transfusion in ICU remains a daily routine despite its known side-effects, because of the lack of real alternatives. Our hypothesis was that transfusion rate may show differential trends depending on risk factors or physicians-induced changes. Our objective was to study the trend of transfusion in our Intensive Care Unit in the last three years and to recognize risk factors for transfusion.

METHODS. We retrospectively review our database of ICU patients from 2004 to 2006. We recorded diagnosis category, age, severity score on admission (Apache II), length of stay, hospital mortality, complications, need for ICU specific treatments and transfusion. Statistical analysis: Multivariate logistic analysis for the risk of transfusion. The yearly trend was assessed by Chi-square analysis in significant groups.

RESULTS. We admitted 2199 patients with a 26.2% rate of transfusion. Mean age (62.3±16.9 yr), diagnosis category, length of ICU stay (8.4±10.5 days), rate of mechanical ventilation (MV) (50.2 %), and mortality rate adjusted for severity were unchanged during the period. Factors associated with transfusion by multivariate analysis were: vasoactive drugs (OR 2,4 (1.8–3.0), $p<0.001$), acute renal failure (OR 3.3 (2.4–4.3), $p<0.001$), trauma (OR 3.0 (2.2–4.1), $p<0.001$), gastroscopy (OR 10 (5.5–18.7), $p<0.001$), MV plus arterial catheter (OR 2.3 (1.8–2.9), $p<0.001$). The trend of transfusion only significantly decreased in this last group (absolute 11% reduction or a 20% relative reduction) (see Table).

TABLE 1.

	2004	2005	2006	p value
MV	140/287 (49%)	124/286 (43%)	106/279 (38%)	0.04
Non MV	69/472 (15%)	69/442 (16%)	67/434 (15%)	ns
Total	209/759 (28%)	193/728 (27%)	173/713 (24%)	ns

CONCLUSION. In our ICU, the trend of transfusion in the last 3 years decreased 4%, but mostly restricted to mechanically ventilated patients.

0802

DOES THE 20/80 PERCENT RULE APPLY TO INTENSIVE CARE?

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INTRODUCTION. The so-called 20/80 percent rule roughly implies that 20% of cases require 80% of efforts. We studied our ICU database to see if the 20/80 percent rule is valid in intensive care. We hypothesized that 20% of patients with the longest length-of-stay in the ICU consume approximately 80% of ICU resources.

METHODS. The ICU is a 10-bed closed format mixed unit in a 500-bed general hospital. Data are collected prospectively in our database of all admitted patients. All patients admitted to the ICU between January 1st, 2004 and December 31st, 2006 were included in the study.

RESULTS. During the study period 2192 patients were admitted to the ICU. The ICU length-of-stay was 4 days or more in 437 patients (20%) and less than 4 days in 1755 patients (80%). Outcome and resource utilisation are presented in Table 1.

TABLE 1.

	20% of patients	80% of patients	All Patients
Number of patients	437	1755	2192
Age (mean/median)	67,2 / 70,5	66,1 / 69,7	66,3 / 69,9
SAPS II (mean/median)	40,5 / 39	29,9 / 26	32,0 / 28
APACHE II (mean/median)	18,2 / 18	12,8 / 11	13,9 / 12
Hospital mortality	25,9%	13,8%	16,2%
ICU treatment days	4524 (66%)	2337 (34%)	6861 (100%)
Days on ventilator	2729 (87%)	695 (13%)	3424 (100%)
Days on hemofiltration	499 (90%)	57 (10%)	556 (100%)
Total TISS	142455 (62%)	86117 (38%)	228572 (100%)
Estimated cost in million euro's	4,03 (70%)	1,77 (30%)	5,80 (100%)

CONCLUSION. The so-called 20/80 percent rule is more or less applicable to intensive care. We found that 20% of patients are accountable for 66% of ICU treatment days, 87% of ventilator days, 90% of hemofiltration days and 70% of ICU costs.

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0803

WAITING ROOMS IN ITALIAN ICUS: A NATIONAL SURVEY

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INTRODUCTION. Families of critically ill patients spend a considerable amount of time in hospital, both beside their loved ones in ICU and outside the unit waiting to visit them or to receive news. No published data are to date available on the provision of waiting rooms in Italy's approximately 600 ICUs and on the facilities available to patients' families and visitors. We investigated these aspects in the course of a national survey concerning visiting policies in Italian ICUs.

METHODS. An email questionnaire regarding visiting policies was sent to all 303 ICUs (general and specialized) in the Italian collaborative group GiViTI (Italian Group for the Evaluation of Interventions in Intensive Care Medicine); questions about waiting rooms and facilities for patients' families and visitors were also included.

RESULTS. The response rate was 85% (257/303). No waiting room was provided in 25% of ICUs. In other ICUs, families and visitors were provided with seats (64% of ICUs), armchairs (23%), lockers for personal effects (18%), magazines and books (12%), drinks machines (19%) and snack machines (12%). A bathroom was available to families and visitors in 43% of ICUs, use of the ICU's kitchen in 2% and access to the hospital canteen in 22%. Median daily visiting time was 60 minutes, ranging from 15 minutes to 18 hours (10th percentile: 30 minutes; 90th percentile: 120 minutes).

CONCLUSION. Overall these data indicate that in Italian ICUs, alongside a clear tendency to apply restricted visiting policies, there is limited attention to the comfort of families of patients in ICU. Comfort is one of five domains (in addition to assurance, proximity, information and support) associated with the needs of families who have critically ill loved ones [1, 2]. Our survey could contribute not only towards modifying current policies in favour of opening ICUs that are still 'closed' but also to promoting more attentive and supportive care for the patient's family [3].

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0804

SATISFACTION WITH CARE IN THE INTENSIVE CARE UNIT: CAN WE RELY ON PROXIES?

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INTRODUCTION. Quality of care has been recognized as an important aspect of quality management, as recall of experiences may impair quality of life[1]. Many patients do not consciously remember their stay in the ICU. Therefore, next of kin are often approached to assess quality of care. However, reliability of proxy assessment has been questioned, i.e. for quality of life[2], as they may not adequately represent patients' points of view.

METHODS. During a 2-month period, next of kin of patients in 23 ICUs were asked to complete a questionnaire on satisfaction with care[3], including a single question and a visual analogue scale (VAS) on overall satisfaction. If these patients themselves were oriented in time, person and place when leaving the ICU, they were asked to complete a short version of the questionnaire. Answers were compared using Cohen's Kappa and Pearson correlation coefficient (for VAS). Analysis was done as suggested[3] with rescaling of all questions to 0 - 100 (worst - best care).

RESULTS. mean ± SD. 106 pairs of responses were available for analysis. Proxies' age was 57±15 years, 52% of respondents were spouses, 23% children, 5% parents and 20 % others. Patients' age was 65±14 years, admission SAPS was 33±48 points, length of stay in the ICU was 4.7±3.3 days and 67 % were emergencies.

TABLE 1.

	patient	proxy	kappa
courtesy, respect	88±16	84±16	0.31
management of - pain	87±19	82±20	0.39
- breathlessness	84±23	82±20	0.42
- agitation	80±23	80±21	0.46
coordination of care	86±17	81±18	0.37
skills and competency of - nurses	87±17	85±15	0.26
- doctors	89±15	84±17	0.36
atmosphere in the ICU	84±17	77±21	0.22
overall satisfaction:- single question	86±15	82±18	0.37
- VAS	90±13	89±13	0.61

CONCLUSION. Next of kin and patients' ratings of satisfaction with care were not significanty different, but the interrater reliability was only moderate. Since satisfaction with care could not be assessed in individuals with impaired consciousness, good outcome may have lead to high satisfaction, resulting in a ceiling effect: the majority of answers were given as excellent or very good, and only very few ratings were moderate or poor.

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0805

FAMILY SATISFACTION IN THE ICU: PRELIMINARY RESULTS OF A MULTICENTRE TRIAL

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INTRODUCTION. Family satisfaction has been recognized as an outcome measures in the ICU[1]. Relatives of critically ill patients have particular needs and if these are not met, they may affect their long-term quality of life[2]. Therefore, sources of dissatisfaction need to be identified to initiate goal directed changes.

METHODS. In 23 ICUs, adult next of kin were asked to complete a questionnaire on satisfaction with care and with information /decision-making[3], and a visual analogue scale (VAS, 0-100: worst-best). Inclusion criteria were patients' length of stay in the ICU > 2 days, and regular visits by the family. Questions were rescaled as suggested[3] to 0-100.

RESULTS. (mean ± SD). 597 questionnaires were distributed, return rate was 66%. Respondents' age was 55±15 years, 45% of respondents were spouses, 33% children, 5% parents an 17 % others. Patients' age was 67±14 years, their SAPS 37±32 points, and 7% of patients had died when proxies responded. 41% of patients had a surgical diagnosis and 44% were emergency admissions. 16 ICUs had ≤ 12 bed (small ICU, 158 patients), 7 had > 12 beds (large ICU, 236 patients).

TABLE 1.

Overall, best and least satisfaction, and distribution among small – large ICUs

	small ICUs	large ICUs
overall satisfaction with: - care	83±18	82±17
- information and decision-making	72±28	75±23
VAS: - care	88±15	90±11
- information and decision-making	83±19	85±18
best satisfaction*: respect and courtesy for patient	84±17	86±15
2nd best satisfaction*: respect and courtesy for family	82±18	85±15
2nd least satisfaction*: completeness of information	77±22	77±21
least satisfaction*: waiting room atmosphere	60±27	65±24

** Ranking according to all patients of all ICUs*

CONCLUSION. In general, next of kin were satisfied with care as well as with information and decision-making. However, large differences between different aspects were found and some facets with need for improvement were identified (e.g. waiting room, information). Satisfaction was somewhat lower than in a previous study[3] from Canada, and similar sources of dissatisfaction were noted. No significant difference was found between small and large ICUs.

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0806

PATIENT'S VIEW ON ICU SERVICE QUALITY: MEASUREMENT BY DESCRIPTIVE ITEMS VS. "GENERAL SATISFACTION" (PRELIMINARY RESULTS OF A QUESTIONNAIRE STUDY)

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INTRODUCTION. Patients' assessment of a received medical service is a measure of quality (1). „General satisfaction" is a questionable measure of quality after threatening situations because of considerable ceiling effects*(1, 2). We hypothesized that following an ICU stay descriptive items show less ceiling effects then „general satisfaction" – if so, they were a more appropriate measure of quality.

METHODS. 81 consecutive patients were interviewed 2-7 days after their ICU stay using a self-constructed questionnaire (ethic committee approval, written informed consent). „General satisfaction" as well as 31 descriptive items focussing on 3 different spheres of subjective experiences were ranked using a 4-point Likert scale (1=positive, 4=negative). The 3 spheres were somatic (pain etc.) intrapersonal (emotions etc.) and interpersonal (communication etc.) experiences and they were described by 7, 14 and 10 items. SAPS 2 (initial and daily mean), TISS 28 (daily mean) and length of stay were chosen as medical descriptors. Statistics: Wilcoxon signed rank test ($p < 0.05$), percentual frequencies of rankings; mean±SD for medical descriptors.

RESULTS. Percentual distribution of the Likert ranks for „general satisfaction" and the spheres of subjective experiences are presented in Table 1. „General satisfaction" is ranked lower (i.e. more positively) than the descriptive items.
SAPS 2initial 37±20; SAPSdaily mean 30±20; TISS 28 33±20; Length of stay: 4±7 days.

TABLE 1.

Frequencies (%) of Likert ranks for "satisfaction" and grouped descriptive items

Ranking (1=pos. ... 4=neg.)	**"satisfied" (1 item)**	**somatic sphere (7 items)**	**intrapersonal sphere (14 items)**	**interpersonal sphere (10 items)**
1	80.3	31.6	51.4	67.8
2	17.2	24.3	15.9	17.4
3	2.5	19.1	13.8	5.9
4	0	21.3	15.9	5.9
invalid answers	0	3.7	3.1	3.0

CONCLUSION. „General satisfaction" received mainly best rankings, while the descriptive items did not, indicating a considerable ceiling effect in the former but not the latter. Therefore, patients' assessment of ICU treatment as a medical service should be measured with descriptive items to produce meaningful results.

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*ceiling effects: best rankings, even despite objectively bad outcome

0807

A PHARMACOECONOMIC MODEL FOR THE ANALYSIS OF PATIENT FLOWS AND SEDATION REGIMENS IN THE ICU

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INTRODUCTION. Modelling allows the extrapolation of study findings to longer time periods and the assessment of study subgroups. We developed a Markov model to simulate the patient flow in the ICU with a focus on mechanical ventilation (MV). It was employed to compare remifentanil-based sedation (RS) vs. conventional sedation (CS) in critically ill patients requiring MV.

METHODS. A probabilistic Markov model was built to analyse the patient flow, the consequences and direct medical costs of different sedation regimen in the ICU. The model contains 8 states: MV - maintenance, MV- eligible start weaning, MV - actual weaning started, MV-eligible for extubation, ICU - extubated, ICU - eligible for discharge, Discharged from ICU, and Death. At every hour, patients may move to a different state. Data to derive the respective transition probabilities were obtained from UltiSAFE (1), a Dutch open-label trial with 205 critically ill patients, using time-to-event analyses. Patients received CS according to Dutch guidelines (predominantly fentanyl or morphine combined with midazolam or propofol) or RS (remifentanil, combined with propofol if required) for up to 10 days. Applying Weibull functions to fit the UltiSAFE data to our model allowed us to run the model for 28 days, i.e. beyond the UltiSAFE study period. Study drug costs were derived from UltiSAFE whereas all other costs were measured in a separate microcosting study, conducted in 3 Dutch mixed adult ICUs. Resource utilisation was valued from a hospital perspective using prices of 2006.

RESULTS. Our model showed a high internal and external validity. CS led to 6.2, RS to 5.2 days of mean MV duration, i.e. RS reduced the duration of MV by 1 day (95% CI 0.6 - 1.3 days). Similarly, CS caused a mean length of stay in the ICU of 8.8 days compared to 7.9 days for RS rendering a difference of 0.9 days (95% CI 0.6 - 1.2 days). The total mean costs per patient were € 17,502 in the CS group and € 16,093 in the RS group yielding cost-savings of € 1,409 per patient (95% CI € 744 - 2,074) in the RS group.

CONCLUSION. A Markov model can be successfully used to simulate the patient flow in the ICU and evaluate different sedation regimens. Compared to CS, RS seems to be the preferred regimen for patients with 5 - 6 days of MV. Its ability to decrease the length of stay not only overcompensates the additional drug costs of RS but also increases the ICU capacity. A shorter duration of MV might benefit the patient as several studies have shown a positive correlation between ventilator associated pneumonia and the duration of MV (2).

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0808

OVER ONE YEAR ON FROM "AN ACUTE PROBLEM": IS IT NOW ACUTE ON CHRONIC?

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INTRODUCTION. The publication in 2005 of the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report entitled 'An Acute Problem' [1], reviewed the care of medical patients referred for Level 3 care. In light of their findings the report made recommendations regarding the provision of critical care including: pre-referral care and monitoring, the referral procedure and the Intensive Care Unit (ICU) admission process. The aim of our audit was to review the process for medical admissions to Level 3 care in the three adult ICUs across UHL, using the NCEPOD data as a benchmark.

METHODS. We audited medical patients admitted to Level 3 care over a three-month period. Case notes were reviewed and data collected on initial clerking and observations, observation plans, evidence of senior clinician involvement and the personnel involved in the referral and admission process to ICU.

RESULTS. There were 104 admissions, 36% referred by Accident and Emergency (A&E), 28% by general medicine and 36% by a medical speciality. 57% were male with a mean age of 58 years; 43% were female with a mean age of 53 years. Admission data: A full history and examination was present in 39% of patients on admission to hospital. Respiratory rate was recorded in 75% of patients. Observation plans were in place in 25%, with early warning score charts used in 16%. A consultant reviewed the patient within 24 hours of admission to hospital in 42% of cases. Referral data: The consultant in charge of the patient was aware of the referral in 39% of cases, referring 21% of the total. A specialist registrar (SpR) referred 65%, a senior house officer (SHO) 11% and a house officer 3%. ICU data: Referral was received by the ICU consultant in 13% of cases, the SpR in 68%, and by the SHO in 19%. The ICU team reviewed all patients prior to admission. The ICU consultant was aware of admission in 89% of cases. The ICU consultant reviewed the patient within 12 hours in 78%, being present on admission in 39% of cases.

CONCLUSION. The A&E clerking was satisfactory in less than 5% of cases; despite accounting for this referrals from medical wards had worse results for clerking than the report. Physiological monitoring, notably the recording of respiratory rate, was better than the NCEPOD report. Pre-ICU consultant input was comparable to NCEPOD; but A&E consultant involvement was markedly lower than other medical specialties. The ICU consultant input was generally comparable to or better than the NCEPOD data. Poor documentation may well hide a greater level of senior input. One year after the report significant improvement still needs to be made.

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0809

CLIENT-PROFESSIONAL-GAPS IN INTENSIVE CARE: PATIENTS' EXPERIENCES AND EXPECTATIONS – AND STAFF'S ASSUMPTIONS (PRELIMINARY RESULTS OF A QUESTIONNAIRE STUDY)

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INTRODUCTION. When true patients' experiences and expectations differ from what staff members assume about these experiences and expectations, suboptimal service quality is likely to result (1). We investigated differences between true patients' experiences and expectations and staff members' assumptions about these experiences and expectations – i.e. client-professional-gaps (cp-gaps).

METHODS. All Participants were recruited from two operative Intensive Care Units (ICUs). 81 patients (local ethic committee approval, written informed consent) and 60 staff members (voluntary participation) were interviewed anonymously with an analog questionnaire; patients were interviewed retrospectively. The questionnaires focussed on the real (patients) and the assumed (staff) patients' experiences and expectations. „General satisfaction" and further 31 items representing patients' experiences in the somatic (pain etc.), the intrapersonal (emotions etc.) and the interpersonal sphere (communication etc.) were ranked on a 4-point Likert scale (1=positive, 4=negative). In addition, 61 dichotomous items (presence / absence of a negative experience) grouped into 5 categories could be chosen. 4 dimensions of expectations (somatic sphere, intrapersonal sphere, interpersonal sphere, medical competence) were ranked on a 4-point Likert scale with regard to their relative importance. Statistics: U-test ($p<0.05$) for Likert ranks, number of chosen dichomotous items for each individual (means$\pm$SD).

RESULTS. Patients chose lower Likert ranks (1.8 ± 1.1 vs. 2.8 ± 0.9) and less dichotomous items (6.2 vs. 25.3) compared to the staff members, indicating cp-gaps. The relative importance of the 4 dimensions of expectations were ranked equally in patients and staff.

CONCLUSION. Our questionnaire detected a cp-gap for experiences but not for expectations with real service being better than the staff members assumed. Maybe a similar cp-gap exists for expectations but could not be measured with the coarse gradation used in our preliminary questionnaire. Gap detection can help to focus measures intended to improve medical service quality.

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0810

DO AESTHETICS MATTER IN THE ICU?

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INTRODUCTION. When planning a new ICU it is important to bear in mind that the aesthetics of the ICU may have a large influence on the mental and physical health of both patients and nurses (Caspari, 2004). The aim of this study was to find out whether the aesthetics (space, light, sound, colours, and art) in a planned new ICU would be of importance to the nurses working there, and if so, how?

METHODS. Using both a qualitative and quantitative approach, we designed a questionnaire containing 42 items (using Likert scale) with 4 main areas (space/design, light, sound, art) and with room for free comments in each area, also containing 3 open questions. The respondents were 101 nurses working part- or full-time. We had a response rate of (77%) and collected 462 free comments. These qualitative statements were collected and qualitative content analysis was used for analysing the themes.

RESULTS. Enough space around the bed to provide easy access and good overview was considered the most important factor for the staff. A need for sufficient storage room for essential supplies and equipment next to each bed was also rated as important. The respondents described many difficulties when space was too narrow, as mobilising ventilator-patients, avoiding cross-infections, preserving the patient's rights to privacy and confidentiality etc. Sufficient natural daylight was also perceived as very important. Inadequat light influences the mood. Windows are the visual link to the outside world (NHS Estates, 2003). The nurses believed bright, colourful, welcoming surroundings would affect the mood of both patients and others in a positive way. Art was welcomed as something beautiful to look at, and stimulating for patients, family and staff. Noise (incl noise from medical equipment) was said to cause discomfort both for patients, family and staff, and made it difficult to concentrate. The respondents believed space and privacy (single bed rooms) for information exchange between staff is important as well as room for private conversation between patient, family and medical staff. It was also expressed that adequate space, light, and nice surroundings give both patient and families a feeling of dignity, safety and respect.

CONCLUSION. Aesthetics do matter when planning a new ICU. Focus on space, light, noise prevention and welcoming surroundings might increase the comfort for patients, families and staff and even increase efficiency and safety in the ICU.

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0811

COMMUNICATION WITH THE RELATIVES OF CRITICALLY ILL PATIENTS: AN AUDIT AND DISCUSSION

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INTRODUCTION. Good communication is an essential part of medical and nursing care. It facilitates the diagnostic process and minimises the emotional distress experienced by patients and their relatives. This study evaluated the effectiveness of communication from two perspectives. The results were compared against a national framework of recommended standards.

METHODS. We prospectively audited the frequency and location of interviews that occurred between ICU staff and patient's relatives from Feb to Jun 2006. After discharge from ICU, the relatives were asked to complete a retrospective anonymous questionnaire regarding their experience.

RESULTS. Of the 106 admissions to ICU within the time period we studied data from 80 patients. The remainder met the exclusion criteria. 30% of relatives were interviewed within 15 minutes of arrival by nursing staff, while 28% were interviewed by medical staff within 60 minutes. Nursing staff spoke to the relatives on 74% of days and medical staff spoke on 57% of days. 21% of patients received no visitors. 41 of the patient's relatives were given questionnaires to complete, the results from these were very positive.

CONCLUSION. The needs of relatives include the opportunity to effectively appraise a situation that is perceived as harmful, to assimilate the information and to formulate a coping strategy. The overall impression a visitor forms of ICU is heavily influenced by the communication skills of the staff and effective communicators are also less likely to receive complaints. The subjective nature of communication makes it difficult to quantify and difficult to measure definitively. As a surrogate marker of quality, we assessed the quantity and frequency of discussions. Arbitrary end points are unable to measure crucial elements of the interaction process or patient perspectives. It has been suggested that an assessment of Doctor and Patient perceptions should be used, based on the premise that subjective measurements may be more useful than objective ones in this context. However, these are highly complex to measure; ipso facto very few studies have been completed in this area to support this assertion. High quality communication is something to which we should all aspire. The strict use of inflexible targets is not necessary to promote good communication, but serves as a benchmark to raise the profile of this issue. Emphasis should be placed on integrating a routine interview process into clinical care.

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0812

USING THE "LIVERPOOL INTEGRATED CARE PATHWAY FOR THE DYING PATIENT" (LCP) IN INTENSIVE CARE

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INTRODUCTION. In this 1200 bed inner city tertiary referral hospital, 10% of patients who die, die in the intensive care unit. 23% of patients admitted to ICU die; of these, 70% have treatment withheld or withdrawn. It is recognised that approaches to dying patients are very variable between units and doctors(1). To improve the quality and consistency of care of patients dying in intensive care, we adapted the LCP, originally designed for patients dying in hospices and on hospital wards. The LCP is divided into 3 sections: initial assessment and care, ongoing care, and care after death. It specifies physical, psychological, spiritual and social goals to be met for each patient.

METHODS. The LCP used on wards was introduced to the intensive care unit. Action research methodology using focus group interviews led to modifications of the pathway to meet specific needs of critically ill patients and their families. After introduction of the modified pathway, a survey of staff satisfaction was performed using a validated questionnaire graded with a Likert scale.

RESULTS. In the first 6 months, 45/ 107 deaths were on the LCP. Patients were on the pathway a median of 5 hours (range 1 – 215). Compliance with specific goals was > 80%, except for continuation of IV fluids (33%) and discontinuation of electronic monitoring (50%). 24% of patients were extubated. 44% of staff responded to the survey; median score for 'improved quality of care' was 4/5.

CONCLUSION. Use of the LCP in our ICU improved documentation of the process of dying on patients for whom treatment was withdrawn. Staff satisfaction with the pathway is high.

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0813

RAPID RESPONSE SYSTEMS IN ITALY: STATE OF THE ART.

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INTRODUCTION. In 2007, a manuscript containing Italian recommendations for implementing Rapid Response Systems (RRS) will be published. In April 2007 the Società italiana di anestesia analgesia rianimazione e terapia intensiva (SIAARTI) the Italian resuscitation council (IRC) the Associazione anestesisti rianimatori ospedalieri italiani (AAROI) instituted a national commission to implement RRS in Italy. The aim of the authors is to investigate baseline management of hospital emergencies in Italy.

METHODS. A survey has been carried out using a national e-mail list enclosing all Italian hospitals with critical care beds (total 413 hospitals in the 2005 national AAROI register). Either general directors or physicians working in critical care areas were contacted.

RESULTS. 109 hospitals (26%) replied to this questionnaire. Most hospitals were located in the north of Italy (67%) and were public (49,5%) hospitals. The medical emergency team (MET) comprised a doctor in 42% of cases, a doctor and a nurse in 34%, but never only nurses. The anaesthesiologist was the specialist most often in charge of MET teams (70,6%). BLS (60,5%) andor BLSD (57,8%) were the certificates of training owned by most people working in the afferent arm (alerting MET teams), while ALS 73,4%) was the training of most specialists working in the efferent arm of the hospital RRS. Most of the time the MET team was called for cardiac arrests (64%), and the report of these events were not systematically written in a register (57%). No statistically significant differences were found among university, public or mixed hospitals, and between hospitals in the north, the centre and the south of Italy.

CONCLUSION. The afferent and the efferent arm of RRS in Italy do not receive a specific certification. No protocols are followed in the way critical events are recorded, as a consequence most crisis are not reported.

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0814

INTENSIVE CARE INPUT INTO END OF LIFE CARE IN A REGION OF THE UNITED KINGDOM

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INTRODUCTION. One in five Americans die using Intensive Care (Intensive Care or Coronary Care) services [1]. The same figure is not known for the UK, despite the acknowledged differences in end of life care between European and US Intensive Care Units [2]. This study investigated the percentage of people who die from a region of the UK having used general ICU services during their final hospital admission.

METHODS. We investigated a target population defined geographically as those living in the area served by a single Primary Care Trust (PCT) in the UK. Patients from this area are treated by two acute hospitals. Anonymous data was supplied by the UK Office of National Statistics on place of death for all those who died during 2004. The general ICU admissions databases of both acute hospitals were interrogated to obtain anonymous ICU and hospital mortality data for all patients from the target population admitted during 2004. The study did not include patients admitted to coronary care units.

RESULTS. The region had a population of 186,000. Of these, a total of 1687 people died during 2004. 902 (53%) died in the two acute hospitals. 59 of these patients (3.5% of total population deaths) were admitted to a general ICU during their final hospital stay.

CONCLUSION. In this UK region, 1 in 29 patients (3.5%) die having used general intensive care services during their final hospital admission. This is substantially less than in the USA. The difference is unlikely to be accounted for by coronary care patients. If seen in a wider population, it is likely to reflect a very different approach to ICU admission criteria and end of life care.

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0815

DIPEX: PATIENTS' AND RELATIVES' EXPERIENCES OF INTENSIVE CARE, WWW.DIPEX.ORG

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INTRODUCTION. There are very few qualitative studies that focus on both patients' and relatives' experiences of intensive care. Most concentrate on fairly small numbers of patients or carers and on specific problems, such as problems with mechanical ventilation, with communication or with a specific condition. Very little qualitative research has focussed on larger numbers of patients and carers or on their entire experience, from the patient's ICU admission to hospital discharge and recovery. The DIPEx charity, based at the University of Oxford, runs an award-winning multimedia website based on qualitative interview studies about patients' and carers' experiences of health and illness. Interview clips from patients and carers are available in video, audio and written formats. The DIPEx intensive care studies, funded by ICNARC, aimed to identify the things that mattered to patients who were admitted to intensive care and their relatives and close friends.

METHODS. 78 qualitative interviews were conducted across the UK between 2005 and 2007, and analysed. 40 in-depth interviews were conducted with ICU patients and 38 with the relatives and close friends of patients.

RESULTS. The interviews detailed different aspects of patients' and relatives' individual experiences, including: physical and emotional experiences, nursing care, information needs, communication, support, and affects on daily life. Over 50 main topics from the interviews were illustrated with extracts in written, audio and video format. The DIPEx intensive care sites linked patients' and relatives' experiences with evidence-based information and with a range of other useful resources, including support groups and links to other websites.

CONCLUSION. DIPEx aims to identify the questions that matter to people when they are ill and is widely used to inform patients and carers, educate healthcare professionals, and provide a patient-centred perspective to researchers and those who manage health services. Each DIPEx intensive care study contains around 250 interview clips in video, audio and written formats from patients and relatives who talk about their experiences from when the patient was admitted to ICU to recovery at home.

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GRANT ACKNOWLEDGEMENT. Intensive Care National Audit and Research Centre (ICNARC)

0816

OUTDOOR ACTIVITY IN AN INTENSIVE CARE UNIT (ICU)

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INTRODUCTION. The purpose of this study was to analyse the overall outdoor activity developed by the intensive care specialist.

METHODS. In our teaching hospital with a closed ICU model, a prospective descriptive study was designed to evaluate all activities carry out by the intensivist outside the ICU during the last nine months (July 2006-March 2007).
Outdoor activity was defined as any intensivist intervention (treatment criteria, illness degree graduation, special technics..) on hospitalized patient outside the ICU.
Requirements for cardiac arrest are usually recorded in a unit independent protocol and were excluded from this study.
We recorded patient demographics, admitting diagnoses, type and duration of activity, clinical outcome.

RESULTS. Outdoor activity was required in 132 patients, 59% being males. Mean age 76 years old. The most common comorbility were ischemic cardiopaty (48%), pulmonary chronic illness (25%), high pressure (14%), diabetes (12%).
Most frequent cause of intervention was respiratory failure (48%), 79% of the calls corresponded to medical department leaded by the emergency (38%). 40% of the requirements received from surgical department were due to general surgery postoperative patients.

CONCLUSION. Mean age in our study shows that we assist an old population. Most of the ICU specialist activities are patients hospitalized in medical departments. Respiratory failure is the leading cause of intervention. Most studies are required to evaluate the perceptive of incremental needs for intensivist outside the ICU.

0818

LONG TERM OUTCOMES AND FUNCTIONAL HEALTH STATUS OF ADULT CRITICAL ILL PATIENTS AT TWO YEARS AFTER ICU DISCHARGE

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INTRODUCTION. Severity of illness are predictors of early and late morbidity/mortality in critical ill patients. Late outcomes of those recovered from their acute illness are scarce in medical literature. Our main objective was to evaluate survival and functional health status of patients at 2 years after discharge from the Intensive Care Unit (ICU).

METHODS. Observational and prospective study including all patients admitted from April-2003 to April-2004 in our 20 beds medical-surgical ICU. Patients clinical characteristics and the main diagnostic-therapeutic procedures were collected during ICU stay. Long-term outcomes, vital status and functional capacity (Karnofsky scale and Activities of Daily Living Scale (ADL) were evaluated by telephone interview two years after hospital discharge.

RESULTS. 788 patients were admitted in ICU during the study period. Mean ICU stay was 8.5 +-13.2 days, mean APACHE II score 14.08 SD6.3; SOFA: 1.58 SD3.3; 38.4% on mechanical ventilation. 99 (12.6%) patients died in ICU and 141 (17.9%) died after ICU discharge in the next two years. 215 patients with long-term complete interviews were included in the study, from the 548 ones that survive and were discharged. 67 patients were lost , 22 do not consent and decline the interview , and the others didn't complete yet the follow-up. The main clinical characteristics of the 215 included patients at ICU admission were: Age: 66±16 years; 66.28% males; APACHE II score at admission:11.6, TISS 24h score: 18.4 +-8.0; SOFA score at ICU discharge: 0.56; 20.8% had infection; 30.7% need mechanical ventilation > 48 hours, and 24.2% were on vasoactive drugs. These survivors patients profiles were less severe compared to those of the whole ICU patients in these cohort. The functional health status was assessed just before ICU admission and 24 months after ICU discharge in all 215 patients. The mean Karnofsky scale was 87.99 before and 80.7 two-years latter ; the mean ADL scale was 26.92 before and 22.80 after respectively. In their own subjective self evaluation those patients younger than 70 years were 66% similar and 33% worst than their physical condition previous to the ICU admission and those elderly than 70 years 35% similar and 60% worst respectively.

CONCLUSION. Adult patients discharged from the ICU recovered from their critical illness were in reasonable functional health status in long-term evaluation.

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Poster Sessions
Long-term outcome 0817-0825

0817

MORTALITY, FUNCTIONAL STATUS AND QUALITY OF LIFE IN PATIENTS SUFFERING CRANEOENCEPHALIC TRAUMATISM AT THE TIME OF DISCHARGE FROM INTENSIVE CARE UNIT AND ONE YEAR AFTER

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INTRODUCTION. Health problems in patients with craneoencephalic traumatism (CT) have a great personal, family and social life quality repercussion. The results reported for patients with CT at the time of leaving Intensive Care Unit (UCI), are given in terms of mortality rate, but there is limited knowledge of their physical and functional status after being discharged from hospital and even less of their quality of life later on. Our working group analyze these aspects when the patient leaves the hospital and after one year out.

METHODS. We carried out a cohort study with the adult patients admitted to ICU in Hospital Carlos Haya at Málaga in the years 2003-2005 with CT. Demographic, epidemiologic and clinical pre/posthospital stay data were recorded. Validated measure scales were used GCS (Glasgow Coma Scale) GOS (Glasgow Outcome Scale), ISS (Injury Severity Score) and a life quality questionnaire PAEEC (Project for the Epidemiological Analysis of Critical Patients), considering basic physiological activities, normal daily activities and emotional state at discharge from hospital and one year after by phone contact.

RESULTS. Data from 417 patients with a mean age of 38.5±19.5 years old, 80.1% male were studied. CT was caused by a traffic accident involving motorcycle (33.8%) or automobile (23.7%). A cranial scan showed evidence of brainstem dysfunction (63%), 24% required surgery, and 57% suffered septic, respiratory or/and neurologic complications. First ISS was 27(14-38), length of stay was 5 days(2-14) , days on mechanical ventilation 5(1-10); GCS at ICU admission 7(4.5-10);GCS at ICU discharge 11(4-14); APACHE II: 16(12-22), GOS at time of hospital discharge 3(2-3); GOS one year later 4(3-5). Mortality rate intra ICU was 24.7% and was associated with a GCS < 8 (p<0.0001, OR 5.2 (CI 95% 2.7-9.9). Multivariant analysis showed as predictors of mortality in ICU the age (p<0.05), length of stay (p<0.0001), GCS at admission (p<0.028), complications (p<0.0001), tracheotomy (p<0.005), days on mechanical ventilation (p<0.0001) and APACHE II (p<0.022). One year after discharge 260 of 314 patients answered the questionnaire (82.8%): severe physiologic dysfunction, great dependence in activities of daily living and emotional disturbances were detected when leaving hospital and marked as 48.5%, 81.5% and 59.6%, while one year after it was 16.1%, 25.4% and 33.9%, respectively.

CONCLUSION. TC are caused by traffic accidents, affect young adults, show, at admission in ICU, severity parameters. Mortality in ICU is near 25%, and is associated with coma level, complications, prolonged mechanical ventilation, APACHE II, age or/and the need for a tracheotomy. One year after admission in ICU, survivors show a better GOS level and also better physiologic capacity, feeling better and more independent in their life style.

0819

INTENSIVE CARE AND LONG TERM MORTALITY AMONG CRITICALLY ILL PATIENTS: OUR PERSONAL EXPERIENCE

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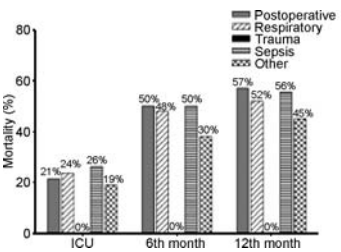
INTRODUCTION. Although ICU and hospital mortality are considered as a quality assurance tool in intensive care (1), low attention has been devoted to 6 and 12 months mortality. Aim of this study was to evaluate both ICU and long term mortality in a cohort of patients following admission to a general ICU.

METHODS. Prospective observational study of adult patients admitted to ICU who required more than 48 hours of mechanical ventilation. Data were collected from November 2004 to March 2006.

RESULTS. 101 patients (87 M) were included. Primary reasons of mechanical ventilation were: postoperative (27%), sepsis (19%), respiratory disease (ARDS, community pneumonia, hospital pneumonia, aspiration and other acute respiration failure) (27%), trauma (6%) and other cause (congestion heart failure, cardiac arrest, neuromuscular disease, liver disease) (21%). Baseline characteristics at ICU admission were: mean age 62±16 yrs, PaO2/FiO2 212±112 mmHg, PEEP 7.2±4.2 cmH2O, Mean Airway Pressure 12.5±4.8 cmH2O, SAPS 45±16, SOFA 7.8±3.6. Clinical characteristics were similar among different underlying disease groups. Mean ICU stay was 20±17 days (range 3–91 days): we did not find any difference in outcome according to the length of ICU stay (more or less than 14 days). ICU, 6 months and 12 months mortality were related to patients' age (> or <65 yrs).
Figure 1 shows ICU (23%), 6 months (44%) and 12 months (50%) mortality, according to the underlying disease at admission.



CONCLUSION. Although ICU mortality is relatively low, 6 and 12 months mortality are very high. Both ICU, 6 and 12 months mortality were not related to the underlying disease at admission.

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0820

CLINICAL PREDICTORS AND OUTCOMES FOR PATIENTS REQUIRING LONG-TERM MECHANICAL VENTILATION IN THE ICU

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INTRODUCTION. Prolonged ventilatory support in the ICU setting has a significant and growing impact on health care economics. As few as 5% to 10% of ICU patients require prolonged mechanical ventilation, and this patient group consumes ≥ 50% of ICU patient days and ICU resources. The aim of this study is to describe clinical predictors and the outcome of this patient population.

METHODS. We conducted a retrospective cohort study in order to identify independent risk factors. We reviewed data from consecutive patients requiring mechanical ventilation from April 2003 to February 2007. We have defined long term patients those in need of mechanical ventilation for a period greater than seven days (LTMV). Epidemiological data, outcome and ICU resource utilization were recorded. Apache II score was calculated (QuaTI software database, Dixtal, Brazil). Statistical analysis was performed by univariate analysis (Fisher's Exact Test, Chi-Square) followed by multivariate stepwise logistic regression.

RESULTS. There were 195 consecutive patients (106 male). The mean age was 60±19. The mean APACHE II score was 18±10. The mean LOS was 9 ± 14. The frequency of LTMV was 23% (n=44). By means of univariable analysis, risk factors for LTMV were male sex, creatinine level ≥ 1.5 mg/dl at admission, presence of organic dysfunction at admission according to APACHE II definitions, hemoglobin level ≤ 7g/dl, APACHE II ≥ 25, use of pulmonary artery catheter, dialysis therapy, enteral and parenteral nutritional support. In the multivariate analysis only use of pulmonary artery catheter (OR 8.3; CI95% 2.3-30.1, p<0.001), dialysis therapy (OR 12.7; CI95% 3.1-52.7, p<0.001) and use of enteral nutritional support (OR 40.7; CI95% 13-127.8, p<0.001) were independent predictors of LTMV. The overall ICU mortality rate was 40 %; it was 60% in patients with LTMV compared with 35% in patients without LTMV (p=0.013).

CONCLUSION. Patients requiring long-term mechanical ventilation have a higher mortality rate and use of pulmonary artery catheter, dialysis therapy and enteral nutritional support are clinical predictors. If we could precisely identify patients at risk we could implement an institutional program to act in advance and improve clinical and financial outcomes in this vulnerable population.

0821

EVALUATION OF ICU PATIENTS HEALTH REALTED QUALITY OF LIFE BY PROXIES.

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INTRODUCTION. Critically ill patients are during their ICU stay often not able to evaluate their Health Related Quality of Life (HRQoL) prior to the admission. This study is an evaluation of how accurate HRQoL assessments of ICU patients are made by proxies.

METHODS. Cohort study of 50 patients and their proxies (> 18 years) admitted to the general ICU in Haukeland University hospital in the period of 2004-2006. The proxies were asked to fill in the questionnaire SF-36, on behalf of the patient soon after ICU admission. In survivors, the patient also filled in the SF-36 when his og her cognitive function allowed it, after ICU discharge.

RESULTS. Mean age of the patients was 58 ± 17 years, 35 males and 15 females. In the eight dimensions of the SF-36 there were no significant differences between the patient answer and their proxy assessments. The differences were greater when we compared male patients with female patients and their respective proxies. There is a trend that proxy assessments of female patient are not as coherent as proxies of male patients. This is further revealed when we look at the gender of the proxies. Female proxies have a greater coherence in their assessments with their patient answers then male proxies have.

TABLE 1.

Patients aswers vs their proxies assessments using the SF-36 (n=50)

	Patients	Proxies	Delta	95% CI
General Health	75,8	69,7	6,1	-3,76 – 15,96
PhysicalFunctioning	82,1	82,3	0,2	-9,96 – 10,36
Role Physical	66,5	64,2	2,3	-14,37 – 18,97
Role Emotional	80,0	84,0	4,0	-9,92 – 17,92
Social Functioning	81,0	82,3	1,3	-9,05 – 11,65
Body Pain	74,3	68,0	6,3	-5,36 – 17,96
Vitality	57,5	55,2	2,3	-7,87 – 12,47
Mental Health	77,1	78,6	1,5	-6,96 – 9,96

CONCLUSION. In our patients there are small but insignificant differences in the assessment of HRQoL prior to the admission between the patient and his or her proxy. This allows us to use proxy evaluation of ICU patients HRQoL before ICU stay.

0822

WITHDRAWAL OF LIFE SUSTAINING THERAPY DOES NOT REDUCE LENGTH-OF-STAY IN CRITICALLY ILL LEUKEMIA PATIENTS

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INTRODUCTION. An increasing percentage of ICU deaths will follow decisions to withhold or withdraw life sustaining therapies (LST)(1). The impact of these decisions on resource utilization should be evaluated. We hypothesized that patients who had made these decisions would have a shorter LOS than patients who did not.

METHODS. We performed a retrospective chart review of all the adult critically ill leukemia patients who died in our oncological ICU between 9/01/04 to 8/31/05. An extensive chart review including nurses, pharmacy and respiratory therapy records to determine data accuracy was performed. Data collected included but were not limited to demographics, overall ICU length-of-stay (LOS), and hours until death after LST were withheld. Patients with ICU LOS <24 hours were excluded to avoid skewing the results by including patients that were admitted in a moribund state.

RESULTS. During the study period, 104 study group patients died in our ICU. The median age was 61 (19-86), 58.4% were male. Thirty-one patients (29.8%) had LST withheld or withdrawn. The overall median ICU LOS was 3.9 days (0.1-39); patients that died without discontinuation of LST had a median LOS of 2.3 days (0.1-39) while patients with LST discontinuance had a median LOS 6.3 days (0.9-24.7) (p=0.01). After exclusion of the 20 patients with ICU LOS <24 hours, the median LOS was 5.2 days (1-39) for patients (n=54) who did not undergo terminal weaning and 6.5 days (1-24.7) for those who did (n=30) (p=0.35). Time until death following initiation of terminal weaning was median 134 minutes (6-2220).

CONCLUSION. Withdrawal or withholding LST was not associated with shortening LOS in patients that survived the first 24 hours in ICU. These results seem to indicate that patient's end-of-life wishes are enforced at a very late stage in their disease process, and with no impact on their ICU resource utilization. A prospective study is necessary to further investigate the similar LOS.

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GRANT ACKNOWLEDGEMENT. George B. Sweeney, Jr. Fellowship in Critical Care

0823

ARDS IS NOT A DETERMINANT OF QUALITY OF LIFE OF SEVERE POLITRAUMA WITH THORACIC TRAUMA.

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INTRODUCTION. It was our objective to characterize thoracic trauma concerning epidemiology, baseline characteristics, ICU characteristics, mortality and quality of life at 6 months.

METHODS. All patients between 2004 and 2005 with thoracic trauma (AIS in the thorax superior or equal to one) from the prospective registry collecting epidemiological data and severity data using Trauma Severity Score System (TRISS) methodology. ICU process was evaluated retrospectively. Mortality was defined as hospital mortality. Quality of life was measured using Euroqol (EQ-5D) questionnaire at 6 months. Categorical variables were described as absolute and relative frequencies; median and percentiles were used for continuous variables. Pearson Qui Square test, and Mann-Whitney test were used for comparisons. Multiple logistic regression was performed with mortality and EQ-Index as dependent variables and background, ICU variables as independent variables. Stepwise Forward method was used.

RESULTS. 179 patients where analysed (45% of all trauma patients admitted in the same period). Median age was 41,42 years; trauma was blunt in 169 (94,4%); and road traffic accidents the main cause (67%). Median Abbreviated Injury Score (AIS) in the thorax was 3.16 (1.05), and 90% had Injury Severity Score (ISS) ≥15. In 93,7% a severe head trauma was also present. 74,3% of the patients where ventilated during 9,12 days (+/-12,431). Pleural drainage was done in 30% of patients and thoracic surgery in 3%. Main complications during ICU stay where pneumonia (25,4%) and ARDS (4,1%). Median ICU LOS was 6 days and hospital LOS was 11 days. Mortality was 34,6%.
EQ-5D at 6 months showed 31% of patients were not able to perform their usual activities and 55,2% referred depression. Median EQ Index was 68% and EQ-VAS 70%. Logistic regression for mortality showed ISS (OR:1.036; IC95%:1.004-1.069); female gender (OR:3.001; IC95%:1.065-8.455); penetrating injury (OR:1.153; IC95%:0.128 -10.360); and ARDS (OR:2.390; IC95%:0.376 -15.169) -0.651;βas independent factors. Logistic regression for EQ-Index showed age (-9.202; IC95%:-21.322; -2.917) asβIC95%:-0.967;-0.336) and ventilation (independent factors).

CONCLUSION. In this severe trauma patients with thoracic trauma, mortality was determined by the initial anatomical and physiological severity (RTS and ISS) and ARDS but those where not determinants of Quality of life.

0824

OUTCOMES OF PROLONGED MECHANICAL VENTILATION

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INTRODUCTION. Patients requiring prolonged mechanical ventilation (PMV) (>21 Days) consume enormous critical care resources and clinician time. They carry a poor short and long term prognosis. Predictors of successful weaning and outcomes will help identify patients who are likely to benefit from critical care treatment and also utilise resources more efficiently. Quantifying the incidence of patients requiring PMV in acute care hospitals will help in the assessment for the need of regional weaning centres.

METHODS. This was a retrospective observational study of patients admitted to Birmingham Heartlands Hospital Intensive Care Unit (ICU) during January 2004 to November 2006. Patients requiring mechanical ventilation were identified from ICNARC (Intensive Care National Audit,Research Centre). Information including demographics, APACHE, length of stay, and outcome were gathered. Costing per patient was calculated based on level of care and length of stay. The PMV patients were identified and further information was obtained from ICU daily charts, including co-morbidities, cardiovascular support days, renal failure, nosocomial pneumonia, albumin and anaemia days. The study aimed to look at mortality and cost implications of PMV patients, to identify risk factors for PMV, predicting factors of outcome, and factors contributing to withdrawal of treatment. Statistical tests were applied for the analysis.

RESULTS. 5%(46) of all mechanically ventilated patients required PMV. However they accounted for 24% of the total cost in bed days. ICU and hospital mortality of PMV patients were 48% and 59%. The only significant risk factor for PMV was increasing age. Age and ischaemic heart disease (IHD) were significant predictive factors of poor outcome in PMV. Trends associated with poor outcome, were more anaemia days, lower albumin, more cardiovascular support days and renal failure. In 60% of non-survivors, treatment was withdrawn. Apart from ICU length of stay there were no differences between non-survivors in whom treatment was withdrawn and continued.

CONCLUSION. PMV patients have a poor outcome and significant resource implication. The study aimed to identify predicting factors of PMV outcome, which could be useful in patient management and ICU resource allocation. We only identified predictive power with age and IHD, which is insufficient to base management decisions on. Furthermore we could not identify factors to help make decisions about withdrawal. We conclude, it is inevitable that a proportion of mechanically ventilated patients will require prolonged care. Our study identifies the need for regional weaning centres (RWC), which can accommodate these patients and help relieve bed crisis in ICU. More rehabilitative care in RWC could be more appropriate and literature shows favourable survival rates and ventilator independence rates. Also cost of care is comparably less in these centres.

0825

MORTALITY AFTER SURVIVING SEPSIS

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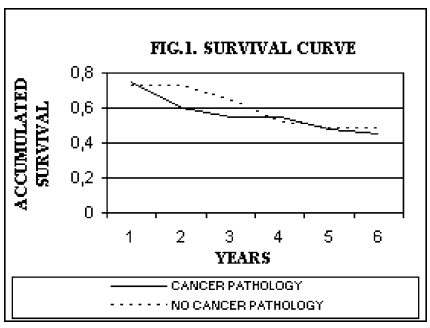
INTRODUCTION. Sepsis is the main cause of death in critical patients. Mortality fluctuates between 28 and 80%(1-3). The aim of our study is to calculate mortality rates of patients that survived from severe sepsis and septic shock within 28 days, one year and two years after discharge from our Critical Care Unit. We also studied the relationship between mortality, malignant tumour disease, the mean number of comorbidities and APACHE II score.

METHODS. We studied 78 surviving patients from our Unit between January 1999 and July 2006. Data (mortality and day of death)were picked up by phone. Age, APACHE II score, medical-surgical records, length of stay in our Unit and presence of cancer pathology were registered. Statistical analysis was carried out with SPSS v.10.0 package using $p<0.05$.

RESULTS. The mean age was 67.91±14.59 years. The mean stay in our Unit was 9.59±8.36 days and the mean score of APACHE II was 17.94±6.60. The mean number of comorbidities was 2.13±1.35. 39.5% presented some kind of malignance. After discharge from our Unit mortality within 28 days, one year and two years were 14.1%,29.5% and 38.5% respectively. Statistical significance was not found between mortality, cancer pathology (Fig.1) and the number of comorbidities. Statistical significance was found between APACHE II score and presence of cancer pathology.



CONCLUSION. Mortality two years after surviving severe sepsis and septic shock remain high and it's not correlated with tumor disease. Patients without cancer pathology have higher APACHE II scores ($p<0.05$) than those with tumor disease.

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Poster Sessions
Outreach 0826-0839

0826

MEDICALIZED EMERGENCY MEDICAL SERVICE MANAGEMENT OF ELDERLY: WHICH BENEFITS?

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INTRODUCTION. Aging is a very important cause of concern for the health care system. If age alone may be an inappropriate criterion for allocation of intensive care unit (ICU) resources, age is an important predictor of mortality. One can wonder about the relevance of early intervention of an emergency physician staffed team from the prehospital phase and possible implementation of critical care techniques. The aim of the study was to evaluate outcomes of very elderly patients managed by the French Emergency Medical Service (EMS) and characterize patients.

METHODS. We conducted a retrospective study over 18 months, including all patients aged 80 years or more managed by our physician staffed EMS department. Characteristics of patients, treatments and destination were recorded. Inhospital mortality was recorded for all transferred patients. Data are expressed as mean or percentage of patients and compared using univariate and multivariate analysis. A $p< 0.05$ was considered the threshold for significance.

RESULTS. During the study period, 933 patients presented inclusion criteria. Among the 933 patients, 124 presented a cardiac arrest: Advanced Life Support was started for 36 patients and 10 patients presented a return of spontaneous circulation on scene. A transfer to the hospital was decided for 750 patients. The destination was emergency room for 494 patients (66 %), ICU for 236 patients (31 %). Despite comparable severity score, the proportion of patients directly admitted in ICU after their prehospital management decreased with increasing age: chi2[3]= 24.0; $p < 0.001$. Inhospital survival rate was 79 % and 77 % for those directly admitted in ICU. A proportion of patients (7 %) was left on-scene, because prehospital management and activation of an out-of-hospital care network was possible (46 patients) or because withholding or withdrawal considerations (23 patients including 14 patients with very poor short-term prognosis). These patients were significantly older (89±6 vs 86±5 years), had lower initial Glasgow Coma score, were more frequently in institution and had more frequently drugs administration. Independent factors associated with maintenance on-scene were age (OR, 1.08; 95%CI, 1.03-1.13), Glasgow coma scale (OR, 1.1; 95%CI, 1.01-1.13) and place of living (OR, 2.2; 95%CI, 1.3-3.7).

CONCLUSION. The present study discloses the high rate of survival of very elderly patients after medicalized EMS management, which suggests the probable benefit of early intervention of an emergency physician in the prehospital setting. For a proportion of patients, medical team intervention allows the activation of an ambulatory network to avoid futile transfers, which integrates withholding and withdrawal considerations when appropriate.

0827

SIGNS OF IMPENDING CARDIAC ARREST ARE NOT ACTED UPON, DESPITE THE INTRODUCTION OF A SINGLE PARAMETER EARLY WARNING SYSTEM.

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INTRODUCTION. There is much evidence that in-hospital cardiac arrests are preceded by a period of deterioration of non-invasively measurable physiological parameters[1]. It is likely that earlier intervention may prevent some cardiac arrests. Single parameter alert systems are easier to use than scoring systems. We audited the use of an early warning system in patients who suffered in-hospital cardiac arrest.

METHODS. A case-note review of all in-hospital cardiac arrests over a 6 month period was undertaken, noting demographic details, co-morbidities, nature and outcome of arrest. Up to 6 sets of physiological observations in the 24 hours prior to the cardiac arrest were recorded. Details of alerts as a result of the early warning system and reviews which took place were also examined.

RESULTS. After exclusions 59 episodes on 58 patients were analysed. Three quarters of arrests took place outside normal working hours. Of these 2% survived to discharge from hospital. In hours, 14% survived to discharge. In 86% of cases initial rhythm was PEA or asystole, of which 1 patient survived to discharge. Three quarters of patients had a documented set of observations which should have triggered a medical review within 20 minutes from our Early Warning System. For 88% of these patients, the first trigger was > 1 hour before the arrest, and for a significant number, up to 20 or more hours before. There were 33% that nursing staff should have alerted medical staff to but did not. Only 53% of patients with early warning triggers were medically reviewed. Registrars were unlikely to be involved more than 12 hours prior to arrest, as the early triggers were managed by more junior staff. All juniors were as likely to instigate treatment, but any reversals of triggers were not followed up, unsuccessful or temporary at best, across all grades. None were referred to the ITU or outreach team. Of all the sets of observations in the study 58% included respiratory rate, 86% included pulse oximetry of which 80% recorded FiO2. Only 30% included urine output, very seldom per hour.

CONCLUSION. Since introducing an early warning system we have seen a fall in in-hospital cardiac arrests. However in patients who suffer cardiac arrest the early warning system is often not followed, despite being hospital protocol. There are failings at all levels of implementation of the track and trigger system, and signs of impending arrest are still poorly treated. We believe simplicity of use, early alert and sensitivity are key properties of a tool to prevent cardiac arrest and so continue to use a single parameter system rather than a more complex aggregate score such as the modified early warning system.

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0828

IMPACT OF A CRITICAL CARE FOLLOW-UP SERVICE ON OUTCOME OF ICU RE-ADMISSIONS

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INTRODUCTION. Re-admission into ICU is associated with high risk of mortality(1). Post-discharge follow-up of critical care patients may in the event of deterioration lead to more timely re-admission to ICU which may result in better outcome of patients. We therefore set out to determine whether establishment of a critical care follow-up service could be demonstrated to lead to improved outcome in patients re-admitted to ICU.

METHODS. Re-admissions in the year before and after establishment of a critical care follow-up service were compared for re-admission rate, delay to re-admission, LOD scores at admission and discharge, ICU and post-ICU mortality. In addition we compared both groups for differences in the following risk factors for post-ICU mortality:age, sex, time of discharge,type of admission and co-morbidity. Differences between groups were tested by the Student-t test for continuous variables and by the method as described by Armitage(2) for proportions. P<0.05 was considered statistically significant.

RESULTS. Complete datasets were obtained for 23 re-admissions.

TABLE 1.

	pre follow-up	post follow-up	P value
icu mortality(%)	33.3	26.9	p>0.62
post-icu mortality(%)	25	15.4	0.55
% re-admissions	4	6.4	p>0.13
delay to re-admission(d)	6.4	12.6	0.17
LOD admission	3.7	2.2	0.15
LOD discharge	2.18	1.5	0.45
age(yr)	53.9	60.5	0.40
%male sex	58.3	84.6	p>0.13
% co-morbidity	16.7	7.7	0.48
% post acute surgery	8.3	23.1	p>0.31
% night time discharge	0	7.7	p>0.31

CONCLUSION. Establishment of a critical care follow-up service led to a trend towards lower ICU and post-ICU mortality in patients re-admitted to ICU. An associated reduction in co-morbidity and severity of illness on admission and discharge may be responsible for these findings.

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0829

ASSESSMENT OF MEDICAL EMERGENCY TEAM CRITERIA IN THE EMERGENCY ROOM: ASSOCIATION WITH SUBSEQUENT INTENSIVE CARE MORBIDITY AND MORTALITY

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INTRODUCTION. The survival of patients admitted to an emergency department is determined mainly by the degree of acute illness at admission, the level and quality of the care provided and the time interval until this care is delivered. Early recognition and prompt treatment of patients at risk of further deterioration may influence the course of illness and decrease morbidity and mortality rates.

METHODS. We retrospectively analyzed 452 consecutive critically ill adult patients admitted to the emergency department from 1 January 2004 to 31 December 2004, who subsequently were referred to the ICU. Scores defined as the sum of organ failures based on the commonly used medical emergency team calling criteria within the first hour (METinitial) and throughout the stay (METmax) in the emergency department were assessed as potential predictors. Main outcome measures were need for mechanical ventilation and hemodynamic instability during the subsequent ICU stay, and hospital mortality.

RESULTS. METinital and METmax both were significant predictors of hospital mortality, the need for mechanical ventilation and hemodynamic instability (Table 1). Hospital survival ranged from 96.2% (METinitial score =0) to 11.7% (METinitial score ≥4) and from 97.7% (METmax score =0) to 13.3% (METmax score ≥4) (log rank tests p<0.0001).

TABLE 1.

	p	odds ratio	lower CI (95%)	upper CI (95%)
Hospital mortality				
METinitial	<0.0001	3.392	2.534	4.540
METmax	<0.0001	3.867	2.816	5.312
Need mech. ventil.				
METinitial	<0.0001	4.151	3.530	4.652
METmax	<0.0001	4.292	3.151	5.846
Hemodynamic instab.				
METinitial	<0.0001	1.548	1.258	1.905
METmax	<0.0001	1.685	1.355	2.094

CONCLUSION. MET scores collected early after admission or throughout the stay in the emergency department allow for simple identification of patients at risk of unfavorable outcome during the subsequent ICU stay.

0830

AN EARLY WARNING SCORE PREDICTED MORTALITY COMPARED TO OBSERVED MORTALITY

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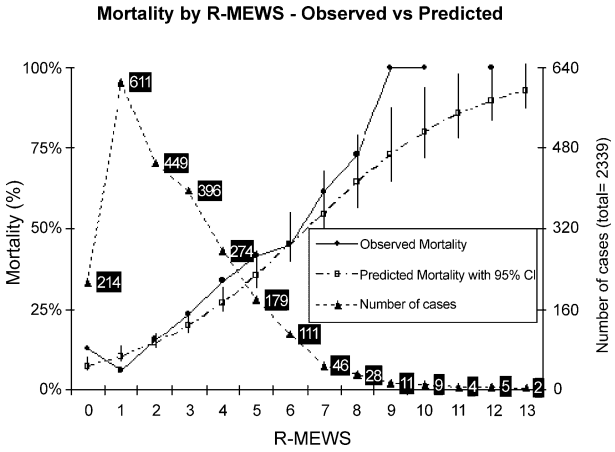
INTRODUCTION. Physiological deterioration is associated with worsened outcome.1 The Reading Early Warning Score (R-MEWS) is a track and trigger tool(range 0-15).

METHODS. The Outreach service used the R-MEWS to trigger referral. Data collected from Sept 2001 to Mar 2003 (2195 patients with 2339 episodes with re-referrals). A model predicting mortality by R-MEWS as the predictive parameter was developed using logistic regression.

RESULTS. Surgical patients made up 81%, and 29% were ICU discharges. For every 1 point increase in the R-MEWS, risk of death increased 1.53 fold (95% CI 1.45–1.61). A score of 2 to 8 showed good prediction by the model of the observed mortality. With R-MEWS of 0, there is under prediction and at a score of 1 over prediction. This despite N=214 and 611 for R-MEWS = 0 and 1 respectively.



CONCLUSION. Multiple factors influence mortality in the critically ill. However in a simple predictive model just using R-MEWS, there is an association with poor outcome and increasing score. Discrepancy at R-MEWS > 8 could be explained by a small sample size. R-MEWS of 0 and 1 suggests there may possibly be recording error, with urine output being underestimated or alternatively previous ICU admission might be a factor.

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0831

THE COST-EFFECTIVENESS OF CRITICAL CARE OUTREACH SERVICES FOR REDUCING IN-HOSPITAL MORTALITY FOLLOWING DISCHARGE FROM AN INTENSIVE CARE UNIT

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INTRODUCTION. Critical care outreach services (CCOS) were introduced in 2000 as part of the modernisation of adult critical care in England but have never been subject to cost-effectiveness analysis (CEA). We conducted a CEA comparing CCOS to no CCOS using a large, multicentre, matched-cohort analysis of patients discharged from intensive care units (ICUs).

METHODS. Fifty-two CCOS collected prospective data for one year on every patient visit. These data were linked to the Case Mix Programme, the national comparative audit of critical care, to identify patients receiving CCOS visits post-ICU discharge (cases). Each case was matched, where possible, to three controls: (1) a patient discharged from the same ICU in the year before CCOS were introduced in that hospital; (2) a patient discharged from an ICU in a hospital with no CCOS during the study period; and (3) a patient discharged from the same ICU during the study period that did not receive CCOS visits. Matching was based on: age (±10 years); severe comorbidity; reason for ICU admission; source of admission/surgical status; ICNARC physiology score (±10); length of ICU stay; and destination following ICU discharge. Hospital costs post-ICU discharge were compared for cases vs controls. For each case the number of CCOS visits post-ICU discharge were multiplied by the cost per CCOS visit, calculated as the total annual costs (predominately staffing) in each centre divided by the annual number of CCOS visits. Days in ICU following original discharge and days in hospital were costed using Healthcare Resource Groups for cases and controls. The incremental cost-effectiveness of CCOS vs no CCOS was reported as the cost per in-hospital death averted.

RESULTS. Of 5887 patients receiving CCOS visits post-ICU discharge, 1743 (30%), 4309 (73%) and 1792 (30%), respectively, successfully matched to the three pools. In matches 1 and 2, CCOS visits were associated with lower mortality (risk ratio ~0.86) and shorter post-ICU hospital stay (Δmean 2–3 days). The mean cost per CCOS visit was £115 (€169). Cases received a mean of 2.6–3.0 visits depending on matching, with an overall mean cost of £5129–£5470 (€7527–€8027). The incremental cost of CCOS vs no CCOS was -£289 (-€424), -£34 (-€50) and +£275 (+€403) for the three matches, respectively. Cost-effectiveness acceptability curves showed that for matches 1 and 2 there was a high probability that CCOS were cost-effective; this result was robust to varying costing assumptions in sensitivity analyses.

CONCLUSION. While CEA ideally use effectiveness data from randomised controlled trials, randomised studies of this established intervention are now infeasible. These results, which use appropriate methods for analysing non-randomised data, suggest that CCOS visits post-ICU discharge are associated with reduced length of stay and are cost-effective.

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0832

SCORING SYSTEM TO IDENTIFY PATIENTS FOR ADMISSIONS TO THE ICU.

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INTRODUCTION. We developed a vital sign alarmscoring system (AS) for our hospital in order to better identify critically ill patients on the ward. In a 3 month pilot we assessed the value of the score in predicting admission to the ICU. The range of AS was 0-30.

METHODS. The AS and admission to the ICU for 127 ICU consultations between October and December 2006 were analyzed and evaluated.
An AS > 8 is the trigger to consult ICU.
The AS points is a weighted score based on vital signs including Pulse, systolic BP, temperature, respiratory rate, SaO2, consciousness and blood lactate level.
Extra points are awarded for oxygen therapy and oliguria.

RESULTS. 127 ICU consultations were recorded for various medical reasons.
Eighty-one patients (64%) were treated on the ward with advice from the ICU team. 6 of these patients died, 4 with DNR orders and two with cardiac arrest. Admission to the ICU was necessary 46 patients (36 %). 12 of these patients died.
The mean AS for the patients treated on the ward was $6.7\pm$ 3.5. For patients admitted to the ICU the mean AS was 11.4 ± 4.1. Sensitivity was 89% and specificity 93%. Positive predictive value was 0.87 and negative predictive value 0.94. For the patients who died in ICU the AS was 15.4 ± 2.3.

CONCLUSION. The AS has a good sensitivity and positive predictive value to identify critically ill patients. An alarmscore might be a valuable tool for an outreach team to identify vitally compromised patients in need of early ICU consultation and possible ICU admission.

0833

PREDICTION OF HOSPITAL OUTCOME IN POST-CRITICAL CARE PATIENTS USING PATIENT AT RISK SCORING SYSTEM

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INTRODUCTION. Patient at Risk (PAR) score1 was developed by James Paget Hospital. It has traditionally been used for identifying sick patients and is based on simple nursing observations (Table 1). The aim of our study was to evaluate the ability of 'PAR' at discharge from our critical care unit to predict hospital morbidity and mortality.

METHODS. We conducted a prospective observational study on all patients discharged from our 14-bedded critical care unit to the wards between September 2006 and March 2007. Demographic data, severity of acute illness (Acute Physiology and Chronic Health Evaluation [APACHE] II), admitting speciality, primary diagnosis, systems supported while on critical care and PAR at discharge were recorded. We then followed up patients on the wards, and determined their morbidity and mortality after discharge from critical care.

RESULTS. A total of 159 patients were discharged from our critical care unit over the six-month period. Of these, 16 (10.1%) patients died prior to discharge home. Our study demonstrated that 'PAR' on discharge was superior to APACHE II in predicting morbidity and mortality (see table 2). Of note, age was also a strong influencing factor in final hospital outcome.

TABLE 1.
APACHE II score vs 'PAR' score at discharge

	APACHE 0-25	APACHE >25	PAR 0-1	PAR 2-3	PAR >3
Total	134	25	80	68	11
Survival	92.5%	76.0%	95.0%	92.6%	36.4%
Complications	47.0%	44.0%	42.5%	51.5%	45.5%
Renal Failure	10.4%	8.0%	7.5%	13.2%	9.1%
Cardiac event	4.8%	12.0%	5.0%	5.9%	9.1%
Sepsis	43.3%	32.0%	35.0%	42.6%	36.4%
GI Bleed	8.2%	8.0%	5.0%	13.2%	0%

TABLE 2.

	Conciousness	Resp. Rate	Heart Rate	Systolic BP	Temperature	Urine Output
3				< 70		0
2		< 8	< 40	71 - 80	< 35.0	< 250mls
1			41 - 50	81 - 100		250 - 500mls
0	Alert	9 - 14	51 - 100	101 - 199	35.0 - 37.9	> 500mls
1	Verbal	15 - 20	101 - 110			
2	Pain	21 - 29	111 - 130	> 200	> 38.0	
3	Unresponsive	>30	> 130			

CONCLUSION. A combination of factors may determine hospital outcome in patients discharged from critical care. Previous studies have focused on APACHE II affecting hospital outcome2. The 'PAR' scoring system is a measurable process for early identification of a sick patient1. Our study suggests that 'PAR' at discharge from the critical care unit may also be a useful tool, along with other individual patient factors (age and APACHE II), in determining hospital morbidity and mortality.

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0834

THE DIFFUSION OF INNOVATIONS THEORY AND INTENSIVE CARE MEDICINE: INTRODUCTION OF THE CRITICAL CARE RESPONSE TEAM IN ONTARIO.

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INTRODUCTION. Intensive care operational system changes develop more slowly than the initiation of new therapies. The central tenet of the "diffusion of innovations" theory is that successful adoption of new ideas follows a predictable pattern (1). An optimal combination of characteristics and practices supporting diffusion of change within an organization has been proposed - the "framework for spread" (2).

METHODS. A retrospective study of the process of development of the Ontario Critical Care Response Team Project was conducted. Analysis was performed to identify the key components, described by the Institute for Healthcare Improvement, essential for successful implementation of innovation. They are: leadership, identification of the better idea, communication, strengthening of the social system, measurement and feedback, and knowledge management.

RESULTS. A multiprofessional collaboration from the Ottawa Hospital and University Health Network outlined proposals for the CCRT pilot project in March 2004. **Leadership** at the local level and central management structure was derived. Description of the evidence base and the concept of the **"better idea"** were presented to staff and key stakeholders. A timeline was established and an agenda for the initial pilot. After review of the pilot the timeline was modified to increase the number of months of planning for the expansion of the CCRT program. During both the pilot study and expansion project monthly local feedback meetings and province-wide teleconferences provide **communication** opportunities to share awareness, technical information, discuss concerns, barriers and new ideas. This **strengthened the social system** of those adopting the new ideas and engaged all stakeholders and potential end users of the system in patient safety. Formation of a sub-committee of "champions" from within the network enabled development, **management**, and promulgation of **knowledge** to emerge as best practice. Prospective, on-line data collection and audit of outcomes improved **measurement**, **feedback**, and afforded accountability.

CONCLUSION. The framework for spread is an effective strategy for the successful diffusion of innovation in intensive care.

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0835

EMERGENCY AND CRITICAL CARE CARDIAC NETWORK: CLINICAL OUTCOME AFTER OUT-OF-HOSPITAL CARDIAC ARREST IN A PERIOD OF 6 YEARS

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INTRODUCTION. In industrialized countries out-of-hospital sudden cardiac death (SCD) is a frequent cause of death. The outcome after cardiac arrest depends on demographic and logistic factors. Survival rates remains low, despite increasing efforts in intensive medical care. To advance treatment and outcome in patients with acute cardiovascular diseases, we initiate an integrative emergency and critical care cardiac network with the emergency medical service division Freiburg and the acute cardiac care unit from the University Heart Center Freiburg.

METHODS. In this study we investigated circumstances and data from patients suffering out-of-hospital cardiac arrest to identify factors influencing outcome. We performed this retrospective study of adults in Freiburg, a midsized German city of about 300.000 people served by two physician staffed ALS services.

RESULTS. We included 675 patients with out of hospital cardiac arrests, in the years 2001-2006. From 675 patients (100%), 364 patients (54%) never achieved ROSC, 311 patients (46%) achieved ROSC and were admitted alive to a intensive care unit. 235 (76%) patients were admitted alive to our intensive care unit with assumed cardiac reasons of out of hospital cardiac arrest. In this patients first registered rhythm was in 114 (48,5%) ventricular fibrillation, 20,4% (48 patients) asystole and 36,7% (86 patients) other rhythms. 115 patients (49%) from the patients admitted to our intensive care unit were discharged alive. Significant more patients with ventricular fibrillation (68,3% vs. 25,5%) achieved ROSC and significant more patients were discharged alive (58,4% vs. 22,9%) with first registered rhythm of VF.

CONCLUSION. Demographic and logistic factors influence outcome after cardiac arrest. Higher survival rates in patients suffering from out of hospital cardiac arrest are associated with primary cardiac care. Our data show an appropriate outcome in patients after out-of-hospital cardiac arrest treated in an integrative emergency and critical cardiac care network. Noteworthy, we can find also in patients with first registered asystolic rhythm an outcome about 23%. This seems to be seeded in a very strictly organized network between first responding emergency teams and critical care unit.

0836

QUALITY OF CRITICAL CARE OUTREACH SERVICES: A COMPARISON BETWEEN TWO STAFFING MODELS

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INTRODUCTION. The Critical Care Outreach Service in United Kingdom(UK)is a multidisciplinary approach to identify patients at risk of developing critical illness and to enable early intervention or transfer to an area suitable to provide care for that patient's individual needs. As these services were developed depending on local priorities and resources[1,2],it has been traditionally staffed by trained nurses and allied health care professionals. The activity of the outreach team may improve patient survival to discharge from hospital and reduce the number of readmissions to critical care[3]. In similar lines,evidence from Australia suggested that introduction of Medical Emergency Teams (MET)reduced incidence of cardiac arrest and unplanned admission to intensive care unit(ICU)[4]. MET is usually a doctor-led service unlike outreach team. We hypothesized that a combined model will improve quality of the critical care outreach services. Hence we introduced a junior intensive care doctor to the outreach team to work full time and subsequently studied impact of this reorganization.

METHODS. Study period extended 3 months before and after the introduction of the doctor in the team. Data collected from audit database with a focus on,reason for referral, patient categories,action taken by the outreach team and final outcome. Statistical analysis done by McNemar chi-square&exact test for matched pairs and p value less than 0.05 considered significant.

RESULTS. With the introduction of a doctor in the outreach team,significant difference observed in number of patients seen within one hour after the outreach trigger($p=0.03$)and number of patients transferred to high dependency care unit(HDU, $p=0.005$)/medical wards($p=0.02$).3 referrals in the study period were felt to be inappropriate. No change observed in number of patients seen,reasons for outreach trigger,source of reference,patient categories,interventions done on site,number of patients transferred to ICU or to surgical wards. In hospital mortality didn't show any improvement where as significant difference observed in number of patients discharged alive from the hospital($p=0.01$).

CONCLUSION. Incorporating a doctor in the outreach team improves number of patients seen within one hour after the outreach trigger,identifies inappropriate referrals,facilitates early transfer to HDU and intra hospital transfer to medical ward. It also improves patient survival to the point of hospital discharge.

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0837

PHYSIOLOGICAL MONITORING IN MEDICAL INPATIENTS PRIOR TO ADMISSION TO AN INTENSIVE CARE UNIT

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INTRODUCTION. The purpose of this study was to determine the monitoring of vital signs in medical inpatients prior to ICU admission.

METHODS. A retrospective review of 44 medical patients admitted from a general ward to the ICU of general hospital between January 2001 and June 2006 was undertaken. Chart analysis was used to determine recording of vital signs in the 24 hours prior to ICU admission and reason for admission to ICU.

RESULTS. The mean age of patients was 61 years (range 24 to 86) and patients were admitted to ICU a mean of 8.5 days following hospital admission (Range 1 to 60). Recording of vital signs varied widely. Pulse rate was recorded a mean of 5.6 times, blood pressure 5.8 times, respiratory rate 2.4 times, temperature 2.4 times and urine output 1.8 times in the 24 hours prior to ICU admission. The median number of new nursing concerns and medical reviews were both 4 in the 24 hours prior to admission to ICU.. Only 10 patients had a decision regarding resuscitation noted in their chart. Reasons for admission to the ICU included cardiac 9.1%, metabolic 11.4%, neurological 22.7%, respiratory 36.4% and sepsis 11.4%.

CONCLUSION. The variation in recording of vitals signs highlights the lack of monitoring in this patient group. The variation in the recording of individual vital signs is of concern. This is particularly noted with regards to respiratory rate which has been shown to be the best independent predictor of impending cardiorespiratory arrest and was the most common reason for admission to the ICU in our study. The number of nursing concerns and medical reviews noted was not matched by an increase in monitoring thereby not allowing early detection of deterioration. We propose that education of healthcare staff in the need for close monitoring of vital signs in at risk patients and the use of techniques such as early warning scores to guide monitoring is required.

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0838

A LABORATORY BASED RISK SCORE FOR MEDICAL INTENSIVE CARE PATIENTS

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INTRODUCTION. Established general risk score models for intensive care patients incorporate several clinical and laboratory data. However, the collection and documentation of clinical data is time consuming and causes labor-related costs. Furthermore, the classification of clinical data is dependent on the experience of the examiner. Therefore, in the present study a general score for medical intensive care patients solely based on routine laboratory parameters is presented.

METHODS. In a prospective study, a laboratory score based on low cost laboratory parameters which are routinely measured at admission to the intensive care unit was developed. Parameter selection was performed by a stepwise logistic regression analysis. The 'maximum likelihood' estimate of the variables' influence on mortality provided a relative weighting for each variable. The new score was compared to two established risk models (APACHE II, SAPS II).

RESULTS. The study included 528 medical intensive care patients. The mean age was 65.4 ± 0.7 years (range, 19 to 94 years). The in-hospital mortality was 16.5% (87/528). Multiple logistic regression analysis revealed the following eight parameters with significant prognostic power: alanine aminotransferase, cholesterol, creatinine, leukocytes, sodium, thrombocytes, urea, and age. These parameters served to build the new laboratory score called Critical Risk Evaluation by Early Keys (CREEK). The correlation coefficient of CREEK for the estimated and the observed mortality was $r=0.990$. The area under curve was 0.857. At a decision criterion of 40% the overall correct classification rate was 87.3%. Linear regression analysis showed significant correlation between CREEK and APACHE II ($r=0.550$; $p<0.001$; $n=387$) and SAPS II ($r=0.516$; $p<0.001$; $n=387$), respectively. The areas under curves of the APACHE II and the SAPS II were 0.869 and 0.874, respectively.

CONCLUSION. We show that a general risk score for medical intensive care patients at admission solely based on routine laboratory parameters is feasible. The quality of risk estimation of CREEK is comparable to established risk models. Furthermore, this new CREEK score is based on quality controlled low-cost laboratory parameters which are routinely measured at admission to the intensive care unit. Therefore, no additional costs are involved.

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0839

COMPARISON OF A SINGLE PARAMETER EARLY WARNING SYSTEM (SOUTHEND EWS) WITH THE MODIFIED EARLY WARNING SCORE

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INTRODUCTION. Different types of early warning system are in use, with a common goal to warn of developing critical illness, and ensure timely therapy where indicated. Divided into single parameter trigger and weighted aggregate scoring systems, there is no clear evidence of superiority of one approach over another, but scope for further investigation.

METHODS. A retrospective audit was undertaken of a single parameter early warning system in patients who went on to have a cardiac arrest. Physiological observations recorded in the 24 hours pre-arrest were collected and analysed by the single parameter trigger system and a widely used aggregate weighted scoring system, the Modified Early Warning Score.

RESULTS. After exclusions, 64 episodes on 62 patients were included comprising 245 sets of observations. 84 sets of observations and 26 patients triggered Southend EWS without triggering MEWS. 3 sets of observations and 2 patients triggered the MEWS system but not the Southend EWS. Average lead time provided by SEWS was 14.5 hours and for MEWS was 11.6. The numbers of triggers per patient were 2.9 and 2.1 respectively. Urine output, where measured (30%), was rarely hourly thus a calculation had to be made of the average over time. Thus we have compared calculations with and without urine output. Within this context, it added sensitivity and consistency to MEWS, reducing the number of patients who triggered only SEWS and not MEWS to 22. However, the number of patients triggering MEWS but not SEWS was unchanged.

TABLE 1.

Triggers per patient SEWS / MEWS	**0**	**1**	**2**	**3 or more**
0	14	11	8	7
1	1	2	4	4
2	1			2
3 or more				8

CONCLUSION. The retrospective nature of this study demonstrates the incomplete nature of observation keeping at typical Level 0 care. It is likely that this is representative. The comparison of the 2 systems suggests increased sensitivity of the Southend EWS over MEWS, triggering more often and providing more lead time in those patients who trigger. It also triggers more consistently as illness progresses. Increased sensitivity of the single parameter system may compensate for incomplete observation keeping, which lets down a weighted aggregate system, whose components are inconsistently recorded by nursing staff. Scoring system validation thus far has taken place at a higher level of observation keeping, for which it may be more appropriate. We suggest the clearly greater sensitivity of the Southend Early Warning System makes it more appropriate for Level 0 care[1] than the commonly used MEWS which may be more suitable for better staffed areas.

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Poster Sessions
Oxidative stress and nutrition 0840-0846

0840

EXAMINATION OF THE EFFECT OF PARENTERAL GLUTAMINE ON INFLAMMATORY RESPONSE AFTER OESOPHAGECTOMY

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INTRODUCTION. After surgical procedures, glutamine levels have been shown to decrease which may be related to the intensity of systematic inflammation. We examined the effect of exogeneous glutamine on postoperative inflammatory response after oesophagectomy in cancer patients.

METHODS. 35 patients were studied in this prospective clinical trial. After randomisation patients were administered glutamine 0.5 g kg^{-1} day^{-1} (Group 1, n=15) or placebo (Group 2, n=20) three days pre- and seven days postoperatively. We examined the level of prealbumin, retinol binding protein, C-reactive protein (CRP), procalcitonin (PCT), interleukines (IL-6, IL-8), tumour necrosis factor alpha (TNF-α) and lymphocyte count preoperatively (t0), immediatly after the operation (tp) and on the first (t1), second (t2) and seventh (t7) postoperative day. Statistical analysis was made with Mann-Whitney U-test, SPSS package ($p<0.05$). Data are shown in median (minimum-maximum).

RESULTS. The level of prealbumin and retinol binding protein showed decreasing tendency postoperatively, but there was no significant difference between the two groups at any measuring point. The level of TNF-α increased gradually between the first and seventh postoperative days, no significant difference was found between the two groups. The level of IL-6 increased postoperatively in both groups (t0: 4,0 (2,0-10,3) vs. 4,7 (2,0-185) ng mL^{-1} p=0,54; tp: 171 (2,3-1670) vs. 412 (154-691) ng mL^{-1} p=0,06) its value was higher in Group 1. At the other measuring points IL-6 level decreased gradually in both groups. Alteration of CRP and PCT levels showed already known kinetics, we found no significant differences between the two groups.

CONCLUSION. The above results show that perioperative parenterallyadministered glutamine did not decrease postoperative inflammatory response.

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0841

PIVOTAL ROLE OF GLUTATHIONE DEPLETION IN PLASMA-INDUCED ENDOTHELIAL OXIDATIVE STRESS DURING SEPSIS

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INTRODUCTION. Plasma from septic shock patients has the capacity to induce in vitro reactive oxygen species (ROS) production by Human Umbilical Vein Endothelial Cells (HUVEC). The resulting cellular cytotoxicity and antioxidant defenses against ROS have not yet been studied. This study tests plasma cytotoxicity and antioxidant defenses of HUVEC exposed to plasma from septic shock patients compared with healthy volunteers.

METHODS. Patients meeting the criteria of septic shock were included in this study. Blood samples were collected within 24 hours of septic shock diagnosis. HUVEC production of superoxide anion, nitric oxide and hydrogen peroxide was studied by spectrofluorimetry using dihydroethidium, diaminofluorescein diacetate (DAF2-DA) and 2',7'-dichlorodihydrofluorescein diacetate (2',7'-DCFH) fluorescent dyes, respectively. Intracellular glutathione levels were assessed by the monochlorobimane fluorecent dye. HUVEC Catalase and SOD activity were also assessed, and cell mortality was assessed using the YOPRO fluorescent dye and MTT assay.

RESULTS. Blood samples were collected from 21 septic shock adult patients and 10 healthy volunteers. The mean patient age was 58 years old, the mean SOFA score on admission was 12, the mean SAPS II was 53 and the mortality rate was 47%. Plasma from septic shock patients induced a significant increase in ROS production and cell death. ROS production and cell death was significantly reduced when cells were pre-treated with N-acetylcysteine or glutathione. Evaluation of HUVEC antioxidant defenses showed a significantly decreased glutathione level, increased catalase activity and no change in SOD activity.

CONCLUSION. Septic shock patient plasma has an in vitro cytotoxic effect on HUVEC. This toxicity is mediated by ROS production which leads to a decrease in glutathione antioxidant defenses.

0842

SYSTEMIC MORPHINE PRE-TREATMENT REDUCES OXIDATIVE STRESS IN THE GUT OF RATS SUBJECTED TO HAEMORRHAGIC SHOCK.

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INTRODUCTION. Haemorrhagic shock (H/S) is associated with overproduction of reactive oxygen species (ROS). Systemic administration of morphine in animal models of ischemia–reperfusion injury has been shown to decrease oxidative stress (OS) in the heart (1), whereas others showed increased oxidative burden in the immune system, kidneys and liver (2). The aim of this study was to investigate the effect of morphine pre-treatment as part of a sedation scheme in the ICU on OS in the gut after H/S, using both indirect and direct methods for the determination of OS.

METHODS. This study was carried out in 24 Wistar male rats, divided in four experimental groups (n=6): sham, H/S and 2 morphine pre-treatment groups: sham-M and H/S-M. In sham-M and H/S-M preservative-free morphine was injected subcutaneously (10mg/kg twice daily for two days), while a last dose was given one hour before the start of the experiment. Under anaesthesia (ketamine, midazolam), blood was removed to a mean arterial pressure of 30 mmHg for 60min, after which the rats were resuscitated by re-infusion of the removed shed blood volume. Three hours later, a segment of the ileum was harvested for determination of the production of organic hydroperoxides (O-HP, indirect method) and superoxide radical (SO-R, direct method). Statistical analysis was performed using ANOVA.

RESULTS. The production of both O-HP and SO-R was increased in the H/S group compared to the sham group ($P< 0.001$, Table 1). Additionally, H/S-M animals showed statistically significant reduction in the production of both O-HP and SO-R as compared to H/S group ($P<0.001$, Table 1).

Group	**Organic Hydroperoxides (nmoles/mg tissue protein)**	**Superoxide Radical (fmoles/min/mg tissue protein)**
Sham	0.0356 ± 0.005	0.8 ± 0.068
H/S	0.0697 ± 0.011 *	1.23 ± 0.1 *
Sham- M	0.031 ± 0.005	0.785 ± 0.09
H/S- M	0.03 ± 0.004 **	0.795 ± 0.073**

** P< 0.001 compared to Sham, ** P< 0.001 compared to H/S, n=6 in each group.*

CONCLUSION. Morphine reduces the oxidative stress in the gut after H/S measured using both direct and indirect methods. This might be important, since the gut is considered a critical organ in the development of multiple organ dysfunction syndrome (MODS), especially in patients after trauma and severe blood loss. The generation of ROS seems to play a pivotal role in ischemia – reperfusion injury, leading to dysfunction of the gut barrier, bacterial translocation and subsequent development of late MODS.

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0843

REACTIVE OXYGEN METABOLITES (ROMS) AND PLASMATIC THIOLIC GROUPS (SH): WHAT IS THEIR DIAGNOSTIC ROLE? EVALUATION IN A GROUP OF PATIENTS WITH SEVERE SEPSIS.

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INTRODUCTION. Extracellular balance of redox state is the result between the intensity of intra- and extracellular oxidative reactions and the amount of reduced substrates available. The evaluation of reactive oxygen metabolites (ROMs) and free thiolic groups (SH) could give some potentially helpful information, even if aspecific, to characterize the degree of diseases in which a change of the redox state is suspected. In this abstract we report the values of plasmatic ROMs and SH in a group of patients with severe sepsis to screen significant variations compared to less illness diseases.

METHODS. Twenty patients with severe sepsis and twenty control cases were included in this study. ROMs and SH groups were assayed in plasma by spectrophotometric methods applied to a automatic instrument (OLYMPUS AU400).

RESULTS. ROMs levels (patients vs controls) is 238 ± 80 U. Carr vs 264 ± 67 U. Carr ($p>0.05$), SH levels is 192 ± 55 μmoles/L vs 364 ± 77 μmoli/L ($p<0.001$); SH content in relation to protein content is 4.4 ± 1.0 μmoles/g vs 5.6 ± 1.0 μmoli/g respectly ($p<0.001$). The analysis of correlation between ROMs and SH shows a significant positive correlation in the controls group ($r2= 0.23$; $p<0.001$) but not in the patients group.

CONCLUSION. These results suggest that: 1) The patients with severe sepsis seem to have a pronounced reduction of SH groups expressed both as plasma concentration (μmoles/L) and as μmoles per protein unit. 2) The main factor of low plasma SH groups is not the oxidative stress but the low protein plasma concentration. 3) In patients with very low values of plasma SH, the ROMs production doesn't depend on SH groups but could be function of the oxidative stress intensity. 4) The complexity of the relationship between ROMs and SH makes the clinical use of ROMs evaluation rather problematic.

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0844

STATINS DOWNREGULATE THE CONSTITUTIVE EXPRESSION OF HLA-DR ON MONOCYTES

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INTRODUCTION. Statins may exhibit beneficial properties in sepsis [1]. Apart from mere cholesterol-lowering effects, immunomodulatory action may be involved. The major histocompatibility complex class II (e.g. HLA DR) is necessary for monocyte antigen presenting function. Since a lack of HLA-DR inhibits monocyte activity [2], the aim of our study was to investigate the influence of statins on the constitutive expression of monocyte HLA-DR.

METHODS. Monocytes from healthy donors were obtained after informed consent. Alternatively, the monocyte cell line Mono Mac 6 (MM6) was employed. Cells were incubated in the presence of the HMG-CoA inhibitors simvastatin, mevastatin, pravastatin, lovastatin and fluvastatin. For some experiments the intermediate mevalonate was used to overcome the inhibition of the mevalonate pathway. Using flow cytometry the expression of HLA-ABC (MHC I) and HLA-DR (MHC II) were analyzed. To explore possible mechanisms the expression of CD74 (invariant chain), cathepsin S, Interleukin-10 (IL-10), IL-10 receptor, annexin V and active caspase 3 were measured. Statistical significance was tested using ANOVA (n=3-6).

RESULTS. HLA-DR on monocytes was downregulated by simvastatin starting at a concentration of 500 nM (-13.51±4.02%, $p<0.05$) with increasing potency until 20 μM (-26.86±8.35 %, $p<0.01$). All tested statins were able to decrease HLA-DR expression ($p<0.05$). In contrast, MCH I was not regulated by statins. In the presence of mevalonate, simvastatin showed no effect. Analyzing possible mechanism for HLA-DR downregulation, it was observed that HLA-DR was decreased in apoptotic cells and that statins induce apoptosis. However, HLA-DR was also homogeneously decreased in the non-apoptotic population after statin exposure. Statins did not regulate intracellular IL-10 production or the IL-10 receptor in MM6. Furthermore, cathepsin S, which is involved in the maturation of HLA-DR, was not altered. Instead, the HLA-DR chaperone CD74 was markedly downregulated by statins (MFI 122.71±4.16 vs. control 163.70±1.52, $p<0.01$).

CONCLUSION. Statins regulate the constitutive expression of HLA-DR in monocytes by a HMG-CoA dependent mechanism. Probably, the intracellular downregulation of the HLA-DR chaperone CD74 is involved. The regulation of HLA-DR underlines the immunomodulatory action of statins.

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0845

MYELOPEROXIDASE- CERULOPLASMIN INTERACTION: AN OPPORTUNITY TO MODULATE NEUTROPHIL MEDIATED REDOX IMBALANCE, SIRS AND ITS SEQUELAE

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INTRODUCTION. SIRS affects 50-80% of ICU patients and is associated with organ dysfunction resulting in significant morbidity and mortality. SIRS is seen in association with a variety of non-infective insults, including surgery necessitating cardiopulmonary bypass (CPB). Data from our institution indicate that 90% of 1200 sequential cardiac ICU admissions fulfil SIRS criteria. Prooxidant mediators are released as a consequence of CPB including myeloperoxidase (MPO)-generated hypochlorous acid (HOCl). HOCl is a strong oxidant and the major end product of the neutrophil respiratory burst. At high concentrations it not only mediates molecular damage, but also affects cellular signalling mechanisms. Ceruloplasmin (CP) is an acute phase protein with antioxidant capacity, whose properties include a binding affinity for MPO, resulting in modulation of its enzymatic function and hence HOCl production. This study aims to investigate the interaction between MPO and CP, thus exploring the potential for CP as an antiinflammatory therapeutic intervention by using CPB as a model of SIRS.

METHODS. a)MPO-CP binding and complex formation measured by immunoprecipitation (IP) / gel chromatography (GC) in control, MPO, MPO-CP, CP solutions. Non-denaturing WB was performed on patient plasma. b)Inhibition of MPO enzymatic activity by CP: determined by oxidation of TMB, A652. c)Changes in plasma MPO and CP post-CPB. Assays: protein (Bradford), MPO (ELISA), CP (immunodiffusion).

RESULTS. a)WB of MPO-CP IP (n=3) was positive for MPO when using anti-CP antibody and vice versa, demonstrating MPO-CP binding. GC(n=4) demonstrated 3 distinct curves for MPO, CP and MPO-CP. The absorbance peak in the MPO-CP curve, tested positively for MPO and CP protein, whereas the MPO and CP curves were negative at this elution volume with corresponding diminished absorbance peaks. GC confirms MPO-CP complex of a MW greater than MPO or CP. A 270kDa band was seen on respective non denaturing WB (n=4), consistent with the MW of MPO+CP, demonstrating complex formation. b)MPO activity inhibition by CP (n=5), ratio MPO:CP 1:10-300 ($p<0.0001$,max inhibition 80%). c)MPO levels rise by 183% (SEM25.5%,$p<0.0001$) 2hrs post-CPB and are sustained to 72hrs. CP levels decrease by 35.8% (SEM1.9%,$p<0.0001$) at 2hrs post-CPB, not reaching pre-operative levels until 48hrs, demonstrating an imbalance in plasma levels between these proteins (n=52).

CONCLUSION. This study confirms MPO-CP binding by IP in vitro, complex formation by GC (in vitro), and non-denaturing WB (ex-vivo), demonstrated for the first time in SIRS patients. MPO activity is significantly decreased by CP, in a dose dependent manner in vitro. Plasma levels post-CPB of MPO significantly increase, whereas CP significantly decease. This imbalance is likely to be associated with decreased MPO-CP binding interaction, hence promoting prooxidant (HOCl) stress. Further work is required to determine if exogenous CP can modulate SIRS by decreasing MPO activity.

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0846

IMMUNOMODULATORY EFFECT OF CVVH DURING SEPSIS: PRELIMINARY DATA

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INTRODUCTION. High TNF-a and IL-6 levels, characterize patients suffering severe sepsis at higher risk of multiple organ-failure (MOF). Continuous veno-venous haemofiltration (CVVH) may well candidate as a potent immunomodulator treatment of ongoing sepsis. Aim of the present observational prospect study is evaluating the immunomodulatory effect of high flux CVVH in sepsis.

METHODS. High flux (4L/hr) CVVH was carried out in 5 patients suffering severe sepsis with Acute Renal Failure. Blood samples were obtained before the beginning of CVVH (T0), and after 12, 24, 48, and 72 hours (T1-4). Total RNA was extracted from mononuclear cells (PBMCs) after 24 hours incubation followed by cell lysis. IL-6 gene expression was measured using real-time PCR. Moreover, SAPS 3 and daily SOFA were measured for each patient.

RESULTS. Table 1 shows the results of real-time PCR analysis on blood samples. In four out of five patients transcriptional activity behavior is similar, i.e. IL-6 mRNA is present in high amounts before filtration (T0), it drastically reduces after 12 hours treatment, and progressively increases at 24, 48, and 72 hours. On the other hand, sample from N4 patient shows a different behavior. Transcriptional activity of IL-6 seems only to progressively reduce.
Table 2 shows clinical data, SAPS 3 and daily SOFA for each patient. Transcriptional activity of IL-6 does not appear to be related neither to clinical data nor to outcome of the patients.

TABLE 1.

IL-6 gene expression

Patient	T0	T1	T2	T3	T4
N1	3,5	1	3.6	5.15	6.7
N2	3	1.9	3.1	4.8	7
N3	4,6	2.8	3.9	5	6.2
N4	12	10.4	10	-	-
N5	9.8	8.5	10.3	11.6	-

TABLE 2.

clinical data

Patient	Saps3	Sofa0	Sofa1	Sofa2	Sofa3	Sofa4	Outcome
N1	55 (26%)	6	6	7	7	8	dead
N2	27 (1%)	9	10	10	8	9	dead
N3	75 (66%)	11	9	9	11	10	dead
N4	56 (28%)	12	13	13	stop cvvh		dead
N5	47(13%)	15	12	12	13	stop cvvh	discharged

CONCLUSION. Our preliminary data show that the transcriptional activity of an inflammatory cytokyne such as IL-6 does not significantly decrease during CVVH. This is likely due to the removal of cytokine from plasma, and subsequent up regulation of gene transcription. This would mean that there is no immunomodulatory positive effect of CVVH in septic patients.

0358

EARLY NASO-GASTRIC ENTERAL FEEDING IMPROVES SURVIVAL OF MECHANICALLY VENTILATED ICU PATIENTS

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INTRODUCTION. To determine safety and impact on outcome of early naso-gastric enteral nutrition (EN) in ICU patients under mechanical ventilation (MV).

METHODS. PROKINE study population (1) was divided into 2 groups according to the delay between ICU admission and beginning of EN through a naso-gastric tube (NGT) : early group (≤24 h) and late group (>24 h). Feeding goal was 30 kcal/kg of theoretical body weight, no starter regimen was used. A positive quantitative bronchial sample culture was mandatory for diagnosis of ventilator associated pneumonia (VAP).

RESULTS. 400 patients (pts) under MV (men 58%, age 61±16 years, SAPS II 49±19) were included in 7 centres. EN was started early in 145 pts (mean 0.7±0.4d) and late in 255 pts (mean 4.2±3.3d). The 2 groups did not differ on admission (age, sex, SAPS II 50±18 vs 49±19 p=0.89). At beginning of EN, early group had a higher SAPS II (47±18 vs 44±14, p=0.049). Risk factors for digestive intolerance (2) did not differ between groups neither at beginning nor during EN (opioids, sedatives, paralytic agents, catecholamines, procubitus, gastric aspirate volume (GAV) before EN). Mean daily prescribed caloric intake through NGT did not differ between groups (28±6 vs 27±6 kcal/kg). Minimum daily delivered/prescribed caloric intake was higher in early group (61±31% vs 54±31%, p=0.03) and mean daily delivered/prescribed caloric intake did not differ (86±18% vs 84±17%, p=0.16). In early group, fewer pts had a GAV exceeding 100 ml (65% vs 76%, p=0.01) and exceeding 500 ml (17% vs 27%, p=0.03), maximum measured GAV was smaller (257±231 ml vs 335±256 ml, $p<0.003$). Frequency of vomiting did not differ between groups (28% vs 35%, p=0.13). In early group, need for parenteral nutrition was less frequent (26% vs 40%, p=0.004). Frequency of VAP did not differ between groups (25% vs 25%). In early group, mean ODIN score during ICU stay was lower (2.1±0.9 vs 2.3±1.0, p=0.049), length of MV was shorter (14d±14 vs 19d±18, p=0.005), ICU mortality (27% vs 39%, p=0.016) and hospital mortality (32% vs 46%, p=0.005) were lower. Early EN remained associated with lower ICU and hospital death rates in multivariate analysis even after adjustment on admission SAPS II and maximum ODIN score during ICU stay.

CONCLUSION. Early EN (≤24 h after ICU admission) through a NGT was feasible and well tolerated in a large cohort of mechanically ventilated ICU patients. It was associated with lower morbidity and mortality.

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Coagulation disorders in sepsis 0847-0854

0847

ENDOTHELIAL CELL APOPTOSIS THROUGH PLATELET-DERIVED EXOSOME PEROXYNITRITE GENERATION

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INTRODUCTION. Although diverse studies have shown that in sepsis hematological dysfunction can be closely related to severity, the role of platelets in the pathophysiology of sepsis is not clear. In previous work we demonstrated that platelet derived microparticles (MP) can induce vascular cell apoptosis in septic patients through NADPH oxidase-dependent superoxide release. In this work we sought to further characterize this MP-dependent vascular injury pathway.

METHODS. Septic shock is a condition related to the generation of thrombin, TNF-α and nitrogen reactive species. Human platelets were exposed to the NO donor diethylamine-NONOate (NONO, 0.5μM), LPS (100 ng/ml), TNF-α 40 ng/ml, thrombin (5 IU/ml) for 1h. MP were recovered through filtration and ultracentrifugation and analyzed by electron microscopy, flow cytometry or western blot for protein identification. Redox activity was characterized by lucigenin (5μM) or coelenterazine (5μM) luminescence and 4,5-diaminofluorescein (10mM) and 2',7'-dichlorofluorescein (10mM) fluorescence. Endothelial cell apoptosis was detected by phosphatidylserine exposure and by ELISA caspase-3 activity measurement.

RESULTS. Size, morphology, high exposure of the tetraspanin CD9, CD63, CD81 together with low phosphatidylserine, characterized the MP from septic patients and those recovered from platelets exposed to NONO and LPS as exosomes. Exposure of those exosomes to the fluorescence and luminescent probes caused two to four-fold increases in signals, which were >50% reduced by a superoxide dismutase mimetic, by NO synthase inhibitors, and by the specific NADPH oxidase inhibitor gp91ds-tat. Together, these data revealed concomitant superoxide and nitric oxide generation. Confirmatory western blots showed presence of NO synthase II (but not of isoforms I and III) and of the NADPH oxidase subunits p22phox, PDI and Nox. Endothelial cells exposed to the exosomes underwent apoptosis and caspase-3 activation (2-fold increase from basal values). Both were reduced by 50% by the NO synthase inhibitors or by the superoxide dismutase mimetic, and were totally blocked by urate (1mM), suggesting that the peroxynitrite radical is the responsible species for those effects. Interestingly, none of these redox properties could be demonstrated for microparticles recovered from platelets exposed to thrombin or TNF-α.

CONCLUSION. We showed that, in sepsis, NO and bacterial elements are responsible for type-specific platelet-derived exosome generation. Those exosomes play active role in vascular signaling as redox active particles, which can induce endothelial cell caspase-3 activation and apoptosis by superoxide, nitric oxide and peroxynitrite radicals generation. In this context, exosomes must be considered for further developments in comprehension and treatment of vascular dysfunction in sepsis.

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0848

FRACTIONAL SYNTHESIS RATES OF INDIVIDUAL HEPATIC PROTEINS IN MURINE SEPTIC SHOCK

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INTRODUCTION. An abundance of hepatic proteins is involved in 'housekeeping' processes like protein folding/refolding, redox balance and energy metabolism. These proteins can be easily analysed with proteomic tools like 2D-gel electrophoresis and mass spectrometry. This study explores whether the fractional synthesis rate (FSR) of these proteins is affected by a septic challenge, and whether the different response patterns could be assigned to common stimulating factors like hypermetabolism or oxidative stress.

METHODS. 2 controls without surgery, 5 sham operated and 6 animals subjected to cecal ligation and puncture received continuous i.v. labelled 1,2,3,4,5,6-13C6- glucose (2mg/gxhr) over 8 hours. This provides an estimate of hepatic glucose production (HPG) but also labels all non essential hepatic amino acids. These amino acids are incorporated into hepatic proteins during their de novo synthesis. Hepatic proteins were separated by 2D-Page gel electrophoresis, and their labelling was quantified by Maldi-TOF mass spectrometry to calculate the FSR (1). The patterns of FSR values for 8 proteins and HPG were analysed by factor analysis.

RESULTS. The average FSR over all proteins showed the same response pattern as HPG: Sham- operated values were higher than both controls and septic values. Factor analysis revealed two prominent and one less significant factor, that were responsible for more than 80% of the variability in the FSR rates. One prominent factor can be assigned to a 'hypermetabolic' axis, with key responders being HPG and the ferritin-light chain protein, which typically is stimulated by inflammation. The second prominent factor pertains to 'redox-metabolism' with the proteins 6-phosphoglucolactonase (NADPH generation) and PDI-precursor (repair of protein disulfide-bridges) as key markers. A third axis, with heat shock protein 5 as key marker, can be assigned to general repair activity.

CONCLUSION. One key factor driving the synthesis of hepatic proteins in sham-operated and septic animals appears to be a general stimulus for hypermetabolism. The second important factor, - disulfide-repair and NADPH generation - may serve as a marker for oxidative stress, as NADPH generation is needed for both ROS generation and detoxification. Factor analysis provides a typical response pattern for the activity of these two factors, and, hence, the basis to assess hypermetabolism and oxidative stress.

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0849

MARKERS OF ENDOTELIAL ACTIVATION AND COAGULATION IN PATIENTSWITH SEPSIS.

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INTRODUCTION. Early identification and treatment of sepsis can improve outcome. Multiple Organic Disfunction Syndrome (MODS) is associated with mortality in relation to the number of organic failures that are present at the first 24 hours. Many markers of endotelial damage have been tested in order to predict outome in patients with sepsis and septic shock. It has been demonstrated that antithrombin III levels have a prognostic value.

METHODS. From september 2006 to march 2007, 31 patients with sepsis or suspected sepsis were admited in the ICU. All patients were treated acording to the early goals in sepsis proposed by Rivers et al. Organ Failure Assessment (SOFA), APACHE II scale and SAPS II scale were calculated. Coagulation tests, platelets, procalcitonin and C reactive protein were measured at admission and at 24 hours. For statistical analysis patients were divided in two groups acording to procalcitonin with a cut level of 3. Statistical tests assessed two-tailed significance with type I error of 5%.

RESULTS. The baseline characteristics between the groups were balanced. Twenty patiens had a procalcitonin level of 2.9 or less and ten patiens had more than 3. Prothrombin time, partial thromboplastin time, thrombin time, fibrinogen, D-Dimer, fibrin degradation products, leucocites and platelets were similar in both groups. Only Antithrombin III (AT III) levels were related to the procalcitonin value. No differences were noted between surgical and medical patients.

	Procalcitonin less than 3	Procalcitonin more than 3	p
PCR	11.3±7.8	17.7±11.7	0.085
TP	15.57±4.4	16.0±4.6	0.783
TTP	33.8±15.4	33.5±9.8	0.953
TT	26.6±52.6	14.0±2.0	0.437
Fib	502.9±198.5	494.8±219.9	0.918
AT III	56.3±16	42.2±20.9	0.043
DD	3988±6354	4005±2458	0.993
PDF	12.4±14.4	16.5±11.3	0.416
Plasm	84.9±28.4	91.3±37.6	0.601
Leucos	12635+6793	8481+6498	0.109
Platelets	291.5±216.4	183±126.7	0.140
APACHE II	11.9±7.6	14±8.5	0.479
SOFA	6.3±4	8.6±4.4	0.146
SAPS II	19.9±16.7	28.8±18.2	0.179
Age	59±19.7	56±18.2	0.681

CONCLUSION. Patients with SIRS caused by sepsis have a greater endothelial activation evaluated indirectly by AT III in comparison with SIRS of non-infection origin.

0850

CHANGES IN HEMODINAMIC PARAMETERS AND ORGAN DYSFUNCTION IN RED BLOOD CELL TRANSFUSED SEPTIC PATIENTS.

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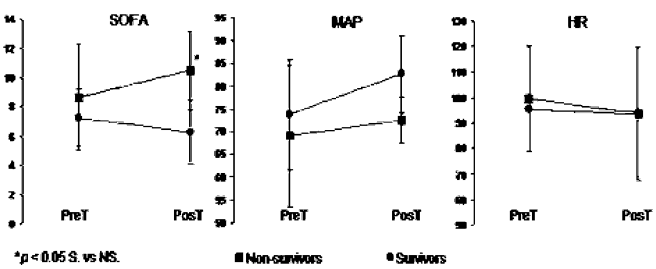
INTRODUCTION. In septic patients the red blood cell (RBC) transfusion has been associated with a mortality increase, although there are some concerns about this issue. Changes in hemodynamics and/or trends in organ dysfunction post-transfusion may help to predict ICU outcome.
Objective: To assess pre- and post-RBC transfusion changes in mean arterial pressure (MAP), heart rate (HR) and Sequential Organ Failure Assessment (SOFA) score and to relate them with outcome.

METHODS. We studied prospectively septic patients admitted in ICU that received RBC transfusion between 08/01/2006 and 02/28/2007. We excluded patients with active haemorrhage. MAP, HR and SOFA were recorded prior to red blood cell transfusion and 24 hours later. We calculated descriptive statistics and t-tests to compare survivors and non-survivors.

RESULTS. We studied 21 patients. Mean age was 65 ± 11 years and mean APACHE II was 20.5 ± 4. ICU mortality was 33%. The pre-transfusion hemoglobin was 7.39 ± 1.1 and the post-transfusion hemoglobin was 9.4 ± 1.7. There were no significant differences between survivors and non-survivors. The SOFA post-transfusion decreased in survivors but increased in patients who died in ICU (Δ SOFA -1 ± 1.3 vs 1.8 ± 1.9 $p < 0.05$). In both groups MAP increased and HR decreased after transfusion.



CONCLUSION. The post-transfusion increase in SOFA, despite an improvement in MAP and HR, could be an indicator to detect patients with worse evolution.

0851

COAGULATION PROFILE OF SEPTIC PATIENTS UNDER REAL TIME MONITORING BY THROMBOELASTOGRAPHY (TEG)

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INTRODUCTION. Sepsis treatment with natural coagulation inhibitors needs the real time monitoring of the coagulation system. It is not always possible to detect it by routine coagulation tests. The thromboelastography (TEG) is a reliable method to evaluate hypercoagulability and to monitor hemorrhagic events. Activated protein C (aPC) is administered in severe sepsis and some Authors have demostrated that Antithrombin III (AT) in plasma of septic patients is decreased. The present study investigates the coagulation profile of septic patients with significant coagulation alterations before and during substitutive treatment with AT and aPC.

METHODS. Patients with severe sepsis (n=18) were assigned to receive AT as a bolus infusion after admission to maintain daily levels between 120% and 140%. They were also assigned to receive a 4 days treatment with aPC (24 mcg/Kg/h) within 48 hours. TEG, platelet count, plasma fibrinogen levels, prothrombin time and activated partial thromboplastin time were assessed at baseline and daily during therapy for 14 days. D-dimer, TAT, FDP, Fibrinogen, t-PA, PAI-1 were registered during the aPC treatment and 3, 7 and 14 days after.

RESULTS. TEG showed a hypercoagulability in both groups at baseline, which was reversed during treatment with ATIII (reaction time prolonged more than 15% – Maximum Amplitude reduced more than 20%). The hypercoagulability was mainly modulated during the aPC treatment with a significant changes in Ly30 (more than 30%- p<.01). Similar changes were not registered by the prothrombin time and activated partial thromboplastin time and were detected only by the full study of procoagulant and fibrinolytic pathway. No hemorrhagic events were registered during and after the treatment (28 days).

CONCLUSION. These findings confirm the role of TEG monitoring in septic patients. Therefore a real time monitoring is useful to state the hypercoagulation and/or the hypocoagulation status of septic patients, specially during treatment with coagulation inhibitors.

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0852

HEMODYNAMIC EFFECTS OF RECOMBINANT HUMAN ACTIVATED PROTEIN C IN SEPTIC SHOCK PATIENTS

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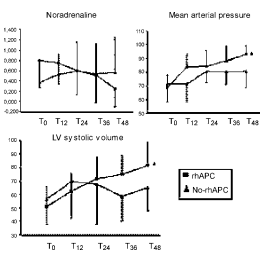
INTRODUCTION. Recombinant human activated protein C (rhAPC) has been demonstrated to reduce the mortality rate of adult patients with severe sepsis (1). In one retrospective study, rhAPC improved the vascular tone in septic shock patients as assessed by a decrease in the norepinephrine dose required to maintain arterial pressure. Cardiac dysfunction has been well described in septic patients and in animal models of sepsis (2). However, effects of rhAPC on sepsis-induced myocardial dysfunction have never been investigated during septic shock. Thus, the goal of this retrospective study was to determine whether rhAPC positively affects the left ventricular systolic ejection in septic shock patients.

METHODS. Ten septic shock patients with at least two organ failures were retrospectively investigated for the required dose of norepinephrine and hemodynamics values before, and 24h, 36h and 48h after rhAPC administration. A control group of 10 septic shock patients with at least two organ failures who did not receive rhAPC was matched on sex, age, MPM0, APACHE II, and sepsis etiology at the time of the theoretical start of rhAPC.

RESULTS. Patients in the treatment group included 7 community-acquired pneumonia, 2 peritonitis and 1 mediastinitis. In control group there were 7 community-acquired pneumonia and 3 peritonitis.(* p < 0,05).

TABLE 1.

	Age	Male (%)	MPM0	APACHE II	SOFA	Glic_24hs
rhAPC	51,4 ± 14	70	48,7 ± 25	28,7 ± 4,5	12,7 ± 3,0	170 ± 52
Control	55,7 ± 16	70	51,2 ± 26	30,5 ± 5,3	12,0 ± 2,6	173 ± 66
p	0.6	1	0.8	0.5	0.6	0.9



CONCLUSION. RhAPC rapidly improved the myocardial dysfunction in septic shock patients as assessed by a decrease in the norepinephrine dose required to maintain arterial pressure and an increase in left ventricular systolic ejection.

0853

EVALUATION OF THE USE OF DROTRECOGIN ALPHA (XIGRIS) IN A DGH

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INTRODUCTION. The published evidence for outcome benefit from APC is predominantly from multicentre experience. We present an evaluation of APC use in a single district general hospital (DGH) intensive care unit aiming to look at adherence to guideline-based prescribing, an outcome comparison with PROWESS[1] treatment arm and ENHANCE[2], and highlight problems hindering achievement of outcome benefit.

METHODS. This is a retrospective cohort analysis of prospectively collected data for consecutive patients prescribed APC from March 2004 to September 2006. Adherence to prescribing criteria guidelines (Table 1), as set out in the Kent Critical Care Network Xigris Audit form, was assessed. Outcome variables analysed (and compared to published results) were bleeding complication rate, length of stay and mortality (ICU and hospital).

RESULTS. 24 patients, mainly medical (62,5%), with a mean age(SD) of 51.8(17.9) years, a mean APACHE II of 19.22(5.26) and a culture positive rate of 83.3%, were treated with APC. TABLE1 APC was started at a median time of 23hrs15min(IQR 9hrs47min–50hrs50min) from ITU admission. The median(IQR) ITU length of stay was 11(5.5–16.25) days and hospital 16(8-43.5) days. The bleeding complication rate (GI bleeding) of 8.3% compared with 3.5% (PROWESS), and 6.5% (ENHANCE). No thrombotic events were recorded. The ICU mortality in this cohort was 41.7% (Unit all comer mortality is 23.8%). This compares poorly with the PROWESS (24.7%) and ENHANCE (25.30 %). We had no single organ failure patients in our group (PROWESS-25.3%,ENHANCE-15.7%). 95.8% were ventilated. The subset with three or more organ failure (41.7%) had a 60% mortality, although had APC started within median time of 23h30min from ICU admission. All patients who were discharged from ITU following APC therapy (59.3%) survived to hospital discharge.

GUIDELINE	ADHERENCE
1. Infection proven/suspected	100%
2. SIRS response- all 4,(3 of 4) criteria	63%, (33%) of patients
3. ≥Two organ dysfunction	100%
4. Two consultant prescribing	100%
5. Dose (24mcg/kg/hr), Duration(hrs) median	100%, 96

CONCLUSION. 1)Guideline based prescribing was extremely effective in this DGH setting.2)Although therapy was started within a median time of 24 hours post unit admission, the high proportion who already had at least three organ failure established at this time highlights the problem of delayed referral in our setting and suggests that both robust referral criteria and early therapy institution are probably required for outcome benefit. 3)Our higher mortality compared to published rates is probably ascribable to higher organ involvement and more ventilated patients. That all survivors of APC therapy survived to hospital discharge was very promising.

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0854

DROTRECOGIN ALPHA (ACTIVATED) FOR SEVERE SEPSIS: CAN WE PREDICT A RAPIDLY FAVOURABLE EVOLUTION?

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INTRODUCTION. Drotrecogin alpha activated (DAA) is an approved treatment for severe sepsis and septic shock since 2001. The duration of therapy has been arbitrary set at 96 hours, but some patients may be stabilized earlier. We reviewed data from 124 patients treated in our institution in order to identify criteria for potential early discontinuation of DAA administration.

METHODS. We reviewed the data of the 124 patients who were given DAA (as a standard 96 hour infusion) in our Dept. We identified the patients with favourable-outcome as those who left the ICU alive within 5 days after initiation of DAA therapy (these patients were likely to be ready for discharge either before or at the end of the infusion). Comparisons were made using Chi-square test.

RESULTS. Twenty-one patients had a favourable-outcome. Of these, 11 patients (52.4%) had an increase in pHa in the first 24 hours of treatment compared to only 22 patients (34.4%) in the other groups (p NS). Out of this subset of patients, eight patients (100%) with favourable outcome also experienced a decrease in SOFA score by more than 50 % during the first 24 hours, which never occurred in the other group (p<0.001). By combining these variables, we were able to reliably identify 38% of patients with a favourable outcome, with a 100% specificity.

CONCLUSION. A simple algorithm based on SOFA score and pHa can help to identify patients with a favourable course under DAA therapy. These patients may benefit from a shorter duration of treatment.

Poster Sessions
General perioperative intensive care 0855-0864

0855

EFFECT ON THE BIOLOGICAL RESPONSE BY THE REDUCTION OF ENDOTOXIN CONCENTRATION IN PORCINE ENDOTOXAEMIC SHOCK; A MODEL OF ENDOTOXIN ELIMINATION

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INTRODUCTION. Endotoxin elimination strategies as a treatment in septic shock are being developed by a number of research groups. However, the role of endotoxin in established septic shock has not fully been investigated. The aim of the present investigation was therefore to study whether the inflammatory and haemodynamic responses and organ dysfunction are affected by a reduction in the elevated plasma endotoxin concentration, once a systemic inflammatory state has been established.

METHODS. 24 pigs were randomised to six groups receiving different endotoxin dose schedules (group name, dose, duration of endotoxin infusion); 1A: 4 μg/kg/h:1 h (n=3), 1B: 4 μg/kg/h:2 h (n=3), 1C: 4 μg/kg/h:6 h (n=6), 2A: 0.063 μg/kg/h:1 h (n=3), 2B: 0.063 μg/kg/h:2 h (n=3), 2C: 0.063 μg/kg/h:6 h (n=6). Physiological variables were registered and blood samples analysed hourly for plasma endotoxin, IL-6, TNF-α, creatinine, leukocyte and neutrophil counts, platelet count and haemoglobin concentrations for 6 h.

RESULTS. After 1 h of endotoxin infusion at a dose of 4 μg/kg/h, plasma endotoxin concentrations reached levels of 3.30±0.66 EU/ml (mean±SE), in the range of those seen in patients with septic shock*. In groups 1A and 1B, the endotoxin concentration dropped to baseline within one hour after termination of endotoxin infusion. No significant differences in any of the variables measured were seen when comparing animals in groups 1A and 1B with those in group 1C. Among the animals receiving 0.063 μg endotoxin/kg/h, groups 2A and 2B demonstrated lower IL-6 concentrations during the last three hours of the experiment (P<0.05) and less endotoxin-induced changes in static lung compliance, pH, hemoglobin concentration, leukocyte and neutrophil counts (P<0.05 for all) in comparison with group 2C.

CONCLUSION. This study provides a model that leads to an indisputable reduction in endotoxin exposure and plasma endotoxin concentrations. The results indicate that there may be an effect of endotoxin elimination provided this is performed at very low plasma endotoxin concentrations and early in the course of endotoxaemia. At concentration levels seen in clinical practice, the achievable effect on inflammatory response, circulation and organ dysfunction of endotoxin elimination seems to be very limited once the biological response has been established.

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0856

CD 177 AS A MARKER OF NEUTROPHIL ACTIVATION IN CORONAY ARTERY BYPASS GRAFTING

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INTRODUCTION. Activation of neutrophils is crucial in innate immunity. Recently, NB1 (CD177), a glycoprotein exclusively expressed on human neutrophils, has been described as a new marker of neutrophil activation in sepsis and inflammatory diseases [1]. Cardiac surgery is associated with a systemic inflammatory response [2]. CD11b, CD35 and CD16 have been thoroughly investigated as markers of neutrophil activation in coronary artery bypass grafting. In this study we assessed perioperative changes of CD177 as well as CD11b, CD16 and CD35 expression in patients undergoing elective on-pump and off-pump cardiac surgery.

METHODS. The study was reviewed by the local ethics committee. EDTA-anti-coagulated blood was obtained from 16 on-pump patients and 7 off-pump patients at five time intervals over a 24 h period. The samples were incubated with fluoresceine-isothiocynate (FITC)-labelled polyclonal antibodies against CD35, CD11b and CD16. Rabbit IgG antibodies served as a negative control. After red cell lysis quantitative analysis of surface receptors using live gating on neutrophils was performed and mean fluorescent intensities (MFI) were determined. Quantitative determination of CD 177 expression was performed by flow cytometry using the CD177-specific monoclonal antibody 7D8 and IgG-coated calibration beads [1]. Calibration beads served for the construction of a calibration curve. The antigen density on neutrophils was calculated by intercalation on the calibration curve.

RESULTS. In the chronological sequence of CD16 and CD177 we found significant differences. In both groups there was a continuous decrease (p<0,01) of CD16 MFI from the beginning of the operation until 24h postoperatively. In the on-pump group MFI decreased from 2564±1031 to 1402±507 and in the off-pump group it decreased from 2363±793 to 1434±620. Furthermore there was a significant increase (p<0,01) of CD177 in both groups during the perioperative 24 h investigation period. In the on-pump group CD177 expression increased from 40951±12546 to 65646±26576 glycoproteins/cell and in the off-pump group from 40128±11491 to 54010±9706. There were no differences between the surgical procedures.

CONCLUSION. Our data indicate that increases in CD 177 expression may reflect neutrophil activation as part of the systemic inflammatory response observed after cardiac surgery. The use of off-pump surgical techniques could neither prevent CD177 increase nor CD16 decrease. Further studies are necessary to validate CD177 expression as a marker of neutrophil activation in cardiac surgery and systemic infection.

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0857

SEVENTY TWO HOURS INTRAGASTRIC PH PATTERN IN ICU PATIENTS ON RANITIDINE OR PANTOPRAZOLE

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INTRODUCTION. The gastrointestinal bleeding due to stress related mucosal damage (SRMD) continues to be a problem in critical care patients. There is an overuse of drugs to prevent SRMD in the hospital setting. The drug most commonly used is intravenous ranitidine (RNT). However, effectiveness of this prophylaxis does not seem correlated with the acid secretion inhibition. It has been shown that H2 receptor antagonists are efficient in reducing overt and clinically important bleeding in ICU patients. Proton pump inhibitors (PPI) are more efficient maintaining gastric alkalinity than H2 receptor antagonists and may have beneficial effects on gastric mucosal blood flow. Proton pump inhibitors are currently reserved for treatment of bleeding or prevention of re-bleeding. However, there is no evidence to support its routine use (instead of H2 antagonists) for stress ulcer prophylaxis. The objective was to compare the effectiveness on gastric pH of RNT or PPI (pantoprazole), as well as to observe clinical important bleeding and gastric mucosal lesions, in septic patients under mechanical ventilation for more than 48 hours.

METHODS. Seventeen patients admitted to the ICU of the Hospital das Clínicas - UNICAMP were submitted to a 72 hour continuous gastric pHmetry (average of 32000 measures in each patient). Nine patients received IV ranitidine (50 mg 8/8 h) and eight patients received IV pantoprazole (40 mg twice a day). All patients were submitted to gastric endoscopies before and after the study. Gastric biopsies were made in 6 out of 9 RNT and 3 out of 8 PPI.

RESULTS. No patient exhibited gastric bleeding. Results are presented in Table 1. Nevertheless, under RNT prophylaxis, pH remained > 4 for most of the time in 4 patients and of those, in 3 biopsies revealed gastric atrophy or hypotrophy. However, only one case out of 3 biopsies PPI exhibited gastric atrophy or hypotrophy. Therefore, excluding the cases with gastric atrophy or hypotrophy, difference resulted more striking: 73.67+/-41.13 (RNT) vs. 16.07+/-17.64 (PPI) (p<0.05).

	n	Mean percentage	Std deviation percentage
Ranitidine	9	47.00	43.86
Pantoprazole	8	14.06	17.29

CONCLUSION. Most of the time RNT prophylaxis resulted on low gastric pH. Some of those with high gastric pH may have resulted from impaired gastric acid secretion due to gastric atrophy or hypotrophy.

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0858

USEFULNESS OF INTERLEUKIN-6, INTERLEUKIN-8 AND TUMOR NECROSIS FACTOR-ALPHA SERUM LEVELS TEST IN DIAGNOSTICS OF SEPSIS INDUCED BY MULTIRESISTANT PATHOGENS

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INTRODUCTION. Severe sepsis induced by multiresistant pathogens is a major diagnostic and therapeutic problem. Control of escalating pathogen resistance requires the implementation of the most advanced methods of immunological and genetic diagnostics of sepsis1. The aim of the study was to assess the relationship between serum level of markers for severe sepsis and the frequency of isolation of multiresistant pathogens from severe sepsis patients.

METHODS. A pilot prospective study included 17 patients aged 18-70 years, meeting the criteria of severe sepsis, divided into two groups: I-patients suffering from sepsis induced by multiresistant pathogens, II-patients without isolation of multiresistant pathogens. All the patients were evaluated by the APACHE II and SOFA scoring systems. Tests included: lactate, C-reactive protein (CRP), tumor necrosis factor-alpha (TNF-alpha), interleukin-6 (IL-6), interleukin-8 (IL-8) serum levels, on 1st , 3rd and 5th day of sepsis therapy. A microbiological analysis of material obtained from the lower respiratory tract, abdominal cavity, blood and central venous catheters was performed.

RESULTS. Pathogens isolated from group I (n=8) included MRCNS, MRSA and ESBL-producing Gram-negative rods, while in group II (n=9)-Gram-negative bacteria, MSSA, MSCNS and fungi. The difference in IL-8 serum levels between both groups was statistically insignificant. Serum levels of IL-6 and TNF-alpha in group I were higher than serum levels of these cytokines in group II in a statistically significant way ($p < 0.01$). A statistically significant increase of mortality and duration of mechanical ventilation was stated in group I ($p < 0.01$).

CONCLUSION. There is a relationship between the serum level of severe sepsis markers and the isolation of multiresistant pathogens. The occurrence of multiresistant pathogens increases mortality in severe sepsis patients.

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0859

SERUM PROTEINS ATTENUATE BACTERIAL LIPOPOLYSACCHARIDE (LPS) — AND LIPOTEICHOIC ACID (LTA) – INDUCED CELL ACTIVATION

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INTRODUCTION. Bacterial structural outer cell wall components, such LPS and LTA, are potent initiators of an inflammatory response that can lead to sepsis and septic shock. In the last decade we have made great leaps forward in our understanding of the mechanisms behind this often-fatal inflammatory response, but our understanding of the initial interactions of these bacterial components with serum proteins as they enters our bloodstream remain unclear.

METHODS. In this study we attempted to identify which serum proteins are involved in the innate recognition of bacteria. Using affinity chromatography and mass spectrometry we performed a proteomic analysis of LPS/LTA-binding serum proteins.

RESULTS. We isolated several serum proteins that can interact with LPS and LTA: albumin, LDL, apolipoproteins A-I, A-IV, D, E, transferrin, as well as haemoglobin. Fluorescent binding experiments as well as cytokine assays revealed that certain serum proteins, such as apolipoprotein, LDL, transferrin and holotransferrin could neutralise LPS/LTA binding and the subsequent inflammatory response, suggesting that serum proteins are capable of modulating LPS/LTA-induced responses. When we investigated the serum proteomic profile of septic patients, it was shown that they had reduced amounts of the "neutralising" proteins.

CONCLUSION. This study adds a new dimension to the puzzle and suggests that in vivo the right balance in the concentration of these proteins must determine whether bacterial components will be neutralised or allowed to cause fatal sepsis syndrome.

0860

ANALYSIS OF RISKS FACTORS AND MORTALITY IN SEPTIC PATIENTS WITH RESPIRATORY ACUTE FAILURE REQUIRING PROLONGED MECHANICAL VENTILATION

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INTRODUCTION. Severe sepsis is the first cause of death in non-coronary intensive care units (30-50%), increasing to 50-60% of mortality if septic shock is present. We've studied our results in patientes suffering severe sepsis and/or septic shock requiring prolongued mechanical ventilation.

METHODS. Retrospective and observational study during 4 years of 166 consecutive septic patients (medical and surgycal) who developed acute respiratory failure requering mechanical ventilation (MV) $\geq$ 3 days. Analized variables: Age, gender, APACHE II, diabetes, ICU length of stay, days on MV, ventilator associated pneumonia (VAP),bacteriemia, ARDS, septic shock, acute renal failure (ARF),tracheotomy. Statistical analysis: T-student,Pearson, Chi2 test,and multivariate logistic regression. Statistically significant p <0.05.

RESULTS. Patients:166. Cause of sepsis: Pneumonia 101 (60%); abdominal 48 (29%); urinary 8 (5%); other: 9 (6%). Septic shock developed in 114(68.7%). Global mortality 53%. Cause of death:MODS 51 (58%);septic shock 23 (26%); refractory hypoxia 14 (16%).
We found 78 survivors and 88 non survivors with some significative differences: Age (58.9±16.1 vs 65.1±12.3),p 0.005; male 52 (66.6%) vs 53 (60.2%), p 0.423; APACHE II (16.7±5.1 vs 21.8±6.2, p <0.001; Diabetes 10 (13%)vs 17 (19%), p 0.297; length of stay(d) (21.8±14.7 vs 17.6±16.6), p =0.078; MV (d) (17.1 12.9 vs 17.2 16.3) p 0.949; VAP 28 (35%) vs 30 (34%) p =0.871; Bacteriemia 10 (13%)vs 18 (20%) p =0.217; ARDS 8 (10%) vs 19 (22%) p =0.002; Septic shock 41 (52%) vs 73 (83%) p <0.001; ARF 8 (10%) vs 39 (44%) p <0.001; Tracheotomy 37 (47%) vs 19 (21%) p <0.001. Multivariate analysis: APACHE II OR (1.202), IC 95% (1.115-1.296) p <0.001; ARDS OR (2.016), IC 95% (1.234-4.785), p 0.008; Septic shock OR (2.985), IC 95% (1.360-6.551, p=0.006; ARF OR (6.225) IC 95% (2.386-16.240), p<0.001; Tracheostomy OR (0.220), IC 95% (0.099-0.458) p <0.001.

CONCLUSION. Septic patients requiring MV show an elevated incidence of shock (68.7%) and a high mortality rate (53%), mainly because of MODS (58%). Non survivals are older, have higher APACHE II and greater incidence of DM, VAP, bacteriemia, days on VM and length of stay. Tracheotomy behaves as a protector factor, being more frecuent in survivor group, probably as a result of a correct indication of this technique. The only independent factors related with mortality were APACHE II and the development of ARDS, septic shock and ARF.

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0861

MULTIORGAN DYSFUNCTION. MORBIMORTALITY ANALYSIS.

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INTRODUCTION. Increasing incidence of MODS in critically ill patients has been linked to the development of the resuscitation and support techniques. MODS may be produced by many different causes and its mortality remains high.
Aim: 1) to describe the etiology, morbimortality rate and mortality causes of MODS and 2) to find factors associated to this syndrome in patients admitted at intensive care unit (ICU).

METHODS. A prospective cohort study which includes 124 not selected medical critically ill patients that were diagnosed multiorgan failure (SOFA score ^{3} 3 in at least 2 organs) and admitted to a 24-bed ICU of a tertiary hospital from January to March 2007.

RESULTS. 124 patients were admitted, 46 suffered from MODS and 74% of them had it at admission. 60% came from the Emergency Room. Mean age was 56 $\pm$ 15.5 and 52% of the patients were male. Causes of admission at ICU were: 35% neurologic pathology, 22% respiratory pathology, 13% sepsis and 11% digestive pathology. Most frequent cause of MODS was sepsis (54%). Other causes were respiratory pathology (22%) and neurologic impairment (11%). At admission, 63% showed one (26%) or two (37%) failing organs. Four or more failing organs were found in 8% of patients at admission. During their stay at ICU, 21% showed four or more failing organs and almost 50% of them showed two failing organs. Severity: APACHE II 25 $\pm$ 7, SAPS II 55 $\pm$ 15, SAPS III 72 $\pm$ 14; SOFA at admission 10 $\pm$ 3, SOFA in 24h 9 $\pm$ 4, SOFA in 48h 8 $\pm$ 3; SOFA in 72h 7.6± 3.7, SOFA in one week 7.71 $\pm$ 3.6. Outcome complications 44%. Mean stay at ICU was 8.8 $\pm$ 7.7 days and at hospital 20 $\pm$ 14 days.
Mortality rate at ICU was 46% and in hospital was 57%. Mortality at ICU was higher in patients with digestive pathology (80 % in severe acute pancreatitis and cirrhosis), septic and haemathologic diseases (66% in haemathologic neoplasias and/or bone marrow transplants). Patients with severe respiratory failure had higher mortality rates (71% vs. 22%, χ2 p .006). Mortality rate at hospital increased with the number of failing organs (patients with four or more failing organs showed 100% mortality, χ2 p .003). Severity score systems (APACHE II, SAPS II y III), sequential SOFA and the level of lactic acid at admission, were found to be independent predictor factors of mortality. Severity socre system with the highest discriminatory power was SOFA max (AuROC 0.894, 95% CI 0.75 – 1).

CONCLUSION. Critically ill patients who show MODS have a high mortality rate, especially if they suffer from respiratory failure or had four or more failing organs. In this study, maximum SOFA score during the stay at ICU shows the highest discriminatory power.

0862

INDUCTION OF THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST: A COMPARISON OF TWO COOLING METHODS TO ACHIEVE TARGET TEMPERATURE

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INTRODUCTION. Clinical and experimental investigations have demonstrated improved neurological outcome after therapeutic mild hypothermia in patients after successful resuscitation from prehospital cardiac arrest. Time course and duration to achieve target temperature and control of temperature may an important factor to influence patient's outcome. After presentation of controlled studies, therapeutic hypothermia moved into international guidelines. Recent investigations showed improved neurological short-term outcome after an accelerated and controlled cooling time. Endovascular cooling with cold fluid or with an endovascular cooling device is safe and practical to induce mild hypothermia.

METHODS. A total of 49 patients were examined retrospectively after successful prehospital CPR, who were treated with mild hypothermia for 24 h either by an endovascular cooling device or an external cooling method. Twenty-nine patients received 4 $^\circ$C cold infusions after arrival in the heart catheter laboratory. After admission to the ICU, both groups were immediately connected to a feedback controlled cooling device (endovascular cooling device or an external cooling method) and were cooled to a target temperature of 33 $^\circ$C (bladder temperature).

RESULTS. The average temperature at admission to ICU did not differ in both groups (35.5 $\pm$ 0.9 $^\circ$C vs 35.04 $\pm$ 0.8 $^\circ$C, p = n.s.). Average age was 65 $\pm$ 12 years in the group of external cooling device and 62 $\pm$ 12 years in the endovascular cooling group. In the group with the endovascular cooling device target temperature could be reached significantly shorter compared with the external cooling device after admission at hospital (319 $\pm$ 104 min versus 559 $\pm$ 320 min, p = 0.002) and after admission at ICU (155 $\pm$ 97 min versus 337 $\pm$ 243 min, p = 0.0035). 24% of the patients in the group of the endovascular cooling, with faster achievement of target temperature, died. In the group with the decelerate achievement of target temperature 39% of the patients died.

CONCLUSION. Endovascular cooling is feasible to induce mild hypothermia. Here we show that the endovascular induction of therapeutic hypothermia could reduce significant cooling time to achieve target temperature. Time course and duration to achieve target temperature probably affects the outcome of these patients.

0863

TIME TAKEN TO INITIATE APPROPRIATE ANTIBIOTIC THERAPY IN PATIENTS WITH SEPTIC SHOCK PRESENTING TO AN INNER CITY GENERAL HOSPITAL

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INTRODUCTION. Recent evidence has shown that early administration of intravenous antibiotics in septic shock improves survival[1]. Patients had a survival rate of 79.9% if appropriate antibiotics were given within 1 hour of the onset of hypotension. Each hour of delay in antimicrobial administration over the ensuing 6 hrs was associated with an average decrease in survival of 7.6%. Surviving Sepsis Campaign guidelines recommend that antibiotics should be administered within one hour of septic shock diagnosis[2]. The aim of this study was to investigate the time taken to administer intravenous antibiotics in patients admitted with septic shock to an inner city general hospital.

METHODS. We conducted a detailed case note review of patients admitted with a diagnosis of septic shock to our hospital's Intensive Care Unit over a 10 month period (January–October 2006). Patients were identified using our institution's ICNARC (Intensive Care National Audit and Research Centre) database. We collected the following data: (i) Time of diagnosis septic shock (as defined by the American-European Consensus Conference[3]). (ii) Time from onset of septic shock to first administration of appropriate intravenous antibiotics. (iii) Possible reasons for any delay in administering the antibiotics.

RESULTS. There were a total of 33 patients admitted with septic shock. We were able to retrieve 20 sets of case notes for detailed review. Of these, 2 did not have documentation of the time of first antibiotic administration. Of the remaining 18 cases, 13 (72.2%) received their initial intravenous antibiotics within the first hour of septic shock. All 18 received intravenous antibiotics within 5 hours of diagnosis.
Reasons for delay included time taken for case discussion with microbiologists, a wait for culture specimen collection, lag between written order and administration and the intra-hospital transfer of patients.

CONCLUSION. A significant minority of patients do not receive appropriate antibiotics with the first hour of diagnosis of septic shock. Focusing on this management aspect of the critically ill patient may improve outcomes. Education, prompt cultures and early discussion with microbiologists may reduce any delay in antibiotic administration.

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0864

IS PROCALCITONIN (PCT) LEVEL A USEFUL TOOL FOR EARLY DIAGNOSIS OF BACTERIAL SEPSIS?

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INTRODUCTION. Early diagnosis of Sepsis still remains a challenge to clinicians despite guidelines and campaigns. Relying on microbiological cultures for specific diagnoses would delay treatment due to inherent delays in the process. It is not uncommon to have inconclusive culture reports either due to prior partial treatment or due to infections caused by organisms that do not grow on standard culture media. Procalcitonin (PCT) assay sounds promising as the levels rise rapidly within 6– 12 hours after an infectious insult. PCT is produced by several cell types and many organs in response to pro-inflammatory stimuli, in particular by bacterial products. A significant elevation of plasma PCT is found during sepsis, but particularly during the early days of severe sepsis and septic shock. The objective of our study was to evaluate if quantitative PCT correlates with results of blood culture in patients with sepsis.

METHODS. A prospective observational study was conducted in 68-bed tertiary care mixed medical surgical ICU. The study was conducted over a period of 6 months and included all patients who met clinical criteria of sepsis. Blood and other appropriate cultures & serum PCT were obtained simultaneously on all these patients. Based on package insert and prior studies, PCT values were interpreted as follows: <O.5 ng/ml: bacterial sepsis unlikely, 0.5- 2 ng/ml-possible, 2-10 ng/ml- very likely, >10 ng/ml- bacterial sepsis present.

RESULTS. 55 patients were studied, (Male: Female = 37:18, median age: 57). Of these 41 were medical patients and 14 were surgical. Data obtained was analysed to evaluate sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of quantitative PCT and is presented in Table 1.

TABLE 1.

Value of PCT levels in bacterial sepsis

PCT Level (ng/ml)	**Sensitivity**	**Specificity**	**PPV**	**NPV**
>10	36	90	75	61
2-10	40	67	50	57
0.5-2	56	53	50	59

CONCLUSION. Higher levels of PCT seem to correlate better with culture positivity. In particular, levels greater than 10 may strongly predict a bacterial etiology and a positive culture.

Poster Sessions
Multi-system trauma 0865-0874

0865

AWARENESS OF PROTECTIVE LUNG VENTILATION STRATEGIES BY ANAESTHETISTS IN TRAUMA PATIENTS

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INTRODUCTION. The use of protective ventilation in acute lung injury (ALI) is well established in intensive care practice [1]. Trauma as a risk factor in the development of ALI is well recognised [2]. The International Trauma and Critical Care Society (ITACCS) have published guidelines on mechanical ventilation in trauma patients, irrespective of the site of injury [3].

METHODS. We surveyed all grades of anaesthetists at the Royal London Hospital, a large teaching hospital and major trauma receiving centre to ascertain preferences when ventilating trauma patients and their awareness both of the recommended strategies and knowledge of the specific ITACCS guidance in trauma patients. A short one page proforma was developed which asked a series of questions related to the individuals exposure to adult trauma patients and any preferences in practice related to ventilation and whether the pattern of trauma influenced their approach.

RESULTS. 26 anaesthetists were surveyed who had regular contact with major trauma patients, 8 consultants and 18 training grades. Most anaesthetists employed PEEP in the operating theatre and had a defined pCO2 target in non-head injured patients. Only one anaesthetist was aware of the guidance for protective lung ventilation strategies in trauma patients.

TABLE 1.

	Preferred vent mode in trauma	**Use of PEEP**	**pCO2 target in non-head injured**	**Awareness of ARDSnet guideline**	**Awareness of ITACCS guidelines**
CONSULTANT	6	4	8	7	1
TRAINING GRADE	13	10	17	15	0

CONCLUSION. There is a general awareness amongst the anaesthetists surveyed of the need to protect the lung and the general strategies employed. However there was poor knowledge of the ITACCS guidelines for ventilation in trauma patients. There is a need for further dissemination of the ITACCS guidelines in our institution amongst anaesthetists.

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0866

THORACIC TRAUMA IN GERIATRICS. VARIABLES ASSOCIATED WITH MORTALITY

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INTRODUCTION. The elderly are a rapidly growing population. Age is known to be a factor in traumatic injury outcome.

METHODS. Retrospective review of patients older than 65 years with thoracic trauma who were admitted to our Traumatic Critical Care Unit from January 1991 to January 2006. Data were analysed by the [chi]2 test with $p < 0.05$ considered significant. The averages were compared with t-Student.

RESULTS. There were 189 patients with diagnosis of thoracic trauma. The middle age was 74±8,68 years. There were more male subjects(62.4%). The principal mechanism of injury was pedestrian collisions(37,5%); motor vehicle collisions and precipitations were constituted the second and third most common mechanisms of injury in the elderly, respectively. The main reason to be admitted in ICU was the observation, followed by neurological vigilance and shock. The GCS mean value was 11,67±4,68, ISS mean value of 21,07±16,13, APACHE II mean value of 15,06±8,74 and APACHE III mean value of 46,23±31,69. The mean ICU stay length was 11,73±23,18 days. We found statistically significant differences between the following variables and mortality: age(p=0,0032), GCS(p<0,0001), ISS(p<0,0001), APACHE II(p<0,0001), APACHE III(p<0,0001), previous arterial hypertension(p=0,007), arterial pressure at admission(p<0.001), temperature, haemoglobin and hematocrit(p=0,003 y p=0,004, respectively), number of platelets(p=0,02), prothrombin activity(p< 0,001), glucose(p<0.0069), creatinin and urea(p=0,04 y p=0.0041), base deficit at admission(p< 0,0001) and the amount of fluids needed for resuscitation(p=0,014). There were 73% of patients with two or more broken ribs, followed by hemothorax and neumothorax. The associate injuries of other organs were traumatic brain injury(56,6%), pelvic trauma and abdominal trauma. 48% of patients with thoracic trauma needed mechanical ventilation(12±15,69 days of MV) because of neurological impairment mainly. The ICU mortality was 29.6%, and intra-hospital mortality was 33,8%.

CONCLUSION. Our results corroborate other studies that showed increased risk of mortality in the age greater than 65 years. The prognostic scales used have been demonstrated to be good predictors of mortality in patients with thoracic trauma. The previous hypertension has been seen as a protector factor. Arterial pressure, temperature, glucose, renal parameters, anemia, haemostasis impairment at admission have been demonstrated as good mortality scoreboards. We highlight the role of the base deficit in the admission as a possible predictor of mortality of easy use to the head-board of the patient. The incidence of rib fractures in elderly is high and increasing number of rib fractures is associated with increasing morbidity and mortality.

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LOW-TECH COMPUTERIZED IN-HOSPITAL TRACKING OF PATIENT LOCATION DURING MULTIPLE CASUALTY INCIDENTS (MCIS)

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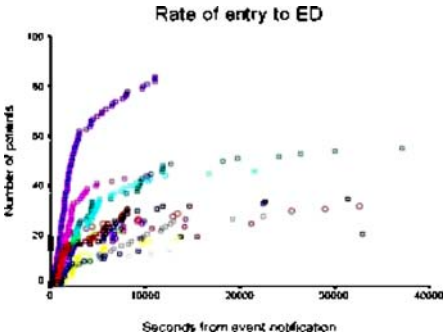
INTRODUCTION. Tracking of patient location during MCIs is challenging particularly in hospitals not specialized in trauma care.

METHODS. A computerized system for patient tracking was developed (4 months full-time programmer). Diagnostic/therapeutic stations were defined prospectively to direct patient flow from the department of emergency medicine (ED) onward; general, trauma, orthopedic and pediatric EDs, radiology and CT, post anesthesia care unit, operating room, ophthalmology, otolaryngology, debridement, post traumatic stress, admission ward/secondary transfer/discharged/deceased. Non-medical staff were trained to update the system with estimated severities of injury, patient identification/identifying features,composition of the physician/nurse team assigned to the patient and patient arrival times per-station.

RESULTS. During 18 MCIs (842 patients) real-time data provided by the system to key hospital staff (e.g event manager, directors of hospital/social services, head nurse)enabled orderly and informed decision-making and family/media updates (e.g. the patient load imposed upon the various stations, the location of individual patients). No patient returned to the ED after exiting it. The system is currently being used for research purposes, evaluation of hospital surge capacity and quality assurance.



CONCLUSION. Low-tech. patient tracking systems improve Command&Control during MCIs and should be used until fully computerized methods become available. Data collected in this manner is of sufficient quality to be used in real-time and for later analyses/planning for future events.

0868

ANALYSIS OF PREVENTABLE DEATH IN THE POLYTRAUMA PATIENTS

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INTRODUCTION. In polytrauma patients the mortality is one of the markers of quality care. Therefore the concept of preventable mortality should be obtained from a large database of patients that was the aim of our study.

METHODS. A database of all the polytrauma patients that arrived to our Hospital during one year period, was analyzed. The registry included demographical data, mechanism of trauma lesion, resuscitative measures during the primary revision, diagnostic methods, graduated anatomical lesions, mortality and four scoring systems: Glasgow Coma Score (GSC), Revised Trauma Score (RTS), Injury Severity Score (ISS) and Trauma and Injury Severity Score (TRISS). The TRISS value was calculated from the prehospital RTS in case of prehospital intubation. The analysis of hospital mortality was based on calculation of TRISS probability of survival (PS) model and application of the preventable mortality criteria was based on other author's criteria. Patients with TRISS value minor o equal than 25% were classified as nonpreventable death (ND). Patients with a TRISS value between 20-50 % were classified as possibly preventable death (PPD) and patients with a TRISS value major than 50% were classified as preventable death (PD). The Z value was calculated to compare our mortality with that from the Major Trauma Outcome Study (MTOS). The M value was calculated to measure the matching between the populations studied with the MTOS. M value lower than 0.88 meaned a great disparity between the two groups.

RESULTS. 198 polytrauma patients arrived to our hospital, 29.1% were female. A total of 184 (93%) were closed and 14 (7%) penetrating trauma. In 111 cases (55.8%) received prehospital treatment support. The mean ISS was 16.89 +/-11.23 and the PS of 0.95 +/- 0.19. There were 91 (46%) patients with an ISS>15. The statistics calculated for this population was: Z =-5.05, M=0.95 and W =-7.15. A total of 22 (11.55%) patients died. In Table 1 are the results of TRISS and ISS for the patients who died.

TABLE 1.

TRISS	Classification	Hospital length	Cause of death
99.9-96.9 (2 cases)	PD	10 -11 days	Broncoasp-Sepsis
99.9	PD	24 days	Multyorganic failure
99.8	PD	29 days	Sepsis acinetobacter
99.8-99.6 (3 cases)	PD	90 minutes-2 days	Delayed treatment
99.5	PD	1 day	No treatment
98.8-72.1(5cases)	PD	180 minutes-6 day	Brain death-Head inj.
78.5-38.9 (2 cases)	PD-PPD	90-120 minutes	Hypovolemic shock
34.5	PPD	1 day	Arrythmia
6.8-0.1 (6 cases)	ND	5-75 minutes	Cardiac arrest
0.1	ND	5 days	Brain death-Head inj.

CONCLUSION. Delayed treatment is the most important factor for potentially preventable death. Brain death, hypovolemic shock and sepsis were the most common causes of death.

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VENTILATORY MANAGEMENT AND OUTCOMES IN COMATOSE PATIENTS

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INTRODUCTION. Coma is a frequent indication for mechanical ventilation. The aim of this study was to describe the ventilatory management of these patients, along with the course of their Intensive Care Unit (ICU) organ failures and outcomes.

METHODS. We studied patients who received mechanical ventilation for at least 12 hours with coma as the reason for initiating ventilation (due to metabolic causes, intoxication, hemorrhagic or ischemic stroke, or brain trauma), who had a Glasgow Coma Score (GCS) below 14. These patients were prospectively enrolled in the 2nd International Study of Mechanical Ventilation and were followed daily for 28 days, and thereafter for hospital outcomes.

RESULTS. A total of 780 patients met inclusion criteria (20% of all ventilated patients). Ventilatory settings in the 1st week and outcomes are shown by coma origin (Table). In the overall population mean age was 54(18) yrs, mean SOFA 7(3)and GCS < 8 in 75 % of the patients. Volume-cycled ventilation was the most frequently used mode of ventilation (70%), while Pressure Support Ventilation progressively increased after the first week. Patients ever met "ready to wean" criteria in 60% for the overall population (from 80% in intoxication to 46% in hemorrhagic stroke). The most common method of weaning after the first spontaneous breathing trial was PSV (75%). ALI/ARDS developed in 12% of the patients (7% in metabolic to 15% in brain trauma).

TABLE 1.

	Overall Population	Metabolic	Intoxication	Hemorrhagic Stroke	Ischemic Stroke	Brain Trauma	P
Pts (N)	780	104	124	260	102	190	
Lung Failure (%)	42	39	36	42	31	53	<0.01
VT (ml/Kg PBW)	9(2)	9(2)	9(2)	10(2)	9(2)	9(2)	<0.02
PEEP (cmH2O)	4(3)	4(3)	4(3)	4(3)	4(3)	4(3)	0.78
PaO2/FiO2	283(116)	278(125)	266(120)	286(114)	250(106)	310(110)	<0.01
Tracheostomy (%)	18	7	7	20	14	30	<0.01
MV (days) median	4	4	2	5	4	6	<0.01
ICUMortality (%)	35	30	17	48	37	29	<0.01

CONCLUSION. Comatose patients frequently have pulmonary organ failure, but receive ventilation with relatively high tidal volume and low PEEP. Airway management and outcome are significantly influenced by the aetiology of coma.

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A CASE OF SPINAL EPIDURAL HAEMATOMA RELATED TO PRES

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INTRODUCTION. Spontaneous spinal epidural haematomas are rare diseases of unknown cause. Elevated blood pressure values can cause acute epidural hemorrage, leading to an impressive and eventually difficult to distinguish spinal syndrome1. Moreover, elevated blood pressure is also a recognized cause of Posterior Reversible Encephalopathy Syndrome (PRES)2,3. Here we describe a case report in which these two conditions are both present in the same patient, at the same time, and, probably, both related to hypertension.

METHODS. A 56 year-old women was admitted to our ICU with diagnosis of epileptic seizures. She also developed neck pain irradiating to her left arm, and left sided weakness in her arm and leg. Moreover, the patient showed progressive blindness and confusion. High systolic (210-200) and diastolic (115-135) blood pressure values were documented. CT scan of the brain and spinal cord performed at admission revealed no signs of brain haemorrhage, and a large extraspinal large lesion (C5-T2). Diagnosis of epidural haematoma was performed on MRI scan with gadolinium. Moreover, MRI sequences showed classical images of PRES. Medical therapy for seizures and hypertension was performed. After laminectomy, epidural haematoma was completely evacuated. Patient's condition improved rapidly so that she was discharged after 6 days.

RESULTS. Some authors have related occurrence of epidural haematomas to arterial hypertension. However, the exact cause of bleeding remains mostly undetermined. PRES is mainly related to arterial hypertension. Since epidural haematoma and PRES occurred at the same time in our patient, we hypothesize that arterial hypertension could have determined both conditions in this case.

CONCLUSION. Although spontaneous spinal epidural haematomas are rare, clinicians should still consider them as possible complications in patients with uncontrolled hypertension.

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0871

MINIMALLY INVASIVE MANAGEMENT OF PNEUMOTHORAX HAEMOTHORAX AND PLEURAL INFUSIONS WITH THE USE OF ONE LUMEN INTRAVASCULAR CATHETER AND A HEIMLICH VALVE

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INTRODUCTION. Drainage of the pleural space by a chest tube is the most common intervention in thoracic trauma and provides definitive treatment in the majority of cases. The commonest chest tube is the Bullau tube. The placement of this tube carries a significant complication rate, reported as between 2% and 10%. In aim to avoid these complications and perform a less traumatic and minimally invasive technique we suggest the placement of one lumen intravascular catheter, and a Heimlich valve in the treatment of pneumothorax, haemothorax and pleural infusions.

METHODS. 312 patients with indication to drain the contents of the pleural space (air 57,75%, blood 10,25% or other fluids 32%) treated by us. In 274 cases (87,8%) a chest X-ray indentified a pneumothorax, haemothorax or other pleural infusion before placing a chest tube. However where the patient was in extremis in 38 cases (12,2%) of tension pneumothorax we placed the tube without waiting for imaging studies. Our technique consists of the placement of one lumen intravascular catheter of Polyurethane, bore 14 Ga, and 20cm length, using Seldinger technique as follows: The area is prepped and draped appropriately. Local anaesthesia is used for the procedure. A needle is inserted into the mid or anterior axillary line, usually the 4th or 5th rib space and advanced slowly until air or other fluid is aspirated. A guidewire is advanced through the needle and the needle is removed over the guidewire. A dilatator is advanced over the wire and the pleural space is entered. The dilatator is withdrawn, the catheter is passed into the pleural cavity ,the wire is removed and the distal edge of the catheter is connected to a one-way Heimlich valve which allows fluid, clots and air to flow out of the chest without reflux into the pleural cavity.

RESULTS. A chest X-ray is taken to confirm placement and position of the catheter. In 44 (14,1%) patients the catheter needed to be pulled out 1-2cm. In 14 patients (4,5%) with haemothorax the catheter was blocked by clots and replaced by a Bullau tube. The pain in this group of patients was insignificant. All catheters were removed when they were no longer draining any fluid and any air leak had resolved. The procedure was successful in all cases of pneumothorax,pleural infusions and in 18 cases of haemothorax (56,25%). We noticed no lung laceration,diaphragm or abdominal cavity penetration in this group of patients.

CONCLUSION. We believe that this minimally invasive technique can easily be performed by all physicians especially in the ICU and the Emergency Room.

0872

POLITRAUMATHIZED PATIENT IN A SECUNDARY HOSPITAL: CHARACTERISTICS

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INTRODUCTION. The politraumathized patient shows a great morbimortality in affected persons. The good integration of the prehospital attentions, hospital and trauma centers access which has special thecniques, will turn into an injuries decrease. We want to show the characteristics of the politraumathized patient who is admitted in the ICU of a local hospital and the necessities which he/she presents.

METHODS. Revision of the admissions during the year 2005. It will be taken into consideration sex differences, age differences, months with more incidences, etiology, permanence, mortality, necessity of hemoderivated use, mechanical ventilation, move, and early laparothomy, we will capture the most frequent placement of the injury. We will express the results in percentages.

RESULTS. The politraumatized patient percentage reachs a 4%, most commonly in men (61.5 %), around 50 years old. During the autumn the incidence is bigger (42.3 %) and winter (26.9 %). Traffic accidents represent the 61.5 %, being more of the half due to car accident. 66 % of the knocked down patients are older than 70 years. The incidence of working accident was of a 77 % and all of them due to falling. Something more of the fourth part of them needed and hemoderivated transfusion. Minimum stay in hospital was around 5.34 days, with a median of 3 days. Patients were moved, and 3 of them in the first 24 hours. Mechanical ventilation was used with the 81 % of the admitted. Almost in the fourth part of them, an early laparathomy was practiced. Mortality is found in the 15.3 % of patients, and is more frequent in patients with serious CET and GCS of 3 at the beginning. Central nerves affectation system appeared in 17 patients, being serious in the 53 %. The orthopaedic trauma was moderated in the 75 % of the cases. Thoracic affectation appeared in almost the half of the admissions. Those who showed and abdomen pelvic affectation were most of them serious.

CONCLUSION. · The serious politraumathized represents a low percentage but not worthless, talking about the consumed resources in our ICU.
·The typical patient would be: 49 years old man, who has suffered a traffic accident, with CE lession and thoracic lession.
·It presents a seasonal predominance in the autumn and winter months.
·Traffic accident remains being the most frequent reason
·The necessity of hemoderivated is most frequent in patients with orthopaedic and thoracic trauma.
·Minimum stay and mortality is found into the range of our unit.
·Mostly of the mechanically ventilated patients were in this situation during 3 or less days.
·The main reason of moving to other centre was neurosurgical.

0873

SCREENING FOR MALNUTRITION AND ENHANCED CLINICAL NUTRITION STRATEGIES IN EARLY NEUROREHABILITATION

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INTRODUCTION. Neurogenic dysphagia in early rehabilitation after cerebrovascular event ist present in up to 50 percent of patients, half of them exhibiting malnutrition leading to reduced rehabilitation potential.

METHODS. subjects: 23 consecutive inpatients, 13 men; median age 65 years, median time since onset: 10 weeks.
Neurorehabilitation (NR) therapy according to the principles of Bobath, Affolter, swallowing and speech therapy, neurocognitive training.
Improvement in NR wa calculated as the difference of NR parametres at admission and discharge: Barthel Index (early rehabilitation version), Rivermead motor assessment (RMA), Basic (BADL) and Extended (EADL) acitivities of daily living.
Nutritional status: BMI, Innsbruck nutrition score, bioimpedance analysis (extraccellular water/ECW, body cell mass/BCM, phasic angle/PA, body fat mass/BFM).

RESULTS. 20 out of 23 patients (87%) showed improvement in NR as measured see above. 20/23 patients showed signs of malnutrition measured with BIA whereas BMI as crude screening instrument was only sensitive in one patient. Improvement of PA correlated significantly with improvement of RMA (p= 0.028), also a significant correlation between BCM and BADL (p=0.028) could be shown.

CONCLUSION. Enhanced clinical nutritional strategies (parenteral, enteral nutrition, food texture modification) under monitoring with BIA (3 compartment model)lead to significant improvement during NR.

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0874

PREDICTION OF CHANGES IN CARE PROMPTED BY ROUTINE CHEST X-RAYS IN TRAUMA ICU PATIENTS

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INTRODUCTION. The clinical value of daily routine chest radiographs (CXRs) in ICU patients has been questioned. This matter has not yet been studied in trauma patient. The objective is to test easy clinical parameters that help us discriminate patients in which the routine CXRs has the greatest clinical value.

METHODS. Observational prospective cohort study in an 8 bed trauma ICU over 1 year. Collection of routine CXRs obtained in severe trauma (ISS>15) patients aged>15, admitted for longer than 48 hours. Pregnant women, CXRs during initial attention and non routine CXRs were excluded. Demographic profile, changes in CXRs (atelectasis, infiltrates, effusions, pneumothorax, pneumomediastinum, and malposition of devices), relevant previous-day events (haemodinamic unstabilization, changes in lung compliance or PEEP, fall in PaO2/FIO2 or O2 saturation, new device placing, SIRS development, changes in respiratory secretions or beginning mechanical ventilation) and secondary modifications in care, were sought daily by an independent reviewer, using internationally accepted close criteria. Probabilities of each item and risk of clinically relevant CXRs changes relative to previous day events were subject to univariate and logistic regression multivariate analysis.

RESULTS. 1440 CXRs were taken of 138 consecutive patients (men 82%, age 39,4±16 years). Blunt severe (ISS 33,4±12,6) trauma prevailed (97,1%). According to MAIS, 45% had no thorax trauma, 3% were light, and 52% severe (MAIS>2). 86,8% of patients were mechanically ventilated (9±8,9 days in average, 83% of routine CXRs). Stay lasted for 12,9±10,1 days. Patients received 10,4±9,3 routine CXRs and 2,7±3,8 non routine CXRs. 14,1% had new findings (>1 in 1,5%): orotracheal tube malposition in 5,%, new infiltrates 4,9%, atelectasis 2.2%, pleural effusion 1,3% and neumothorax 0,5%; other devices malpositioning in 1,8%. 84,6% of new findings meant action. After univariate analysis, probability of new radiologic phenomena increased if: during the first two days of admission, and if the previous day a fall in PaO2/FIO2, O2 saturation <90%, mechanical ventilation, haemodynamic unstabilization, change in lung compliance, SIRS development, changes in respiratory secretions and non rutine CXRs, occurred. Multivariate analysis showed the following significant (p<0,05) risk factors for CXRs findings: first 2 days of evolution (RR 1,7; IC95% 1,2-2,5), fall in PaO2/FiO2 (3; 2-4,5), mechanical ventilation (2,1; 1,2-3,5), change in lung compliance (1,9; 1,1-3,8), and changes in respiratory secretions (3,9; 2,4-6,5).

CONCLUSION. According to these results, restricting CXRs to some situations, implies little risk of ignoring dangerous conditions. A substantial money saving and radiation restriction policies could result of this behaviour. This can be subject of further studying.

GRANT ACKNOWLEDGEMENT. To the personal of Trauma ICU

Poster Sessions
Hypothermia 0875-0885

0875

OUTCOME AFTER CARDIOPULMONARY RESUSCITATION AND MILD THERAPEUTIC HYPOTHERMIA: TWO YEARS EXPERIENCE.

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INTRODUCTION. In 2005 mild therapeutic hypothermia (TH) after cardiopulmonary resuscitation (CPR) was introduced in our ICU. This retrospective analysis was designed to evaluate the protocol and outcome of patients treated with TH.

METHODS. A retrospective cohort study of TH patients between January 2005 and December 2006. All patients with return of spontaneous circulation (ROSC) after cardiac arrest (VF and non-VF) underwent TH (target temperature 32,5 degrees Celsius) over a period of 24 hours. An external cooling technique with a cooling blanket and a mattress was used (Blanketroll-II). Exclusion criteria were: active bleeding, >8h after ROSC or improved GCS>8 at the onset of TH. Efficacy (time to target-temperature) and hospitality mortality were analysed. Neurological outcome at hospital discharge and six-months were documented by the Cerebral Performance Category (CPC).

RESULTS. Sixty comatose patients presented after cardiac arrest and ROSC were treated with TH. No major complications during TH occurred. Overall mortality was 63 % (38/60). VF mortality was 50 %(17/34), non-VF mortality 85 % (21/26). Neurological outcome in survivors by CPC scores was 1.5 (± 0.7) in the VF group and 1.8(± 0.5) in the non VF group.

TABLE 1.

Characteristics of patients treated with TH

patient characteristics	VF Patients	Non-VF patients	p-value
N	37	23	
male (%)	30/37 (81%)	15/23 (65%)	0.59
Hospital mortality	17/34 (50%)	22/26 (85%)	0.03
CPC score survivors 6 months	1.5± 0.7	1.8± 0.7	0.57
Time to target Temp	184.4 ± 112.9	153.2± 26.0	0.13

CONCLUSION. Our first two-years experience of TH is promising. Survival after VF is significantly better then non-VF. The survivors in the VF group had an excellent CPC score and slightly better then non-VF survivors. The patients that survived in the non VF group also had a good CPC up to one year follow-up. Our results are much better than historic controls.

0876

THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST WITH ONLY COLD SALINE INFUSION AND ICE PACKS IS AN EFFECTIVE METHOD TO INDUCE AND MAINTAIN TREATMENT

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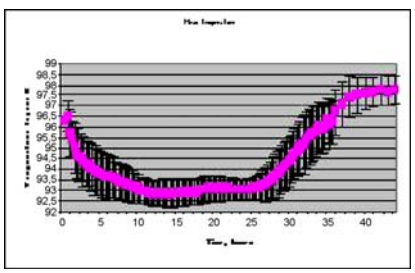
INTRODUCTION. Therapeutic hypothermia after cardiac arrest have been used since 2002 after clinical studies showed improved neurological outcome and increased survival. Recommended target temperature is 32-34 ˚C and to be maintained for 12-24 hrs. The hypothermia treatment will start as soon as possible after restoration of spontaneous circulation. Different cooling methods are described such as surface cooling, endovascular catheters and cooling caps/helmets. These methods are often combined with induction using cold intravenous infusion. The aim of this study was to evaluate a simple method for induction and maintenance of hypothermia treatment that could possibly be used universally.

METHODS. Thirty-two out of 37 patients treated with hypothermia after cardiac arrest December 2004 to January 2007 were included. The patients were cooled with 4 ºC intravenous saline infusion 30 ml/kg and ice packs in the groins, axillas, and along the neck and hypothermia treatment was maintained for 24 hrs. Passive rewarming was expected to occur over a period of 8 hrs. The temperature was measured in the urinary bladder and documented every 15 mins up to 44 hrs after the cardiac arrest.

RESULTS. The target temperature, 34 ˚C, was reached within 280 ± 180 mins from cardiac arrest and 220 ± 170 mins from induction of cooling. All patients reached the target temperature interval of 32-34 ˚C. In 4 patients (8%) temperature dropped below 32 ˚C but for no more than 1 hr. The nadir temperature in these patients was 31.7 ˚C. Passive rewarming started 26 hrs after cardiac arrest and remained 7.85 ± 2.92 hrs.



CONCLUSION. Therapeutic hypothermia with only 4 ºC intravenous saline infusion 30 ml/kg and ice packs in the groins, axillas, and along the neck is a simple, rapid and inexpensive method to induce and maintain treatment.

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0877

ACHIEVING TEMPERATURE DURING HYPOTHERMIC POST RESUSCITATION CARE

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INTRODUCTION. The international resuscitation comity indorses the use of pot resuscitation cooling. Our initial approach to cooling [1] proved ineffective and therefore we switched to the Artic Sun surface cooling system.

METHODS. Ten patients were cooled with cooling commenced in 5 patients whilst in the Emergency department with cold fluid prior to transfer to the ICU. On arrival all patients where cooled with the Artic sun system.

RESULTS. Artic Sun proved effective at achieving target temperature within 2-hours and maintaining it for 24-hours (Table 1). Cooling initiated in the Emergency department achieved the target temperature in 2 out of 5 patients.

TABLE 1.

Achieving target temperature

Patient ID	Temp in ED	Temp on arrival ICU	Target temp 1 hour post cooling	Target temp 2 hour post cooling	Temp maintained for 24 hours
A	36.4	33.7	yes	yes	yes
B	34.6	33.0	yes	yes	yes
C	35.6	35.6	no	yes	yes
D	36.4	35.0	yes	yes	yes
E	36.0	36.1	no	yes	yes
F	35.0	35.6	no	yes	yes
G	35.1	35.0	yes	yes	yes
H	36.4	34.7	yes	yes	yes
I	35.6	34.5	yes	yes	yes
J	34.3	34.7	yes	yes	yes

CONCLUSION. The Artic Sun system proved an effective cooling device allowing rapid cooling of post-cardiac arrest patient's and for maintaining hypothermia temperature during post resuscitation hypothermic care.

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0878

THE USE OF THERAPEUTIC HYPOTHERMIA IN PORTSMOUTH CRITICAL CARE UNIT POST CARDIAC ARREST AND PRACTICAL RECOMMENDATIONS.

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INTRODUCTION. Both ILCOR and the Resuscitation council UK advocate the use of therapeutic hypothermia for the prevention of brain injury in out of hospital primary VF cardiac arrest. It is recommended cooling should be started as soon as possible and continued for at least 12-24 h at 32 to 34 ˚C [1].

METHODS. A Retrospective analysis was performed of all patients following cardiac arrest admitted to the ICU, Queen Alexandra hospital Portsmouth, during 12-month period 2005-2006. Currently no protocol or guidelines are in place for therapeutic hypothermia. Induction and maintenance of therapeutic hypothermia was with an air-cooling blanket, cooled intravenous fluids and icepacks. Data regarding Therapeutic Hypothermia, Cardiac arrest and outcome was recorded.

RESULTS. 66 patients post cardiac arrests were admitted to ICU. 40 of these were out of hospital of which 20 were VF arrests. Of these out of hospital VF arrests 12 (60%) underwent attempted cooling. 6 other patients post cardiac arrests underwent attempted cooling (2 asystole, 3 PEA and one unknown). During our attempts at cooling the mean temperature was 36.4 ˚C and the median temperature was 36.6 ˚C. The mean of the lowest recorded temperature for our patients was 34 ˚C (Range 26.9-36.9). Of the 66 cardiac arrests 31 (47%) were alive at ICU discharge, 20 (30%) returned home. 28% of patients we were attempting to cool were receiving warm humidified oxygen. Temperature was measured peripherally in 72% of the patients we were attempting to cool. Central line was in situ in 83% of patients admitted to ICU post cardiac arrest.

TABLE 1.

Glasgow Coma Score of patients discharged from ITU who go on to leave Hospital

	GCS 15	GCS 14	GCS 10	GCS 9	GCS 8
Patient Numbers	9	7	2	1	1

CONCLUSION. Practical Recommendations drawn from this audit include:
1)Regular measurement of core rather than peripheral temperature will help monitoring.
2)Warm humidified Oxygen should be avoided unless contraindicated to aid cooling.
3) A New cooling method is advocated and is currently being implemented.
4)Early implementation of the ILCOR and Resuscitation Council UK guidelines starting in A/E
5)A large majority of post cardiac arrest patients admitted to our ITU received central venous lines. This indicates central cooling methods could be introduced without increasing the risks associated with central venous cannulation.

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0879

THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST AND THE RISK OF BLEEDING AFTER CORONARY REVASCULARISATION

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INTRODUCTION. Acute myocardial infarction is the most prevalent cause of out-of-hospital cardiac arrest. Therapeutic hypothermia is increasingly developing into a standard of care but may increase the risk of bleeding due to impaired platelet function. This raises the question about the safety of the combination of coronary revascularization and therapeutic hypothermia.

METHODS. In a prospective observational setting we identified 31 comatose patients admitted at our MICU with acute myocardial infarction and out-of-hospital cardiac arrest who were treated with hypothermia. They were compared to a historical control consisting of patients admitted after out-of-hospital cardiac arrest due to acute myocardial infarction in the era prior to hypothermia treatment.

RESULTS. There was no difference in the incidence of bleeding complications between the two groups. If transfusion was necessary the patients in the hypothermia group tended to needed a greater number of erythrocyte units. In both patient groups we found a decrease of both haemoglobin value and thrombocyte counts in the first 48 hours without a difference between the groups. The neurological outcome assessed with the Cerebral Performance Category was improved in the patient group treated with hypothermia.

CONCLUSION. Our results indicate that the combination of both reperfusion strategies and the application of mild hypothermia does not entail an excessive risk of bleeding complications. Patients with acute myocardial infarction and out-of-hospital cardiac arrest should receive the optimal therapy for both conditions, that is, both coronary revascularisation and therapeutic hypothermia.

0880

OUT-OF-HOSPITAL SURFACE COOLING WITH A COOLING-BLANKET TO INDUCE MILD HYPOTHERMIA IN HUMANS AFTER CARDIAC ARREST. A FEASIBILITY TRIAL.

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INTRODUCTION. Mild hypothermia (32-34 °C) is a promising new therapy for patients resuscitated from cardiac arrest. Animal studies suggest that early and fast cooling is crucial. Inducing mild hypothermia immediately after successful restoration of spontaneous circulation (ROSC) out-of-hospital remains a challenge. Therefore, a novel cooling-blanket (EMCOOLSpad®), independent of any energy source during use, was developed. The aim of the study was to evaluate feasibility and safety of out-of-hospital surface cooling with the cooling blanket in patients successfully resuscitated from cardiac arrest.

METHODS. Included in the study were patients successfully resuscitated from out-of-hospital cardiac arrest with oesophageal temperature (Tes) > 34 °C. The cooling blanket consists of multiple cooling units (12 mm thick), filled with a mixture of graphite/water, which are stored in a cooling box at -3 °C in the ambulance car. Cooling was initiated as soon as feasible by the first treating paramedics and emergency physicians, and continued in the Emergency Room (ER) until Tes 34 °C, when the cooling-blanket was removed. Target-temperature of Tes 33 °C was kept for 24 hours. Data are presented as median and interquartile range (25-75%).

RESULTS. From 09/2006 to 01/2007, fifteen patients with a weight of 70 (61-79) kg were included into the study. Cooling was initiated 12 (8.5-15) min after ROSC. The cooling-blanket decreased Tes from 36.6 (36.2-36.6) °C at start of cooling to 34.0 °C within 54 (39-80) min, and to target temperature Tes 33 °C within 70 (55-106) min, resulting in a cooling rate of 3.3 (2.0-4.0) °C/h. Hospital admission was 45 (34-52) min after ROSC, Tes 33 °C was achieved 50 (29-82) min after admission. In 9 patients, pre-cooled parts of the cooling-blanket had to be reapplied repeatedly on chest and abdomen to maintain the target temperature of Tes 33 °C for 24 hours. One patient died before hospital admission, nine died during hospital stay, four patients survived to hospital discharge, and one undergoes rehabilitation. No skin lesions were observed.

CONCLUSION. Non-invasive surface cooling with this novel cooling blanket immediately after resuscitation from cardiac arrest, in the out-of-hospital setting, showed to be feasible and safe. If early cooling, as compared to delayed cooling in the hospital, will improve neurological outcome, needs to be determined in a prospective randomized trial.

GRANT ACKNOWLEDGEMENT. Grant of the Jubiläumsfonds of the Austrian Nationalbank (# 12121). EMCOOLS- Emergency Medical Cooling Systems AG, Vienna, Austria, provided the cooling device. Thomas Uray was employed at the Department of Emergency Medicine, Medical University Vienna, with support of a grant from EMCOOLS AG.

0881

AUDIT OF THE USE OF THE ARCTIC SUN® COOLING DEVICE AFTER OUT-OF-HOSPITAL CARDIAC ARREST

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INTRODUCTION. Induced mild therapeutic hypothermia (IMTH) has been shown to improve outcome after out-of-hospital ventricular fibrillation (VF) cardiac arrest, with survival to hospital discharge rates of 50% compared to 26-39% with standard therapy [1,2]. The optimal system for performing IMTH is not known. We audited the use of the Arctic Sun® 2000 non-invasive cooling device over a 1-year period in patients admitted after an out-of-hospital VF arrest.

METHODS. A retrospective review of 11 patients admitted to our intensive care unit over a period of 1-year who recieved IMTH was compared with the previous 3 years (2002-2005) patients (n=37), during which time all aspects of therapy have been similar. All patients had been resuscitated from an out-of-hospital VF cardiac arrest. IMTH was commenced within 1-hour of admission to hospital. No complications related to the use of the device were observed.

RESULTS. The mean time to achieve 33 °C was 2 (range 2-3) hours and the target temperature of 32-34 °C was maintained during this time. The mean time to re-warming (36 °C) was 6 (range 2-9) hours. Other data form this audit is shown in the table, presented as mean (range) or number. In comparison, our ICU data showed a hospital discharge rate of 34% after out-of-hospital VF arrest over the three years 2002-2005 (n=37 patients).

TABLE 1.

GCS on admission	3 (3-5)
Age	54 (39-81)
Time to CPR (minutes)	12 (0-25)
Time return spontaneous circulation (mins)	27 (15-54)
Survival to ICU discharge	8 (72%)
Survival to hospital discharge	6 (54%)

CONCLUSION. We found the Arctic Sun device easy to use and were able to achieve the target temperature within the recommended 4-hour period and maintain this during the period of therapeutic hypothermia. Our outcome data are encouraging and support the continued use of this device in resuscitated patients after out-of-hospital VF cardiac arrest.

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0882

IMPACT OF COOLING ON BIOCHEMISTRY AND REQUIREMENTS FOR CARDIOVASCULAR SUPPORT

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INTRODUCTION. We instigated therapeutic hypothermia on all prehospital cardiac arrests admitted ICU. We wished to monitor its impact on biochemical and cardiovascular parameters.

METHODS. As part of audit we monitor the impact of cooling on biochemistry and cardiovascular instability.

RESULTS. Within the 1st 24-hours 90% required Insulin, 70% required at least one fluid bolus, 50% recieved inotropes and sustained atrial fibrillation occurred in 30% of patients. Hypothermia was continued for the prescribed 24-hours in all patients.

Patient ID	**Insuline required within 24-hours**	**Lactate on admission**	**Lactate at 24-hours**
A	no	3.3	0.5
B	yes	2.1	0.9
C	yes	3.4	2.0
D	yes	8.8	1
E	yes	2.4	2
F	yes	6.4	3.5
G	yes	3.7	1.6
H	yes	2.6	8
I	yes	6.5	1.7
J	yes	6.6	2.1

Patient ID	**Fluid bolus 1st 24-hours**	**Intropic support 1st 24-hours**	**Arrhythmias 1st 24-hours**
A	yes	no	no
B	yes	no	no
C	yes	yes	no
D	yes	no	no
E	yes	no	no
F	yes	yes	no
G	yes	yes	no
H	no	no	yes
I	no	no	yes
J	no	yes	yes

CONCLUSION. Patients receiving therapeutic hypothermia following cardiac arrest frequently require insulin therapy and cardiovascular support.

0883

MANAGEMENT OF CASE OF DEEP HYPOTHERMIC CARDIAC ARREST

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INTRODUCTION. Management of severe hypothermic cardiac arrest1 has always been very challenging2. Victims can appear to be clinically dead because of marked depression of brain and cardiovascular function, and full resuscitation with intact neurological recovery is possible, although unusual.3 There have been reports of successful resuscitation in children with core temperatures as low as 14.2 degrees Celsius4 and similarly in adults down to 13.7 degrees Celsius.5 We describe a prolonged but ultimately successful resuscitation from hypothermic cardiac arrest utilising available algorithms6 and various re-warming methods.

METHODS. A thirty five year-old male was found unconscious in his backyard at around 11:00 where he may have been lying for more than twelve hours. He had a history of alcohol abuse and depression. Paramedics arrived and started cardiopulmonary resuscitation (CPR) as he was in asystolic cardiac arrest. He was transferred to Altnagelvin Area Hospital where his temperature on arrival was noted to be 19.5 degrees Celsius. CPR was continued and efforts to re-warm the patient were started. The various methods employed for re-warming were with warming blanket7, warm humidified oxygen, lavage through naso-gastric & urinary catheter, thoracic lavage8 through a chest tube drain and continuous venous- venous haemofiltration.

RESULTS. After five hours of continuous CPR and re-warming to a core temperature of 30 degrees Celsius ventricular fibrillation was seen on the cardiac monitor. Following three shocks he did convert to sinus rhythm with return of spontaneous circulation (ROSC) with a systolic blood pressure of 90 mmHg. He had a stormy intensive care course, but at the end of 23 days was discharged to the ward and has recovered very well with good neurological outcome.

CONCLUSION. This case illustrates successful resuscitation and excellent outcome in a case of severe and prolonged hypothermic cardiac arrest using aggressive CPR and re-warming in district general hospital without availability of cardiopulmonary bypass. 9.

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0884

THERAPEUTIC HYPOTHERMIA BY PASSIVE WHOLE BODY COOLING AFTER PERINATAL ASPHYXIA

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INTRODUCTION. Active cooling of either total body or selective head has been shown to be neuroprotective after perinatal asphyxia in two large randomized studies. We speculated that by accepting the spontaneous, so called endogenous neuroprotective hypothermic reaction of the asphyxiated newborn, mild hypothermia of $33.5 \pm 0.5\ ^{\circ}C$ might be induced and maintained as effective as active cooling with much less effort and equipment.

METHODS. From April 2005 until March 2007 all asphyxiated newborns were treated according to a strict protocol defining target rectal temperature, medication for sedation and analgesia, anticonvulsiva, blood pressure and ventilation goals and metabolic, coagulation and infection monitoring. Inclusion criteria were the same as in the NICHD study[1]: 10 min Apgar score of 5 or less, severe acidosis at 1hour after birth (pH 7.0 or less or BE 16 mmol/l or more) or a continued need for ventilation 10 min after birth; plus clinical signs of moderate to severe encephalopathy (according to Sarnat stages) or seizures. Exclusion criteria were: GA < 35 weeks and birth weight of < 2000g, severe malformations, inability to enroll by 6 hours of age or therapy resistant shock, bleeding or respiratory failure. Cooling was achieved by turning off the ambient heating systems and adding cold-packs at the infants head and chest if needed.

RESULTS. 9 patients were included and were cooled passively only. We defined hypothermia start once rectal temperature was documented to have reached $35\ ^{\circ}C$ or less. This was achieved on average 4.4 ± 1.8h (SD) after birth with an average temperature of $34.3 \pm 0.9\ ^{\circ}C$. 1h into hypothermia target temperature was reached with $33.9 \pm 0.9\ ^{\circ}C$. From 1h to 72h of hypothermia overall average rectal temperature was $33.6 \pm 0.7\ ^{\circ}C$. One patient showed cardiac arrhythmia due to the combination of hypothermia and hyperkaliemia of 7.2 mmol/l, easily treated by calcium. This newborn as well as 3 others had therapy withdrawal within 48-72h because of unfavorable neurological prognosis estimated by EEG.

CONCLUSION. These preliminary data demonstrate the feasibility of passively achiving mild hypothermia in infants with hypoxic-ischemic encephalopathy. Compared to the NICHD[1] study, target temperature was reached faster after birth and without initial hypothermic overshoot. This approach appears to be simple and effective, allowing early start of hypothermia and earlier achievement of target temperature, which might further improve longterm outcome.

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0885

CAN HYPOTHERMIA BE THE SINGLE POSSIBLE METHOD OF EFFECTIVE ICP CONTROL?

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INTRODUCTION. Algorithm of intracranial hypertension (ICH) therapy is well-known for patients with TBI or SAH. However there are some clinical situations when another priority of chosen intracranial pressure (ICP) control method is necessary. Illustration of that is intracranial hypertension after complicated pituitary surgery.

METHODS. A case report of a 26-year old male with giant pituitary adenoma. He recovered after transcranial removal. CT-investigation revealed blood imbibition tumor remnants. Neurological deterioration developed on the second postoperative day due to the increasing of brain edema, verified on CT-investigation. He was intubated and artificially ventilated. ICP monitoring was performed. Transcranial Doppler revealed accelerated velocity of blood flow. There were fluid-electrolytes disturbances with polyuria episodes with sequences of hypernatremia and hypovolemia due to diabetes insipidus. Desmopressin acetate was successfully used for correction of diabetes insipidus.

RESULTS. ICP monitoring revealed severe intracranial hypertension (30 -45 torr). Sedation with propofol (45 mkg/kg/min) and fentanyl (0,02 mkg/kg/min), relaxation with pipecuronium (0,5 mkg/kg/min), 300 elevated head bed-side did not decrease ICP. Lateral ventricles could not be drainaged due to severe brain edema. Glucocorticosteroid therapy was ineffective because deterioration was determined by hemorrhagic insult. Hyperventilation was contra-indicated because of vasospasm. Osmotherapy could not be used as there was a high risk of new episodes of rebleeding and provocation of uncontrolled polyuria. Induced arterial hypertension to achieve adequate level of cerebral perfusion pressure was objectionable because this manoeuvre would increase the probability of rebleeding. Surgical approach consisted in contra-indication of the decompressive craniotomy. In this clinical situation mild hypothermia was the single possible method of effective ICP control. Sedation and relaxation were continued. The patient was cooled to 33 – 340 C. During 2-hours period ICP was normalized to 10 - 15 torr, and then ICP was stable. Hypothermia duration lasted 24 hours. Then patient was gradually rewarmed. He was at ICU during 14 days. He left hospital and patient returned to work 2 months later.

CONCLUSION. ICH after complicated pituitary surgery frequently requires different management than for patients with TBI or SAH. Mild hypothermia can be the single possible method of effective ICP control in complicated pituitary surgery. Further investigations are necessary.

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Poster Sessions
Poisons 0886-0895

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PHARMACOKINETIK / PHARMACODYNAMIC RELATIONSHIPS IN HUMAN ACUTE GAMMA-HYDROXYBUTYRATE INTOXICATIONS

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INTRODUCTION. Incidence of gamma-hydroxybuturate (GHB) intoxication is increasing in relation to its use as recreational or illicit agent in drug-facilitated assaults. Pharmacokinetic / pharmacodynamic (PK/PD) relationships have not been evaluated in this poisoning. Our objective was to study the relationship between the coma depth and plasma GHB concentration.

METHODS. Patient admitted in our ICU in 2006-2007 for a deep coma in the context of GHB intake were included. Coma depth was prospectively assessed using the Glasgow Coma Scale (GCS). Plasma GHB concentration was concomitantly measured using mass spectrometry (quantification threshold: <1 mg/l). The results were presented as median [25%-75% percentiles]. The modeling of PK-PD relationships was performed using WinNonlin® software. This study was approved by our institutional ethic committee.

RESULTS. PK-PD relationships were studied in 4 patients (4M, age: 28 years [27-35], SAPS II: 41 [39-45]). Among them, two patients co-ingested ethanol (concentrations: 1.7 and 0.6 g/l), and one MDMA. One patient declared a usual intake of GHB. Another one was victim of GHB-facilitated assault. The GCS was 3 in all patients. Plasma GHB concentration was 152 mg/l [162-322]. During the course of poisoning, PK-PD relationships between coma depth (E, E_{max}=15, E_0=3) and plasma GHB concentration (C) fit the sigmoidal Emax model $E = E_{max} \cdot C^n / [C_{50}{}^n + C^n] + E_0$ (Hill coefficient (n): 9.9 [9.6-9.9], C_{50}: 134 mg/l [116-165], R^2: 0.98 [0.95-0.99]). A maximal toxic effect (GCS: 3) was associated with a wide range of GHB concentrations, suggesting the existence of a saturation of the GHB receptors in vivo. The high values of the Hill coefficient demonstrated that a small decrease in plasma GHB concentrations near the C50 was associated with a dramatic improvement in the level of consciousness (on/off curves). PK/PD relationships varied in relation to the existence of a tolerance in case of chronic GHB consumption or pharmacodynamic interactions, such as co-ingestions.

CONCLUSION. Our results clearly showed that PK-PD relationships can be helpful to understand the individual variability of human response to GHB.

0887

A STUDY OF PROGNOSTIC FACTORS IN ORGANOPHOSPHOROUS AND CARBAMATE POISONING IN INDIA

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INTRODUCTION. Insecticides are being used worldwide in increasing quantities for control of insects which affect agriculture. Poisoning with insecticide is one of the major health hazard in the current scenario. In this study, an attempt has been made to study the different factors that may influence the outcome in a patient with OP or carbamate poisoning.

METHODS. 80 cases of Organophosphorous (OP) and Carbamate poisoning admitted to M. S. Ramaiah Hospital,Bangalore over a period of 1 1/2 years from July 2005 to December 2006 were studied with respect to the probable prognostic factors. Details of the patients were entered in a suitably designed data collection form. Guidelines were prepared for the management of these patients as per the hospital protocol based on standard text books and published literature. Serum Cholinesterase was measured by colorimetric method using cholinesterase reagent kit(RAICHEM ®). Parameters studied were–type of insecticide, quantity, time for first aid,co-morbid conditions, muscarinic/nicotinic features, serial serum cholinesterase, Bardin grading of severity, total dose and duration for atropinization,total quantity and duration of atropine given,the events occuring due to insecticide poisoning including development of respiratory insufficiency, intermediate syndrome, OPIDN, ventilator support and outcome.

RESULTS. Most patients were young,with agricultural background and had consumed the insecticides with suicidal intention. OP was the most common group of insecticides and Dimethoate was the commonest OP consumed. In this study,it was found that the occurrence of adverse events due to OP/Carbamate poisoning was high in older patients(Age>40 years),OP class of insecticide,presence of combined muscarinic and nicotinic features,severe toxicity according to Bardin Grading,presence of co-morbid conditions,delay in hospitalization and first aid,delayed time for atropinization,low serum cholinesterase levels or a fall in serum cholinesterase levels. The quantity of poison consumed is probably not of prognostic value for the development of Intermediate Syndrome and Organophosphate Induced Delayed Neuropathy but may be of predictive value for development of Respiratory Insufficiency requiring ventilator support.

CONCLUSION. Insecticide poisoning represents a substantial burden on an agricultural country like ours. OP and Carbamates are among the commonly used insecticides. The present work was focused to draw attention to the factors that affect the outcome in a patient exposed to OP compound. Atropine and Pralidoxime are the mainstay in treatment of OP poisoning and early recognition with prompt treatment of complications is of great significance in modifying the morbidity and mortality of OP poisoning. The role of mechanical ventilator support deserves a special mention to treat such complications and reduce mortality.

0888

UNUSUAL PRESENTATION OF PENDIMETHALIN POISONING: A CASE REPORT

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INTRODUCTION. Pendimethalin is a commonly used herbicide which is slightly toxic if ingested, inhaled or absorbed through the skin. Studies indicate that ingested pendimethalin is largely unabsorbed by the bloodstream and excreted through the feces. Pendimethalin which does become absorbed into the bloodstream from the gastrointestinal tract is rapidly metabolized in the kidneys and liver and is then excreted in the urine(1). Pendimethalin shares a similar chemical structure with nitro compounds such as dinitrobenzene, which was previously demonstrated to cause methemoglobinemia in mammals. However, reports on pendimethalin poisoning in humans are rare(2). Pendimethaline is marketed in India by Rallis India, as trade name of PENIDA 30% EC, being widely used for the control of weeds in wheat, musterd, groundnut, cotten, soyabean and a range of crops.

METHODS. We report an unusual presentation of pendimethalin poisoning in a 21 year old female who presented to casualty in semiconscious state (GCS- E3V2M3) after suicidal ingestion of about 300 ml of pendimethalin. Patient was having irregular respiration, cyanosis was present and her oxygen saturation was 70% on room air, her blood gas analysis showed hypoxemia without any metabolic acidosis. The pupils were semi dilated and reaction to light was sluggish. There was no history of trauma, seizures, incontinence and vomiting. She was intubated and put on mechanical ventilation following which her hypoxemia was corrected. Gastric lavage was done and supportive management was started. Within one hour she became comatose along with flaccid paralysis of all four limbs (power0/5). On fourth day she was tracheostomized and weaned off from the ventilator.

RESULTS. In her twenty days stay in the ICU the patient didnot regained consciousness , her flaccid paralysis persisted and she developed dysautonomia. As part of neurological workup a CT scan head, a MRI brain and spine and a CSF analysis were done and found to be normal. Rest of the routine investigations were normal except for a moderate rise in liver enzymes. The patient eventually died of secondary sepsis and multiorgan failure after forty days without any neurological improvement.

CONCLUSION. The persistence of coma and flaccid paralysis is unique in the setting of pendimethalin poisoning and has not been reported till date.

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0889

THE INTENSIVE CARE PHYSICIAN AS A CRIME SCENE INVESTIGATOR: CASE REPORT OF TWO COCAINE BODY PACKERS.

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INTRODUCTION. The process of swallowing or inserting packets of illegal drugs for the purpose of evading law enforcement officers carries risks other than criminal charges and consequences can be fatal. Individuals engaged in such actives are called "Body Packers" or "Mules". The most frequent cause of death among body packers is acute drug intoxication due to rupture of the package(s) within the gastrointestinal tract. In the event of a cocaine intoxication due to rupture of a package, an emergency surgical exploration should be carried out. This report takes into consideration the complications due to "body packers" cocaine absorption. In particular we present a case of two "body packers" with different outcomes: one fatal and another non-fatal.

METHODS. Case Report
A 23 year old male with unknown medical history, traveling by plane from Cancun to Birmingham, started seizures after 7 hours of flight. He was treated on board with intravenous diazepam. The pilot performed an emergency landing to transport the patient to the nearest hospital. After landing another passenger, a 27 year old female started convulsing and went into cardiopulmonary arrest with no response to CPR. The male patient was admitted to our hospital presenting tonic-chlonic seizures and opisthotomus, hypertension, tachycardia and hyperthermia. He was sedated with midazolan, an endotracheal tube was placed and assisted ventilation was initiated. Urine samples were positive for cocaine and ecstasy.

RESULTS. Considering all the facts (clinical and laboratory signs of cocaine intoxication, hours of flight and death of one passenger with similar clinical signs) the intensivist immediately thought that he could be a drug smuggler with leakage of packets'contents. AbdominalCAT scan showed several oval foreign bodies inside the patient's stomach. Emergency surgery was performed and a total of 40 packets were extracted from the patient's stomach and colon, one of which was ruptured. Sedation and assisted ventilation were maintained for several hours and overall outcome was good. The post-mortem examination of the female patient revealed 60 similar packets, some ruptured.

CONCLUSION. Cocaine is a powerful sympathomimetic and central nervous system stimulant, an overdose of which causes primarily cardiac, neurological and psychiatric effects. The cocaine body packer syndrome is seen in drug traffickers swallowing hermetically packed cocaine. The prompt identification of the syndrome and aggressive surgical treatment of one of the patients prevented his death. The death of the other patient was probably related to the fact that more packets were ruptured and higher cocaine levels occurred.

0890

WATER-ELECTROLYTES DISTURBANCES AND THEIR TRANSFORMATION AFTER CRANIOPHARYNGEOMAS REMOVAL IN PEDIATRICS

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INTRODUCTION. Postoperative diabetes insipidus (DI) after craniopharyngeoma (CF) resection in the majority of the patients is transient and reliably corrected with Desmopressin acetate. The removal of giant CF leads to polyhormonal insufficiency (PGI). 3 described postoperative water-electrolytes disturbances (WED) in patients with PGI differs from DI and they may interchange.

METHODS. It was a prospective cohort study during the period 1990-05. 152 pediatric patients underwent removal of giant CF and uncommon WED were involved. All patients received a standard postoperative hormone therapy, desmopressin acetate if polyuria due to DI. Blood and urine samples were investigated once per 3 – 6 hours during all the period of WED. Hormone level was investigated twice a week. Fluid balance and urine output flow were calculated every hour.

RESULTS. During postoperative days 1 – 2 all patients had a typical pattern of DI. Then DI manifestations either became other types of WED or DI co-existed with another abnormalities. There were 3 ways of these phenomena.
1st variant developed in 32% of cases. It appeared in decreasing of urine output, arise of urine osmolarity and patients' weight. Hyponatremia in blood samples was revealed. Cortisol level was 260±32 nmol/l. Thyroxin level was slightly decreased. SIADH was diagnosed. Therapy was corrected in accordance with recommendations of SIADH treatment.
2nd variant developed in 41% of cases. Polyuria developed (urine output >1 ml/kg/h). Urine osmolarity and its sodium level were unstable. Plasma osmolarity was normal or decreased. Sodium level was normal or slightly decline. Cortisol and thyroxin levels were normal. Postoperative DI coexisted with cerebral salt wasting syndrome in these cases. Desmopressin acetate was combined with Fludrocortisone. This maneuver was successful.
3rd variant developed in 27% of cases. Patients' condition was grave and unstable. Urine output ranged from 0.5 to 5 ml/kg/h. Hypernatremia alternated with hyponatremia. Plasma and urine osmolarity was extremely unstable (260 – 340 mosm/l, 300 – 1500 mosm/l, respectively). Severe PGI was confirmed both clinically, and by laboratory findings of hormone levels: cortisol<150 nmol/l, T3<1,2 nmol/l, T4<60 nmol/l. Arterial hypotension developed. Diffuse edema was common. This type of WED is intimately connected with delayed secondary diencephalon damage. Patients of this group had the highest level of mortality. If therapy was effective the outcome was favorable and all types of WED transformed to DI again during a period of postoperative days 15 – 30.

CONCLUSION. Typical feature of complicated postoperative period after removal of giant CF is PGI manifested in transformation of postoperative DI to other types of WED. Transformation of 4 determined variants of WED one into another depends on the variant of development or regress of PGI.

0891

THE USEFULNESS OF TRANSCRANIAL DOPPLER IN SUPRATENTORIAL TUMOR IN CRITICAL CARE UNITS

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INTRODUCTION. Transcranial Doppler (TCD) ultrasonography is a technique that uses a hand-held Doppler transducer to measure the velocity and pulsatility of blood flow within the intracranial and the extracranial arteries. TCD is primarily a technique for measuring relative changes in flow. The utility of the technique is now well established for a number of different disease processes. TCD has been frequently employed for the clinical evaluation of cerebral vasospasm following subarachnoid haemorrhage (SAH). To a lesser degree, TCD has also been used to evaluate cerebral autoregulatory capacity, monitor cerebral circulation during cardiopulmonary bypass and carotid endarterectomies and to diagnose brain death. This review critically evaluates the evidence for the use of TCD in the critical care population.
One of the supratentorial tumors complications is increased ICP that cause headache, vomiting and in severe cases , loss of consciousness. It depends on size, location and speed of tumor growth. TCD is an available and noninvasive technic to detect increased ICP. Findings consist of decrease in diastolic flow and spiky systolic peaks.

METHODS. We had been allocated 42 neurosurgical icu patients ,then estimate pre & post operation cerebral blood flow & MCA,PCA,ACA velocities. In post operation, vasospasm can be detected in TCD as increasing in the flow velocities. Although severe vasospasm can be associated with reduced regional CBF. So there is a linear, inverse relationship between severity of vasospasm and amplitude of flow velocity increase. Ratio of MCA to ICA ;distinguish vasospsm(ratio more than 3) from hyperemia.(hemispheric index or Lindegard ratio).

RESULTS. If the tumor size is large and its perfusion is from one of the major intracranial arteries, changing in blood flow in those arteries can be detected by TCD.
After trauma and probably in post operation patient there is impaired brain auto regulation ,this can be observed as increased PSV. There is no documented evidence for impaired cerebrovascular reactivity in these patients, but it can be evaluated with TCD to predict the risk of cerebral ischemia.

CONCLUSION. In critical care units, neurophysiological monitoring like TCD and EEG have decreased the risk of many neurosurgical procedures.

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0892

ATYPICAL DIABETES INSIPIDUS IN A PATIENT WITH GAINT PITUATORY ADENOMA.

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INTRODUCTION. Diabetes insipidus is a common complication in neurosurgery. We present a case of pituatory adenoma operated and developed diabetes insipidus in post operative period having atypical presentation as hypernatremia without polyurea.

METHODS. Male patient aged 43 years presented with blurring of vision for 3 years. MRI showed huge sellar and suprasellar tumor. Pre operatively patient had depressed sensorium with GCS of 11. On investigation T3,T4 and cortisol levels were reduced and other biochemical and radiological investigations were normal. This patient was posted for tumor decompression by craniotomy. Surgery was uneventful, 1 week later patient deteriorated in sensorium, on evaluation patient was dull with GCS 8, biochemical reduced T3,T4 and TSH, patient on eltroxin 100mcg once daily, CT scan showed residual tumor with multiple thalamic infarct. Patient was intubated and ventilated, patients serum sodium level increased to 160mmol/lt, serum osmolality 336.11mosm/kg with corresponding urinary sodium 51.5 mmol/lt and urine osmolality of 327.75mosm/kg, without polyurea, other causes of hypernatremia was ruled out. This persisted for 10days, patient was given adequate fluids with extra water through ryles tube based on calculated water deficit. Patient developed sepsis then landed in septic shock. Patient was treated with antibiotic based on sensitivity and haemodynamic was supported with dopamine initially,then started on injection vasopressin as infusion to stabilise haemodynamics. Patient responded to antibiotic and vasopressin, This stabilised haemodynamic and sepsis, serum sodium levels became normal with in 8 hours of starting of vasopressin and even reached lower levels by 24 hours to 128mmol/lt. vasopressin was tapered in 2 days and stopped, immediately after stopping patient developed polyurea which responded to intranasal desmopressin. This stabilized urine output and serum electrolytes to normal range, subsequently patient was continued with desmopressin spray. Patient required ventilatory support for 2 months, patient was weaned subsequently and shifted to ward.

RESULTS. Patient was successfully managed with vasopressin and antibiotics, this helped in stabilising haemodynamic and diagnosing diabetes insipidus.

CONCLUSION. Diabetes insipidus following sellar and suprasellar tumor surgery is a common complication, this usually manifest as polyurea and hypernatremia, our case had only hypernatremia with out polyurea probably due to Sepsis causing early renal involvement and reducing out put. Tumor involving hypothalamus and destroying its centre which regulate thirst and urine output. Vasopressin was useful in this case in stabilizing haemodynamics and diagnosis of diabetes insipidus.

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CARDIAC OUTPUT MONITORING IMPORTANCE FOR IMPROVEMENT OF OUTCOMES AFTER BASAL BRAIN TUMORS SURGERY

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INTRODUCTION. We would like to discuss prognostic criteria of hemodynamics changes in patients after hypothalamic and brain stem surgery. We hope that better understanding of mechanisms of adaptive disorders in local brain lesions will help in optimization of postoperative management of these patients.

METHODS. Cardiac output by means of echocardiographic method, others hemodynemics and humoral parameters was investigated in first week after operation in 139 patients with tumors of hypothalamic area (adenomas of hypophysis, craniopharyngiomas, tumors of the bottom third ventricle) 148 patients with lesions of brain stem structures.

RESULTS. We consider that unfavorable hemodynamics changes may be used as prognostic criteria of severe damage of regulatory centers in hypothalamus or brain stem such as hypophysotropic area of hypothalamus and dorso-medial part of medulla oblongata. It's clear for us that favorable type of hemodynamics changes is a kind of postoperative stress reaction. This is of reduced type reaction after hypothalamo-hypophisis surgery, or reaction was delayed and grew to its peak till third day after brain stem surgery. The main character of unfavorable type of hemodynamic was decrease of cardiac output(CO). However the cause of this decrease are quite different. In case of severe damage of hypophysotropic area of hypothalamus the decrease of cardiac output is connected with decreased of blood volume and the last is connected with decrease of neurosecration of vasopressin. In case of severe damage of dorsomedial part of medulla oblongata the reason of decease of cardiac output is a primary neurogenic cardiac insufficiency. In cause of severe damage of hypothalamic structures we see increasing the amplitude power spectral density (PSD) of respiratory periodic of heard rate variability (HRV), decreasing the amplitude of low frequency peak and very high degree of coherence between HRV and respiratory variability (RV). In cause of severe damage of brain stem structures on the PSD of HRV we can see low frequency components only. But high frequency component and coherence between HRV and RV were absent. We postulate that these differences of HRV showed that in all causes the hemodinamic disturbance a new inadequate type of cerebral regulation of hemodynamic forms.

CONCLUSION. Our investigations showed that HRV and RV monitoring is useful diagnostic methods makes possible to determining the state of brain regulatory structures in patients after excision of tumors of hypothalamic and brain stem localization. Obtained data have allowed to develop algorithms of intensive therapy of the revealed hemodynamics changes and to improve an outcome of the postoperative period.

0894

DELIRIUM IMPACT IN A SURGICAL INTENSIVE CARE UNIT

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INTRODUCTION. Delirium is a common but under-diagnosed and under-treated problem especially in the surgical intensive care unit (SICU). It has been associated with increased morbidity and mortality, prolonged length of stay and functional decline. The Confusion Assessment Method (CAM) is a simple tool (validated for portuguese language) to be applied for health care professionals previously trained for delirium detection. We describe characteristics, risk factors and related mortality of patients who presented delirium and also compared delirium diagnosed by CAM in relation to a question about presence of unclear thinks 24 hours before.

METHODS. Five hundred and fifty-four consecutive subjects were prospectively studied in a SICU of a tertiary care hospital between November 2005 and July 2006. Delirium was evaluated in a daily basis by a group of nurses previously trained using the CAM tool applied twice a day, five days a week and also asked if patients have had unclear thinks 24 hours before. We describe information on demographics and initial severity of illness. Delirium data was collected as total number of occurance and compared with: presence of bladder and central line catheters, use of feeding tube, prescription of narcoleptics, opioids and benzodiazepines; and laboratory data as usual inflammatory markers. It was compared with delirium or non-delirium groups. The results are expressed as mean standard deviation (SD). For statistical analysis was used chi-square for evaluated difference of proportion, and considered statistical significance $p<0.05$.

RESULTS. One hundred and sixty-five females and two hundred and fifty-nine males were studied. The mean age and APACHE II score were 60.9±14.98 years and 9.95±5.17 respectively. Delirium occurred in 42 patients (7,0%). The mean onset after admission was 2.64±2.31days and the mean duration was 1.70±1.16 days. Presence of unclear thinks resulted in a sensitivity and specificity of 81% and 91% respectively for delirium diagnosis. Delirium group were older: 60,10±17,60 years vs 70.20±19,64 years (p=0.001); presented higher APACHE II score 9.71±5.09 vs 12.95±5.27 (p=0,001); and higher length of stay 4.92±12.15 days vs 8.95±8.14 days (p=0.038). Use of feeding tube was related to delirium (p=0,001). Neither prescription of narcoleptics, opioids and benzodiazepines drugs nor mean titulated C reactive protein (CRP-t) and white blood cells count showed difference between groups. Mortality was similar between groups.

CONCLUSION. The incidence of delirium was lower than expected. Older patients and higher APACHE II score were independent risk factors for delirium development. Delirium is related with higher length of stay but not with mortality. Asking patients about unclear thinks may help to diagnose delirium in patients at risk.

0895

"INTERRUPTION OF SEDATION - WHY NOT?"

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INTRODUCTION. The aim of this paper is to identify the reasons for the no utilization of the daily interruption sedation protocol by medical staff.

METHODS. We studied the first ten patients admitted in October, 2006 and who required both mechanical ventilation and continuous infusion of sedatives and analgesics. The population studied included: 08 entubated patients coming from the OR, being 05 post-brain surgery patients, 01 post-abdominal surgery patient, and 02 with extubation failure, and 02 patients coming from the ER, being 01 presenting sepsis and suspected ischemic colitis, and 01 presenting respiratory failure after tracheotomy canula deslocation.

RESULTS. Out of the 10 patients studied, no one had their interruption of sedation proposed by the doctor on duty. The reasons for the no interruption were various, and since there was no impossibility, all patients had their sedative and analgesic interrupted. Out of the 05 neurosurgery patients, for whom the alleged reason for the no interruption of sedation was based on the necessity of tracheotomy due to the surgical prognostics, 02 were extubated 72 hours after the interruption of sedation, and 03 underwent tracheotomy with local analgesia and single doses of intravenous analgesic. The abdominal surgery post-op patient was extubated 3 hours after the interruption of sedation, being the alleged reason for the no interruption the poor adaptation to the mechanical ventilation on the previous day due to a metabolical acidosis already corrected. The patients presenting extubation failure in the OR were successfully extubated. The first patient presenting recirculation of drugs and a questionable respiratory arrest was extubated 03 hours after the interruption of sedation, and did not require brain CT, which had been previously alleged as a reason for the no interruption. The second patient who presented pos-extubation acute hypertensive lung edema was successfully extubated one hour later. The reason for the continuation of sedation was the X-ray of chest that showed congestion and poor P/F, which was, however, later solved by diuretical stimulus and BP control. The patient presenting sepsis and suspected ischemic colitis was extubated 48 hours after the suspension, and underwent colonoscopy with no need of sedation, since there was still residual sedation (being the colonoscopy the alleged reason for the no interruption of sedation). The patient with canula dislocation was removed from mechanical ventilation one hour after the suspension of sedation.

CONCLUSION. None of the ten patients had to return to sedation, evidencing that, more important than the use of new protocols, is the on-going evaluation of the use of those protocols by the medical staff. Protocols should be largely understood and discussed before becoming part of the daily routine of intensive care.

GRANT ACKNOWLEDGEMENT. Hospital Sao Lucas/Amil, Rio de Janeiro

0897

COMPARISON OF AUDITORY EVENT-RELATED POTENTIALS (ERPS) WITH BIS INDEX AND ENTROPY AS MEASURES OF SEDATION IN THE ICU

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INTRODUCTION. Inadequate deep sedation with prolonged ICU stay is a major problem in critically ill patients. Processed EEG parameters like BIS Index (BIS) and the more recent State Entropy (SE) and Response Entropy (RE) have been suggested in the ICU as sedation monitoring tools, demonstrating mixed results. We have used auditory event related potentials (ERPs) as an instrument to objectively discriminate between clinically important sedation levels in healthy volunteers. The aim of this study was to evaluate processed EEG parameters and auditory evoked potentials as objective tools in the assessment of sedation in patients recovering from anesthesia.

METHODS. 10 patients after elective thoracic or abdominal surgery with general anesthesia were included. EEG, BIS, SE + RE and ERPs were recorded before and immediately after surgery in the ICU at Richmond Agitation-Sedation Scales (RASS) -5 (very deep sedation), –4 (deep sedation), -3 to –1 (moderate sedation), and RASS 0 (awake) during decreasing target-controlled sedation with propofol and remifentanil.

RESULTS. The main results are presented in Table 1. Prediction probability P_K values are 0.94 (BIS), 0.88 (SE), 0.89 (RE) and 0.72 (ERP). (A value of $P_K = 0.5$ means that the parameter predicts the steps with no better than a 50:50 chance. A value of $P_K = 1.0$ means that the parameter predicts the steps correctly 100% of the time).

TABLE 1.

	baseline	RASS -5	RASS -4	RASS -3/-1	RASS 0
BIS*	94 (4)#	47 (15)#	68 (9)#	75 (10)#	88 (6)
SE*	87 (5)#	46 (10)#	60 (22)#	74 (21)	87 (3)
RE*	97 (4)#	48 (9)#	71 (25)	81 (18)#	96 (3)
ERP	-7.7 ± 3.0	-2.4 ± 1.6	-2.4 ± 1.7	-2.9 ± 1.6	-3.6 ± 1.7

*median (IQR); * p<0.05 Friedman, # p<0.05 between adjacent sedation levels*

CONCLUSION. Neither processed EEG parameters nor ERP provide sufficient discrimination between very deep, deep to moderate and no sedation after general anesthesia. The high inter- and intra-individual variability precludes the definition of a target range for different sedation levels.

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0896

COMPARISON OF CARDIAC OUTPUT DETERMINATION BY THERMODILUTION AND ARTERIAL PULSE WAVEFORM ANALYSIS IN PATIENTS WITH AORTIC STENOSIS UNDERGOING AORTIC VALVE REPLACEMENT

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INTRODUCTION. The analysis of the arterial pulse waveform to continuously assess cardiac output (CO) is discussed to be of value in critically ill patients. We evaluated this method in patients with aortic stenosis, a high-risk patient group who might benefit from extended hemodynamic monitoring.

METHODS. In 30 patients with aortic stenosis, undergoing aortic valve replacement, cardiac output was assessed in triplicate by thermodilution via pulmonary artery catheter (COPAC) and by pulse wave analysis (COPW, FloTrac/Vigileo, Edwards Lifesciences, Irvine, USA) at four sample points before and after valve replacement (A, after anesthesia induction; B, after sternotomy; C, after termination of extracorporeal circulation; D, after chest closure). Statistical analysis was performed by assessment of the repeatability coefficient of each method and calculation of the percentage error, the bias, and the limits of agreement between methods.

RESULTS. The repeatability coefficient of COPAC and COPW was 0.89 l/min and 1.04 l/min at A, which corresponded to 24% of COPAC and 26% of COPW, and increased to values between 30% and 33% of CO at the other sample points. The bias between COPAC and COPW was not significantly different from zero at all sample points. The limits of agreement were ± 1.42 l/min at A and ±1.82 l/min at B, which corresponded to a percentage error of 36% and 39%. At C and D the scattering of the differences between methods increased with a percentage error of 0.56 and 0.46, respectively.

CONCLUSION. The repeatability of COPAC measurement, as well as COPW, is limited in patients with aortic stenosis and low CO, compared with previously reported criteria for the thermodilution method (1). In the time period after termination of cardiopulmonary bypass the repeatability of both methods, as well as the agreement between methods, decreased markedly. This phenomenon may, at least partly, be attributed to increased hemodynamic fluctuations after cardiopulmonary bypass. In view of this inherent error of CO measurement, the precision of COPW measurement seems to be acceptable in patients with aortic stenosis, a systematic error between methods could not be observed. Our data indicate that arterial pulse waveform analysis can be used to provide extended hemodynamic monitoring in these high risk patients from existing arterial lines.

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GRANT ACKNOWLEDGEMENT. Fund of Edwards Lifesciences, Irvine, USA

0898

HYPOXIC PULMONARY VASOCONSTRICTION CAN BE ASSESSED BY ELECTRICAL IMPEDANCE TOMOGRAPHY

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INTRODUCTION. Electrical impedance tomography (EIT) is a promising new medical imaging modality. Most of the lung-oriented studies performed so far have examined the ability of EIT to determine regional lung ventilation and aeration. However, EIT can detect not only the changes in regional electrical impedance associated with variation in regional lung air content but also those caused by changes in the pulmonary vascular bed dimensions. The aim of our study was to evaluate if EIT is able to determine acute hypoxic pulmonary vasoconstriction during one-lung ventilation in patients.

METHODS. The study was approved by the local ethics committee and written informed consent was obtained from all patients. Eight mechanically ventilated patients (age: 67 ± 7 years (mean ± SD), body weight: 77 ± 9 kg, height: 173 ± 7 cm) intubated with a double-lumen endotracheal tube were studied during bilateral and unilateral ventilation of the right or left lungs. EIT measurements were performed using the Goe-MF II system (Viasys Healthcare, Höchberg, Germany). The patients were ventilated with a constant tidal volume of 800 ml and 400 ml during bilateral and unilateral ventilation respectively. EIT data were acquired at a rate of 13 scans/s. The variation of relative impedance changes synchronous with the heart rate was evaluated in the right and left lung regions. The heart region was omitted from analysis. The ratio of the sums of relative impedance changes in the right and left lung regions was determined. Statistical analysis was performed by repeated ANOVA with Bonferroni's multiple comparison test. P values <0.05 were considered significant.

RESULTS. The mean ratio of the sums of relative impedance change between the right and left lung regions was 1.13 ± 0.21 during bilateral ventilation. The ratio value decreased significantly to 0.85 ± 0.15 during the separate ventilation of the left lung and increased significantly to 1.44 ± 0.38 during the ventilation of the right lung. The latter results indicate that in both cases vasoconstriction occurred in the vascular bed of the non-ventilated lung. Hypoxic pulmonary vasoconstriction was accompanied by vasodilation in the ventilated lung as the sums of heart rate-related relative impedance changes over both the right and left lung regions did not significantly differ from each other (0.57 ± 0.23 vs. 0.55 ± 0.24 during ventilation of the left and right lung respectively). These values were not significantly different from bilateral ventilation (0.62 ± 0.24).

CONCLUSION. Our results indicate that regional hypoxic pulmonary vasoconstriction was reliably determined by EIT during one-lung ventilation. The performance of EIT in detecting hypoxic pulmonary vasoconstriction in even smaller lung regions remains to be established.

0899

DECREASED SPATIAL DISTRIBUTION OF VIBRATION ENERGY IN LUNGS WITH ACUTE HEART FAILURE

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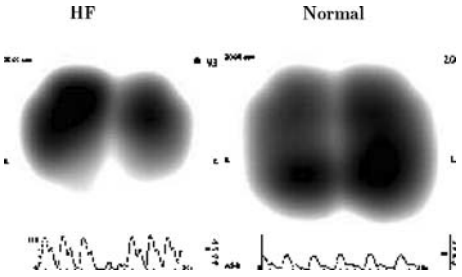
INTRODUCTION. Vibration response imaging (VRI) is a novel technology using sophisticated software and 34 surface skin sensors placed on the back to record, analyze and display vibration energy of lung sounds during the respiratory cycle. It is a likely surrogate of airflow in the lungs (1). The purpose of this study is to compare VRI in acute heart failure (AHF) to those with a normal chest x-ray.

METHODS. We performed VRI in 9 consecutive AHF subjects in the emergency department (ED) and ICU and compared them to 12 controls (without pulmonary disease). Recordings were performed over 20 second periods of respiration. Respiratory cycles free of noise or artifacts were chosen for analysis and images were analyzed. The images at maximum vibration energy during inspiration were chosen and areas were compared. Areas of right and left lungs and regional areas of both lungs were calculated digitally using the program Image J. Statistical t-test was used to compare total mean lung areas.

RESULTS. The total mean areas of both lungs were 56756.9± 8231.4 and 76170.2 ±3843.2 (mean ± SD) in AHF patients and normals, respectively (p = 0.01). The mean upper region areas of both lungs were 35220.6± 3497.9and 36423.5± 2398.3 (mean ± SD) in AHF patient and normals, respectively (p = 0.11). The mean lower region areas of both lungs were 17119.7±6461.1 and 39634.5± 4651.1 (mean ± SD) in AHF subjects and normals, respectively (p = 0.01). (Figure 1).



CONCLUSION. Distribution of vibration energy was shifted away from lower lung regions in patients with AHF compared to normal subjects. Pulmonary edema predominating in lower lung regions or pleural effusion (4 subjects had radiographic support for pleural effusion) may be the physiologic explanation.

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0900

ALARM RULES IN INTENSIVE CARE MONITORING – A DATA DRIVEN APPROACH

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INTRODUCTION. The high rate of false positive or clinically not relevant alarms from patient monitors is still a concern in critical care. False alarms are an issue even with the latest generation of monitoring devices and can cause mistrust in the alarm system. This reduces the caregivers' willingness to react to them, the so-called "crying wolf effect". Better alarm rules are needed to reduce the false alarm rate. Since it is very difficult, if not impossible, to set up universal rules from expert knowledge, machine learning techniques can be applied to deduct rules from annotated data.

METHODS. Complete high-resolution monitoring data was acquired from 55 critically ill patients on the medical ICU of the University Hospital Regensburg. All alarms were annotated as "true" or "false" by an intensivist. New alarm rules were learned from the data by a classification method called "Random Forrest". A Random Forrest is an ensemble of decision trees which "vote" for the class membership of an alarm situation. Usually, a situation is classified as not alarm relevant, if more than c=50% of the trees vote for this. Misclassification of an alarm relevant situation as not alarm relevant may be considered more dangerous than vice versa. Therefore, the probability of such classification needs to be controlled. The alarm system must achieve certain sensitivity with maximum specificity. The analogy of this classification problem to statistical testing is used to choose a suitable cut off value c that enables us to adjust the sensitivity of the resulting alarm system. The database comprising 2749 annotated alarm situations was divided randomly into learning, estimation and test sets 1050 times. 1050 forests were grown on the learning samples which incorporated the new alarm rules. These forests were used to calculate the cut off value on the estimation sets. Performance of each forest was evaluated by applying it to the test set.

RESULTS. For a chosen sensitivity of 95% which was achieved on average false alarms were reduced by 46% on average. The same evaluation was also done with a chosen sensitivity of 98% where the false alarms could be reduced by 30% on average.

CONCLUSION. In our study the use of a Random Forrest approach led to a reduction of false alarms from a standard patient monitor by 46% and 30% on average with a chosen sensitivity of 95% and 98% respectively. Such data driven approach may improve future alarms systems by enhancing specificity while maintaining adequate sensitivity.

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0901

VALIDATION OF NEW CARDIAC OUTPUT ULTRASOUND DILUTION METHOD IN CARDIAC ICU PATIENTS

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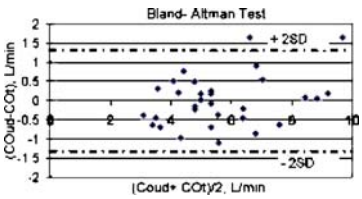
INTRODUCTION. Existing cardiac output (CO) dilution methods that are less invasive than pulmonary artery (PA) thermodilution have limitations. Some of them use toxic substances (LiDCO); some require a dedicated arterial catheter inserted (Pulsion). None of them can be routinely used in small children. First animal (rats, pigs, sheep) validation of a novel ultrasound dilution cardiac output (COud) method was presented at the 2006 ESICM meeting [1]. This method utilizes the decrease in blood ultrasound velocity caused by injecting isotonic saline. The purpose of this study was to compare the COud measurements with CO measured by PA thermodilution (COt) in humans.

METHODS. Twelve adult ICU patients (10–bypass surgery; 2–after implantation of Impella Recover LP 5.0 System) were studied. For COud measurements, a disposable extracorporeal AV loop filled with 3 ml of heparinized saline was connected between an existing radial artery catheter and PA catheter introducer. Reusable ultrasound sensors were clamped on the arterial and venous limbs of the loop. A peristaltic pump (Nipro, Japan) was used to circulate the blood from the artery to the vein at 8-12 ml/min for 5-7 min. Two to three (later averaged) COud measurements (HCP101, Transonic Systems Inc., USA) were obtained by injecting 20-25 ml of body temperature isotonic saline into the venous limb of the AV loop. At the end, the system was flushed with heparinized saline until the next measurement session. Five COt measurements were obtained by thermodilution (Nihon Koden, Japan). Three readings were averaged (largest and the smallest were ignored). For comparison, COud measurements were started within 3-5 minutes after thermodilution measurements.

RESULTS. A total of 31 comparison measurements were obtained. Correlation was R^2= 0.88. Linear regression was COud = 1.06 COt - 0.34 L/min. Bland-Altman test (Fig 1) did not show a significant bias (-0.01 L/min).



CONCLUSION. First clinical comparison of CO by ultrasound dilution with PA thermodilution produced good agreement. This method works with central venous and arterial catheters routinely used in ICU patients, utilizes innocuous indicator, thus can be used with patients of any age and at any time in the treatment.

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0902

REFINING THE ENHANCED MODEL PREDICTIVE CONTROL ALGORITHM USING TIME VARIANT SAMPLING FOR TIGHT GLYCEMIC CONTROL IN THE ICU

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INTRODUCTION. Tight glycemic control (TGC) in critically ill patients significantly improves clinical outcome. (1,2) Currently used algorithms to implement TGC are not always efficient. We developed a second version of a fully automated algorithm based on an enhanced model predictive controller (eMPC2), following the comparison between the first eMPC with the routinely used insulin algorithm in the ICU.

METHODS. In a first study, patients were included for 72 consecutive hours and randomized either to the control group (n=10) treated by our routine insulin algorithm or to the eMPC1 group (n=10). A follow-up study evaluated an adapted eMPC2 algorithm in 16 patients for 120 consecutive hours. Target range for blood glucose (BG) was 80–110 mg/dl for all groups. Safety was assessed by the number of hypoglycemic events (BG<40mg/dl). Efficacy was assessed by calculating time-to-BG-target (BG<110mg/dl), hyperglycemic index (HGI) (3) and sampling frequency (SF).

RESULTS. There were no hypoglycemic events and time-to-BG-target was not significantly different in the 3 study groups. HGI was significantly higher at day 1 (p<0.05; Table 1), but not statistically different among the 3 groups at any time point. HGI was lower than the target of 27 mg/dl in all cases. SF was significantly higher at any time point in the eMPC1 group, whereas the eMPC2 group showed the same pattern as the standard group (p<0.05; Table 1). HGI and SF remained low on day 4 and 5 of the eMPC2 study.

TABLE 1.

	HGI (mg/dl) Standard	HGI (mg/dl) eMPC1	HGI (mg/dl) eMPC2	SF (#/d) Standard	SF (#/d) eMPC1	SF (#/d) eMPC2
Day 1	11.4 (± 2.1)	14.4 (± 2.4)	11.0 (± 3.2)	12 (± 1)	18 (± 1)*	13 (± 1)
Day 2	1.5 (± 1.0)*	1.4 (± 0.5)*	4.7 (± 1.1)*	8 (± 1)*	11 (± 1)£	8 (± 1)*
Day 3	1.1 (± 0.6)*	3.4 (± 1.2)*	3.9 (± 1.2)*	8 (± 2)*	12 (± 2)§	7 (± 1)*

**p<0.05 vs. Standard day 1; £p<0.05 vs. Standard day 2; §p<0.05 vs. Standard day 3*

CONCLUSION. Use of eMPC in the ICU is safe and efficient in patients with prolonged mechanical ventilation. The refined algorithm eMPC2 resulted in a decreased workload, comparable to the use of our standard ICU insulin protocol. eMPC2 is a reliable tool for the implementation of TGC in the ICU.

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GRANT ACKNOWLEDGEMENT. EC 6th Framework Program, ref 506965 (Clinicip)

0903

HOW ICU VENTILATORS COMPENSATE FOR COMPRESSED GAS VOLUME. A BENCH TEST

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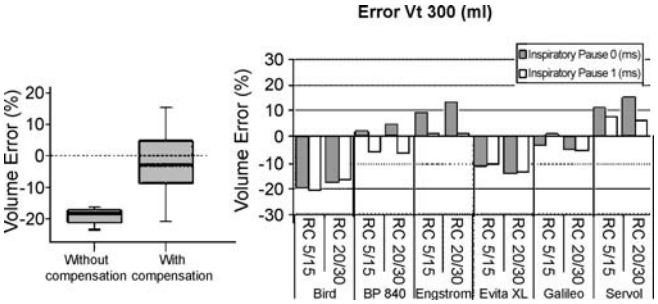
INTRODUCTION. During volume controlled ventilation (VCV), part of the insufflated volume is compressed into the circuit due to pressurization as a function of circuit compliance. The preset tidal volume (VT) could therefore differ from the VT received by the patient and ventilators use different mechanisms to compensate for this effect. The aim of this bench study was to evaluate the ability of ICU ventilators to deliver accurate VT by compensating the compressed volume.

METHODS. Five ICU ventilators which compensate compressed VT (Engstrôm, Evita 4, Galileo, Servo I, PB840) were evaluated using a Michigan test lung model, and compared with a ventilator without compensation (8400 ST, Bird). VT of 300, 500 and 800 ml with and without an inspiratory pause were studied in case of high resistance and low compliance. We compared VT s delivered by the ventilator and received by the patient, using two pneumotachographs.

RESULTS. Compensation of compressed gas algorithm reduced the error for delivered VT (Fig 1). Despite this compensation, large errors persisted from 15% to -14% of the preset VT whatever the respiratory system condition. Adding an inspiratory pause improved compensation performance.



CONCLUSION. Compensation algorithms allowed a better accuracy of delivered VT, but the performances of these different ventilators remained heterogeneous, and dependent on ventilatory settings.

0904

PROGNOSTIC VALUE OF THE NONINVASIVE MESUREMENT OF INDOCYANINE GREEN PLASMA DISAPPEARANCE RATE(LIMON®) IN SEPTIC SHOCK PATIENTS.

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INTRODUCTION. Septic shock is one of the leading causes of admission to the intensive care unit (ICU) and carries a high morbidity and mortality. Many risk scoring systems,like the APACHE II and SOFA,are used in this patient population to predict prognosis in clinical practice and to stratify patients for the comparison of results between clinical trials. Specifically, measurement of the indocyanine green elimination with the plasma disappearance rate index(PDR) is an early predictor of liver dysfunction due to splanchnic hypoperfusion in shock and has been correlated with prognosis in critically ill patients. Nowadays bedside and noninvasive measurement of PDR can be accomplished with the monitor Limon®. This parameter could have prognostic value in the septic shock patient population.

METHODS. Observational study of 26 patients admitted to the ICU in septic shock and treated following the Surviving Sepsis Campaign guidelines. Objective:Study the prognostic value of the PDR index during the first day of stay in the ICU. Parameters measured: age,sex,admitting diagnosis, Apache II,SOFA and PDR during the first day of ICU stay and mortality during the ICU stay. Numerical data is described as median plus interquartil range. ROC curves for the result "death during the ICU stay" were calculated with the parameters SOFA, APACHE II and PDR. Thereafter patients were divided on the basis of the threshold values obtained with the ROC curves to study the prognostic value of these measurements with the Fisher exact test.

RESULTS. Area under the ROC curve(AUC) and standard error(ED) were: SOFA 0,723(ED=0.116);PDR 0,786(ED=0,092) and APACHE II 0,845(ED=0,082). Optimal threshold values obtained with the ROC curves were 6.5 for the SOFA; 17 for the APACHE II and 15.9 for the PDR. Statistical association was found between the result "death during ICU stay" and the threshold value of the APACHE II(p=0.005) and the PDR(p=0.021). No statistical association was found with the SOFA threshold value.

CONCLUSION. In our septic shock patient population,PDR measurement during the first ICU day of stay showed similar prognostic capability to APACHE II and better prognostic capability than SOFA values. The quick and easy measurement of this parameter with the noninvasive monitor Limon® and the information it provides about the splanchnic circulation could make the PDR become an ideal prognostic marker in septic shock patients.

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0905

EVALUATION OF THE INTELLIGENT VENTILATOR (INVENT) SYSTEM FOR OPTIMIZING INSPIRED OXYGEN FRACTION IN INTENSIVE CARE

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INTRODUCTION. Selecting appropriate inspired oxygen fraction (FiO_2) levels in intensive care involves a balance between achieving adequate oxygenation, whilst minimizing lung damage due to oxygen toxicity and absorption atelectasis. The INVENT system quantifies these considerations as penalty functions and provides advice on setting FiO_2 to minimize risk of hypoxemia and lung damage [1]. INVENT uses an oxygen gas exchange model to simulate arterial and mixed venous oxygen saturations for possible FiO_2 levels, and calculates penalties due to low oxygen saturations and high FiO_2 levels. The suggested FiO_2 is that incurring minimal penalty. This study retrospectively evaluated INVENT FiO_2 advice in comparison with FiO_2 selected in the intensive care unit (ICU).

METHODS. 16 mechanically ventilated ICU patients were studied on 1 or 2 occasions giving a total of 27 patient cases. Patients were studied using 4-8 different FiO_2 levels, achieving arterial oxygen saturations (SaO_2) in the range 90-100%. At each FiO_2 level, measurements were taken of ventilation and arterial acid base and oxygenation status. The initial FiO_2 was set by the attending clinician according to standard clinical practice. The gas exchange model used in INVENT was fitted to pulse oximetry measurements at each FiO_2 and the initial arterial blood gas measurement. Model parameters from this fit were used to calculate INVENT FiO_2 advice.

RESULTS. The median (min, max) INVENT FiO_2 advice was 44% (33%, 64%), while FiO_2 levels selected in the ICU had a median of 53% (39%, 83%). Model simulated SaO_2 values for INVENT FiO_2 selections had a median of 95% (89%, 97%). Measured SaO_2 values for FiO_2 selected in the ICU had a median of 97% (91%, 99%). As such INVENT reduced FiO_2 whilst maintaining SaO_2 within a clinically acceptable range ($SaO_2 \geq 88\%$) [2].

CONCLUSION. The results show that INVENT maintains an acceptable level of oxygenation in ICU patients using similar or lower FiO_2 levels compared with clinical practice.

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0906

VOLUMETRIC PARAMETERS OF PRELOAD ARE NOT AFFECTED BY TIDAL VOLUME DURING HEMORRHAGE IN AN ANIMAL MODEL

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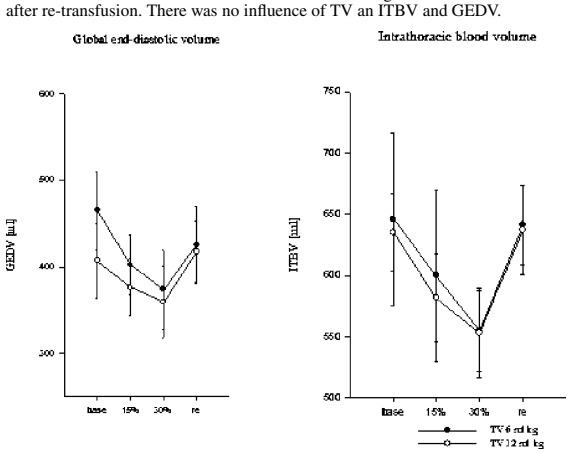
INTRODUCTION. Different ventilation strategies lead to a change in lung perfusion. Volumetric preload parameters are affected by the amount of lung perfusion. In an animal model of acute hemorrhage we compared the effect of two different ventilation strategies (tidal volume (TV) 6 vs. 12 ml/kg) on the thermal dye dilution technique derived parameters intrathoracic blood volume (ITBV) and global end-diastolic volume (GEDV).

METHODS. After approval of the local animal protection committee, 7 female pigs were studied at baseline, 15 % estimated blood loss (EBL), 30 % EBL and after re-transfusion. In each phase preload parameters were measured by injecting 10 ml of indocyanine green 0.1% between 0 and 4 °C at TV 6 and 12 ml/kg. The respiratory rate was adjusted to maintain an end-tidal CO2 of 35 mm Hg. Effects of EBL and ventilator settings on ITBV and GEDV were statistically analyzed by ANOVA for repeated measurements.

RESULTS. ITBV and GEDV decreased with increasing blood loss and reached baseline levels after re-transfusion. There was no influence of TV an ITBV and GEDV.



CONCLUSION. Our study suggests, that independently of the TV applied, both ITBV and GEDV reflect the loss of intravascular volume.

GRANT ACKNOWLEDGEMENT. intramural funding

0907

MONITORING OF CARDIAC OUTPUT CHANGES INDUCED BY DIFFERENT DEGREES OF INTRA ABDOMINAL PRESSURE.

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INTRODUCTION. Intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS) have been increasingly recognized in critically ill patients over the past decade. A prolonged IAH at greater than 25 mmHg can produce significant morbidity and mortality (1). Cardiac output (CO) can be influenced by IAH, and a low CO may lead to multiorgan dysfunction and failure. The aim of this study was to compare three different CO monitoring methods during different degrees of intra abdominal pressure.

METHODS. We investigated the PRAM (Pressure Recording Analytical Method) by comparing its CO (PRAM-CO) with paired measurements obtained by the Fick method (Fick-CO), and by the standard thermodilution (ThD-CO) during various CO changes in a swine model. PRAM is a pulse contour method that has been studied in humans and animals, and does not need for calibrating factors (2). Ten pigs (mean body weight 39 ± 2.4 kg) were monitored with a pulmonary artery catheter and a femoral artery catheter at T0 (baseline), at T1, T2, and T3, (after 10, 20, and 30 minutes of IAP=15 mmHg, respectively), at T4 (IAP=20 mmHg), and at T5 (IAP=30 mmHg). IAP was induced by pneumoperitoneum by CO2 insufflation. Bland-Altman statistical analysis was used.

RESULTS. 180 paired cardiac output values over a range of ThD-CO of 2.5 to 6.4 litre/min resulted. At T0 mean ThD-CO value was 5.5 litre/min. From T1 to T5 CO mean values were 5.0, 4.6, 4.1, 3.6, 3.2 litre/min, respectively. The analysis of variance showed a significant decrease of CO values from T0 to T5 ($p<0.05$). We found close agreements between the techniques. Mean bias between PRAM-CO and Fick-CO was +0.02 litre/min (precision of ± 0.38 litre/min; 95% limits of agreement from -0.54 to +0.57). Mean bias between PRAM-CO and ThD-CO was +0.07 litre/min (precision of ± 0.56 litre/min; 95% limits of agreement from 0.44 to +0.67). Similar results between ThD-CO and Fick-CO were found.

CONCLUSION. We demonstrated that under different degrees of IAH, CO can be interchangeable calculated with invasive or minimally invasive monitoring systems. In this porcine model PRAM seemed easy to use and provided CO continuously during the different measurements. This is the first study assessing PRAM in this clinical setting.

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0908

DISTRIBUTION OF LUNG VIBRATIONS DURING USE OF VIBRATORY ACAPELLA DEVICE

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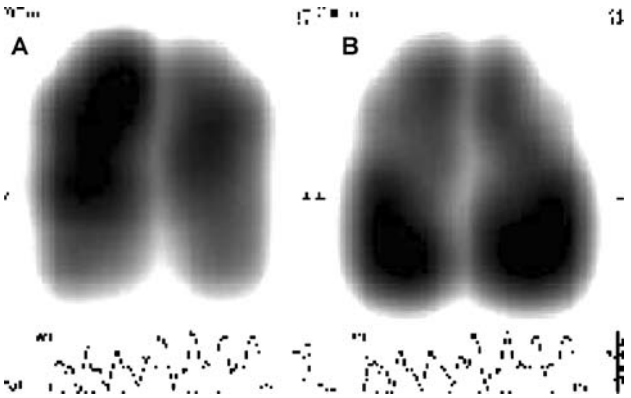
INTRODUCTION. Vibratory devices work by oscillating vibrations that travel into the lungs. The Acapella® is a small hand-held vibratory device that combines the resistive features of the positive expiratory pressure (PEP) and the vibratory features of a flutter valve to mobilize secretions in the airway. VRI is a novel dynamic imaging technique that measures vibration energy of lung sounds generated during respiration. In this study, our aim is to determine, using the VRI, what regions of the lungs receive the most vibrations when the Acapella is being used.

METHODS. A 20 second VRI recording was performed on a healthy volunteer during normal breathing (first three breaths) and while using the Acapella device (last four breaths). The VRI recordings were obtained in 20 second periods of respiration. Dynamic digital images and numerical raw values for vibration energy are analyzed and compared any regions of interest.

RESULTS. There was an over sixty fold increase in total vibration intensity during expiration when Acapella was used. VRI images at maximal expiration during normal breathing (Fig. 1A) was compared to images obtained while using the Acapella (Fig. 1B). Areas of highest vibration intensity are black. When the distribution of expiratory vibration is examined, it appears that vibration from the acapella goes more to the lower lung regions.



CONCLUSION. VRI data clearly demonstrate that oscillating vibrations coming from the Acapella not only increase vibrations in the lungs, but preferencially affect the lower lung regions. The vibrations from this device can penetrate the dependent lung regions where atelectasis is likely to occur and mucus likely to collect.

0909

AN ELECTRONIC ALERT TO IMPROVE GLUCOSE CONTROL IN A GENERAL ICU

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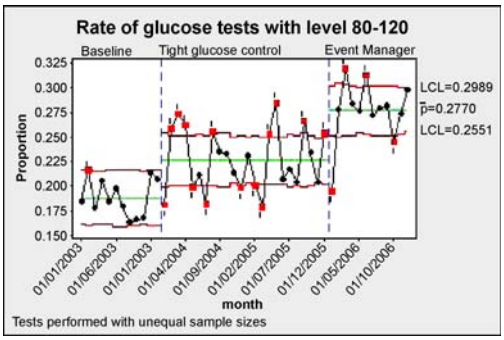
INTRODUCTION. Tight glucose control is an important component of modern critical care.1 Different algorithms have been assessed with regard to their impact on morbidity and mortality.

METHODS. We used a novel computerized alert as a tool to improve the rate of patients in whom glucose levels below 120mg/dl were measured, yet without an increase in the rate of hypoglycemic episodes. The alert notified the clinical staff if a patient had not had a blood glucose test in 3 hours. We analyzed retrospectively the glucose levels measured in the ICU which are recorded in the computerized patient record (MetaVision, IMDsoft, Israel). Control charts of the glucose levels were compared over three time periods: A baseline period (Baseline, Jan-Dec 2003), a period following the implementation of tight glucose control (Jan 2004-Dec 2005), and a period following the implementation of the event (Event manager, Jan 2006-Dec 2006).

RESULTS. There was a consistent and statistically significant increase in the rate of glucose measurements at a level of 80-120 mg/dl, over the three time periods (Figure). At the same time there was a statistically significant decrease in the rate of glucose levels greater than 200 mg/dl. There was no change in the occurrence of hypoglycemia episodes.



CONCLUSION. Using computerized alerts may impact clinical care and improve performance of ICU teams.

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GRANT ACKNOWLEDGEMENT. Prof. Perel And Dr. Segal are members of the MAb of IMDsoft

Poster Sessions
Protective strategies in lung injury 0910-0923

0910

HIGH FREQUENCY PERCUSSIVE VENTILATION ATTENUATES LUNG INJURY IN A RABBIT MODEL OF GASTRIC JUICE ASPIRATION

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INTRODUCTION. Protective conventional mechanical ventilation (CMV), including tidal volume (VT) reduction and sufficient positive end expiratory pressure (PEEP), decreased lung pathology and cellular inflammatory response in experimental lung injury. High frequency oscillatory ventilation (HFOV) is as effective as protective CMV to improve lung function 1. More recently introduced in clinical practice, high frequency percussive ventilation (HFPV) combined advantages of both high frequency ventilation and CMV, but evidences concerning its protective character are still lacking. Thus, we investigate the effects of HFPV, as compared with HFOV and protective CMV, on lung injury course in a gastric aspiration model.

METHODS. 43 rabbits were anesthetized and received intratracheal human gastric juice (1.5 ml.kg-1 followed by subsequent 0.5 ml.kg-1 boli) to achieve a PaO2/FIO2 ratio ≤ 50 Torr. Animals were ventilated for 4 hours after randomization in one of the following 4 groups: HFPV (median pressure 15 cmH2O), LVCMV (VT 6 mL.kg-1 and PEEP set to reach 15 cmH2O Pplat), HFOV (mPaw 15 cmH2O), and a high volume control group HVCMV (VT 12 mL.kg-1 and ZEEP).

RESULTS. Static respiratory compliance increased after the ventilation period in HFPV, LVMCV, and HFOV groups, contrasting with the HVCMV group. PaO2/FIO2 improved similarly in the HFPV, LVCMV and HFOV groups, and remained lower in the HVCMV group than in the three others. Lung edema, myeloperoxydase and histological lung injury score were higher in HVCMV group, but not different among all others.

TABLE 1.
Data after 4 hours of ventilation in the four study groups (mean±SD)

	HFPV n=11	LVCMV n=11	HFOV n=11	HVCMV n=10
PaO2/FIO2, Torr	210±161	248±167	219±130	77±47 *
Lung weight, g.kg-1 body weight	3.1±0.6	2.7±0.5	3.0±1.2	4.5±1.4 *
Myeloperoxydase, units.g-1 of tissu	0.8±0.4	1.1±0.8	1.1±0.9	2.6±0.9 *
Lung injury score % maximal damage	17.4±8.7	16.8±7.5	16.5±7.5	28.2±4.5 *

** $p < 0.05$ vs three other groups (ANOVA)*

CONCLUSION. HFPV, as HFOV and protective CMV, improves respiratory mechanics and oxygenation, and attenuates lung damage. HFPV should therefore be considered as an effective protective ventilation strategy, deserving the need for prospective investigation on ARDS patient's outcome.

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0911

INFLUENCE OF HYPERCAPNIA ON ORGAN PERFUSION IN LUNG INJURY

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INTRODUCTION. To attenuate ventilation associated lung injury, low tidal volumes (VT) are used in modern lung ventilation strategies. Under this low VT ventilation hypercapnic acidosis often appears. Hypercapnia has direct effects on the regulation of the vascular bed, which may change organ perfusion. This study examines the role of hypercapnic acidosis on organ perfusion in pigs with healthy lungs and experimental lung injury (ALI).

METHODS. 24 pigs (12 healthy/12 ALI) were tracheotomised and mechanically ventilated with a VT of 6ml/kg and 12ml/kg body weight in random order. Lung injury was induced by oleic acid injection and low and high VT ventilation again was applied in random order. In addition to conventional hemodynamics and blood gases, organ perfusion of brain and intestinal organs was measured with the coloured microspheres technique during each setting.

RESULTS. Results are shown in Table 1.

TABLE 1

Systemic parameters and organ perfusion (ml/g/min)

	Healthy lung		Lung injury	
PaCO2, mm Hg	41± 4	61±8††	47±4	72±9††
cardiac output L*min-1*m-2	2.83±0.20	3.41±0.31†	2.94±0.21	3.65±0.32††
pH	7.42±0.03	7.30±0.03††	7.38±0.03	7.26±0.05††
gyrus centralis	0.78±0.14	2.28±0.40††	0.62±0.07	2.06±0.49††
ileum	0.35±0.05	0.41±0.08	0.31±0.07	0.57±0.16†
stomach	0.27±0.05	0.32±0.12	0.20±0.02	0.23±0.03

†p < 0.05 compared with hypocapnia, ††p < 0.01 compared with hypocapnia

CONCLUSION. Hypercapnia results in an increase in systemic and cerebral perfusion in animals with healthy and injured lungs. Oleic acid-induced lung injury did not alter cerebral CO2-responsivenes but increased ileum perfusion during hypercapnia.

0912

A PROSPECTIVE VALIDATION STUDY OF STRESS INDEX IN PREDICTING MECHANICAL STRESS IN ARDS PATIENTS

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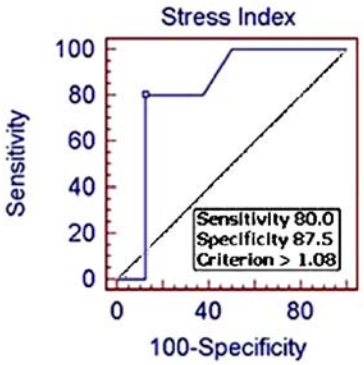
INTRODUCTION. 30% of ARDS patients ventilated according to NIH protocol presents CT scan evidence of hyperinflation. Functional analysis of pressure-time curve (Stress Index=SI) has been shown to identify this condition in experimental settings. We tested the hypothesis that the SI is an accurate predictor of mechanical stress due to overdistention in ARDS patients.

METHODS. The presence of mechanical stress was identified by CT scan analysis. The threshold value of SI that best discriminated between patients with and without overdistention was determined by Receiver Operating Characteristic (ROC) curve; the accuracy of this threshold value was prospectively tested in a second group of patients. Accuracy of plateau pressure (Pplat) to identify CT hyperinflation was also assessed.

RESULTS. A SI threshold value of 1.08 was chosen by ROC analysis (fig 1); sensitivity and specificity of the selected threshold was 0.80 and 0.67 respectively. Sensitivity and specificity of Pplat equal or >30 cmH2O to identify hyperinflation were 0.40 and 0.90 respectively. With a threshold value of 28 cmH2O sensitivity and specificity were 0.70 and 0.75.



CONCLUSION. SI analysis is an accurate predictor of mechanical stress in the clinical settings for ARDS patients with a higher sensitivity than Pplat.

GRANT ACKNOWLEDGEMENT. Supported by Ministero Università e Ricerca (PRN60ANRA04)

0913

PROTECTIVE VENTILATION WITH CO2-REMOVAL TECHNIQUE IN PATIENTS WITH ARDS

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INTRODUCTION. 30% of ARDS patients ventilated according to NIH protocol presents morphological (CT scan) and functional (Stress Index>1) conditions of hyperinflation even with Plateau pressure (Pplat) < 30 cmH2O. Values of Pplat lower than 26 cmH2O are associated with a condition of more protective ventilation [1]. In patients at risk of hyperinflation, use of alternative techniques such as CO2-removal may allow the reduction of Tidal Volume (Vt) and Pplat. Aim of the study was to verify the efficacy of CO2-removal technique in reducing Vt and consequently Pplat to obtain a Stress Index value equal to 1.

METHODS. In 5 ARDS patients presenting a Pplat >26 cmH2O Vt was lowered with CO2-removal device support (flow ml/min = 345 ± 67) to maintain a pH >7,30. Ventilatory parameters and SI value were recorded at baseline,at the onset CO2 removal, 24,48 and 72 hours.

RESULTS. See Table 1.

	Vt/kg (PBW) ml/kg	Pplat Mean cmH2O	b value	PEEP cmH2O	P/F	pCO2 mmHg	pH
BASELINE	6,8±2	28,8±2	1,14±0,07	10±6	128±40	88±17	7,27±0,08
CO2-removalON	6,8±2	28,8±2	1,14±0,07	10±6	120±46	73±16**	7,33±0,07*
24 h	5,8±1,6**	27±2*	1,08±0,08	11±6	125±53	75±9*	7,33±0,07*
48 h	4,8±0,9*	26±2**	1,05±0,08	11±6	122±39	78±11*	7,33±0,06*
72 h	5,0±1,0*	25,6±1**	1,05±0,03*	13±5*	152±48	77±15**	7,37±0,09*

*Data represent means ± SD; * = p< 0.05; **= p<0.01 vs Baseline*

CONCLUSION. Further reduction in Vt after application of CO2 removal device led to significant decrease in Pplat reaching the Stress Index target value equal to 1; CO2-removal techinque could be useful to achieve more protective ventilation in ARDS patients.

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GRANT ACKNOWLEDGEMENT. Supported by Ministero Università e Ricerca

0914

PUMPLESS EXTRACORPOREAL LUNG ASSIST FOR PROTECTIVE MECHANICAL VENTILATION IN EXPERIMENTAL LUNG INJURY

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INTRODUCTION. In acute lung injury (ALI), mechanical ventilation with a tidal volume of 6 ml/kg revealed decreased mortality when compared to 12 ml/kg, probably due to decreased ventilator associated organ injury. Reduction of tidal volumes below 6 ml/kg has been suggested to further reduce ventilator associated organ injury but may cause severe hypercapnia and respiratory acidosis due to hypoventilation. Using the interventional lung assist (iLA), hypercapnia can be avoided by extracorporeal CO2-removal. In the present study, we tested the hypothesis, that ventilation with 3 ml/kg tidal volume combined with iLA reduces ventilator associated organ injury in experimental ALI when compared to ventilation with 6 ml/kg tidal volume without iLA.

METHODS. In a prospective, randomized, controlled trial ALI was induced by repeated lung lavages in 14 pigs. Animals were randomized to an interventional group with a tidal volume of 3 ml/kg with iLA (n=7) or to controls with a tidal volume of 6 ml/kg without iLA (n=7) for 24 hours. In both groups PEEP was set at 5 mbar. Organ function in vivo was determined by laboratory analyses including calculations of pulmonary ventilation/perfusion distribution. Histological assessment of organ injury was performed post-mortem after 24 hours.

RESULTS. In both groups, gas exchange improved in the course of the study (p<0.05). However, in contrast to controls animals with lower tidal volumes and iLA had more severe ventilation/perfusion mismatch as indicated by increased perfusion to lung areas with low ventilation/perfusion ratio (p<0.05). Other parameters of organ function in vivo and results of histological examination post-mortem did not reveal any statistical difference between groups.

CONCLUSION. In this experimental setting, combined ventilation with lower tidal volumes and extracorporeal CO2-removal is not associated with differences in organ injury when compared to ventilation with traditional low tidal volumes without extracorporeal CO2-removal. In contrast, ventilation with lower tidal volumes may cause pulmonary de-recruitment when PEEP is not adequately increased.

GRANT ACKNOWLEDGEMENT. This study was supported by a research grant of Novalung (Hechingen, Germany)

0915

GLOBAL VARIATION IN ADHERENCE TO THE ARDS NETWORK VENTILATION PROTOCOL IN THE VALID STUDY OF RSP-C SURFACTANT IN SEVERE RESPIRATORY FAILURE

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INTRODUCTION. Standardisation of patient care is a challenging task in multi-national clinical trials enrolling intensive care patients. To promote patient safety and consistency of care, the ARDS Network ventilation protocol (ARDS Network, 2000) was chosen as the standard for the multi-national VALID study, a randomised double-blind mortality study of rSP-C surfactant (Venticute®) in intubated and mechanically ventilated patients with severe respiratory failure due to pneumonia or aspiration of gastric contents.

METHODS. The VALID study is currently ongoing in more than 140 medical centers in 23 countries. For all countries having enrolled at least 12 patients, we analysed ventilation data with a focus on tidal volume (V_T) and peak inspiratory pressure (PIP) during baseline. In addition, V_T was analysed in cohorts of 200 patients over the course of the study to assess the influence of specific, intensified training measures aimed at promoting study site adherence to the ARDS Network ventilation protocol. These measures were initiated after the first 200 patients were enrolled.

RESULTS. Preliminary data from 641 randomised patients were available for analysis. In this overall data set, median V_T was 7.4 ml/kg predicted body weight (PBW) varying substantially among participating countries (median 6.2-8.3 ml/kg PBW). Lowest median $V_T$values (<6.6 ml/kg PBW) were observed in Estonia, New Zealand, Russia, and Denmark. Median V_T values were still below study average in Germany, Austria, Spain, and Finland (~7 ml/kg PBW). In Argentina, the United States, and Hungary, average values were found. Other countries had higher median V_T. In the overall study population, the highest median V_T of 7.8 ml/kg PBW was found for Patients 1 to 200, i.e. prior to intensified training measures. Since initiating these measures, median V_T decreased significantly to 7.4 ml/kg PBW for Patients 201 to 400 and to 7.1 ml/kg PBW for Patients 401 to 600 (p=0.003 for difference between the groups prior to and after initiation of intensified training measures). Median PIP ranged between 24 to 35 cm H_2O in the different countries and decreased with intensified training from 29.5 to 28.5 cm H_2O (p=0.012).

CONCLUSION. Adherence to a low stretch ventilation strategy shows marked variation among countries. Specific training measures can help to increase adherence to ventilation standards in multi-national ICU trials.

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GRANT ACKNOWLEDGEMENT. Funded by ALTANA Pharma AG, a member of the Nycomed Group.

0916

FUNCTIONAL RESIDUAL CAPACITY MEASUREMENT AS A GUIDE DURING PEEP TITRATION IN ARDS.

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INTRODUCTION. In ARDS, Peep setting is usually guided by FiO2 requirements and the existence of alterations in pulmonary compliance. Theoretically, functional residual capacity (FRC) reflects the extent of lung aeration and thereby may be an excellent indicator of lung recruitment area as a result of Peep manipulations. Unfortunately, because of methodological difficulties, assessment of FRC at the bedside is not currently used in clinical practice. In this study, we tested a new method of FRC measurement (Engstrom Carestation, Datex-Ohmeda, General Electric) in an experimental model of ARDS in order to assess the changes in FRC in response to Peep settings and evaluate the effects on pulmonary gas exchanges.

METHODS. ARDS was induced by oleic acid injection in 6 anaesthetized pigs weighing 26 ± 1 kg. FRC, static compliance, and arterial blood sample (pH, PaO2, PaCO2) were obtained before and after induction of ARDS at Peep values of 20, 15, 10, 5 and 0 cmH2O with a 15 min period of stabilisation between each level of Peep. Data are presented as mean ± sem. ANOVA for repeated measurements and when necessary a post hoc test (Scheffe) were used to compare values.

RESULTS. ARDS was responsible for significant decreases in FRC, static thoracopulmonary compliance and PaO2/FiO2 ratio values from 421 ± 58 to 190 ± 37 ml, 28 ± 2 to 17 ± 1 ml/cmH2O and 402 ± 14 to 105 ± 10 mmHg, respectively. A 20 cmH2O Peep was associated with FRC values that increased to 514 ± 81 ml and static compliance remained unchanged (19 ± 2 ml/cmH2O). The procedure was responsible for a significant improvement in PaO2/FiO2 which reached 345 ± 29 mmHg. When Peep was progressively reduced from 20 to 0 cmH2O, PaO2/FiO2 ratio and FRC values turned to the basal values obtained after ARDS induction. Static thoracopulmonary compliance did not show any further alteration.

CONCLUSION. Our results indicate that FRC measurements obtained during mechanical ventilation were well correlated to the changes in PaO2/FiO2 during Peep recruitment manoeuvres. In contrast, static compliance did not reflect with accuracy the corresponding changes in pulmonary gas exchanges. Therefore, FRC may be a more sensitive indicator of alveolar derecruitment than static compliance. This is in accordance with CT scan studies suggesting that FRC measurement offers a better morphologic changes assessment than static compliance.

GRANT ACKNOWLEDGEMENT. Funded by a Grant of Fondation Leon Fredericq

0917

IMPACT OF THE ARDSNET VENTILATORY STRATEGY ON LUNG ACTELECTASIS IN A MODEL OF HIGHLY RECRUITABLE DIFFUSE ARDS: A CT SCAN STUDY

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INTRODUCTION. The peculiarity of the ARDSnet strategy lies in tidal volume (VT) limitation and in the application of enough PEEP and FiO2 to keep oxygenation between 55 and 80 mmHg. We tested the impact of this strategy on the clearance of lung actelectasis in a model of diffuse ARDS.

METHODS. In 12 pigs,ARDS was induced by intravenous LPS administration (100 mcg/Kg in 1 hour). Lung CT scan were obtained during ventilation a) at zero end expiratory pressure (ZEEP); b)with the ARDSnet protocol (PEEP 7.7 ± 2.1); c)during a vital capacity (VC) maneuver at 45 cmH2O.

RESULTS. Results are shown in Table 1. Data are mean +/- standard deviation; *) $p < 0.05$ VC versus ARDSnet; #) $p < 0.05$ ARDSnet versus ZEEP.

TABLE 1.

	ZEEP	ARDSnet	VC
Hyperinflated areas (cm2)	2 +/- 1	2 +/- 1	27 +/- 3 *
Normally aerated areas (cm2)	662 +/- 262	833 +/- 325 #	3162 +/- 1174 *
Poorly aerated areas (cm2)	1148 +/- 395	884 +/- 341	547 +/- 343 *
Non aerated areas (cm2)	815 +/- 252	495 +/- 215 #	101 +/- 51 *

CONCLUSION. In this model of highly recruitable diffuse ARDS, the ARDSnet protocol allowed to match the oxygenation target although a significant amount of actelectasis remained unresolved. The meaning of such actelectasis "tolerance" in terms of lung protection from ventilator induced lung injury deserves further investigation.

GRANT ACKNOWLEDGEMENT. University of Bari.

0918

EFFECTS OF VENTILATORY SETTINGS ON VENTILATOR-INDUCED DIAPHRAGMATIC DYSFUNCTION

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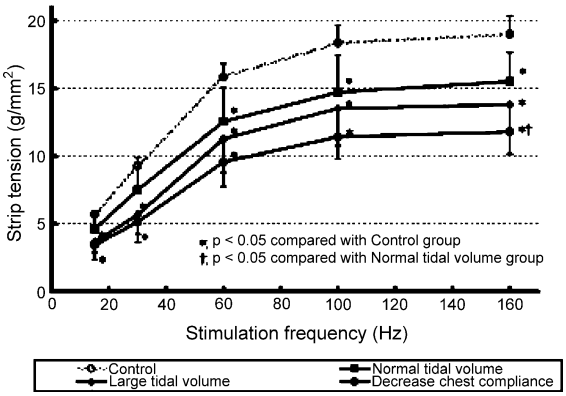
INTRODUCTION. It was rarely examined that effects of ventilatory settings on ventilator-induced diaphragmatic dysfunction (VIDD).

METHODS. Four different settings were applied to tracheostomized 24 rats. Control animals breathed spontaneously for 12 hours. The other animals were received mechanical ventilation with three different settings for 12 hours (CMV mode 80/min, PEEP 1cmH2O, and inspiratory time 0.3sec). In normal tidal volume (NTV) group, peak inspiratory pressure (PIP) was set at 8cmH2O. In large tidal volume (LTV) group, PIP was set at 18cmH2O. In decreased chest wall compliance (DCC) group, we placed 50g of weight on the abdomen and bound the chest wall by a chest band. The PIP of the DCC was set at 16cmH2O. Muscle relaxants was continuously received to suppress the inspiratory efforts. To prevent hypocapnia, we added a dead space to the circuit. We examined diaphragmatic function using the isolated strip method.

RESULTS. Force-frequency curve of each group was exhibited in the figure. The maximal tetanic tensions of NTV, LTV and DCC were smaller than Control. That of DCC was smaller than that of NTV.



CONCLUSION. Ventilatory settings producing higher diaphragmatic tension may be more attributed to diaphragmatic injury.

GRANT ACKNOWLEDGEMENT. Grant from the Japan Society for the Promotion of Science (185917019)

0919

ASSESSMENT OF LEFT ATRIAL FILLING DURING A RECRUITMENT MANEUVER: A NEW WAY TO DETECT ALVEOLAR OVERINFLATION?

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INTRODUCTION. Recruitment is a dynamic inspiratory process that refers to re-aeration of the previously nonaerated lung and may be accomplished by periodically and briefly raising transpulmonary pressure to higher levels than those achieved during tidal ventilation. Because high transpulmonary pressures for the nonaerated lung are, at the same time, "distending" pressures for the normally aerated lung, lung recruitment bears an inherent risk of alveolar overinflation especially for patients with ALI/ARDS and focal loss of aeration (lobar ARDS).

METHODS. Four patients with lobar ALI/ARDS underwent transesophageal echocardiography (TEE) that included assessment of left superior pulmonary vein flow. Measurements were taken at end-expiration with a 10 cmH2O PEEP and during a recruitment maneuver (RM). The RM was applied using a pressure-control mode with a 40 cm H2O peak pressure and a 20 cm H2O PEEP for 30 s. One of the patients undewent lung CT scan at end-expiration and during RM. We performed volumetric analysis of the CT scans in order to measure the distribution of overinflated (OI), well aerated (WA), poorly aerated (PA) and nonaerated (NA) lung areas.

RESULTS. Pulmonary vein flow was significantly modified in all four patients during the RM. Systolic and diastolic forward velocities remained stable but the systolic velocity-time integral decreased by approximately 50%. In three patients the reverse flow at atrial contraction that was clearly imaged at end-expiration was eliminated during RM, while in one patient the reverse atrial velocity decreased by 44%. Volumeric analysis of the CT scans showed that NA areas decreased from 18.68% to 9.84% and OI areas increased from 0.88% to 8.52% during the RM.

CONCLUSION. 1. In lobar ARDS the application of a RM is possibly associated with a sinificant increase in alveolar overinflation. 2. The increase in transpulmonary pressure during the RM appears to modify the pattern of extraparenchymal pulmonary vein flow and left atrial filling. TEE could serve as a bedside tool to detect and monitor alveolar overinflation in ARDS. 3. The intrepretation of left ventricular diastolic function in mechanicallly ventilated patients should take into account the important aspects of heart-lung interaction.

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0920

THE HIGH INSPIRED OXYGEN CONCENTRATION IS NOT A MAJOR DETERMINANT FACTOR IN AN EX-VIVO MODEL OF VENTILATOR-INDUCED LUNG INJURY

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INTRODUCTION. The institution of mechanical ventilation and the administration of oxygen are mandatory interventions that are simultaneously employed in the management of respiratory failure. However, their interaction has not been adequately studied.

METHODS. We designed this study in order to investigate whether the inspired oxygen concentration contributes to ventilator-induced lung injury. Forty sets of rabbit lungs, isolated and perfused at a constant flow of 300 ml per minute were randomized for 60 minutes of pressure-control ventilation at either 25 (Higher pressure - HP) or 15 (Lower pressure - LP) cm H2O peak static pressure, respiratory rate 15 per minute, inspiration:expiration ratio 1:2 and positive end-expiratory pressure 3 cm H20 while receiving either 100 % (High - H) or 21 % (Normal - N) oxygen. The addition of CO2 in the perfusate maintained normocapnic conditions (perfusate CO2 approximately 40 mm Hg) and neutral acid-base status. Weight gain, changes in the ultrafiltration coefficient (dKf), histological lesions (composite score included alveoral and perivascular hemorrhage, alveolar and interstitial infiltration by leukocytes and pulmonary congestion), and bronchoalveolar lavage (BAL) levels of tumor necrosis factor (TNF-a) and malondialdehyde (MDA) were compared between the groups. Between-group comparisons were performed using one-way analysis of variance (ANOVA) with Tukey's correction for multiple comparisons. A P value < 0.05 was considered statistically significant.

RESULTS. The 2 sub-groups (HPH, HPN) ventilated at the higher inspiratory pressure that corresponded to a tidal volume of approximately 30 ml per kg had greater weight gain ($P < 0.001$), increase in the ultrafiltration coefficient ($P = 0.003$) and composite histological scores ($P < 0.001$) than the 2 sub-groups (LPH, LPN) ventilated at a low inspiratory pressure that corresponded to a tidal volume of approximately 20 ml per kg. No difference was noticed between sub-groups in BAL TNF-a or MDA levels. Hyperoxia was not found to exacerbate any of the lung injury indices beyond the point induced by the high-pressure, high-stretch ventilation.

CONCLUSION. Despite the known limitations of the ex-vivo lung model, our data suggest that the relative contribution of the high inspired oxygen concentration to ventilator-induced lung injury may not be as significant as the contribution of lung overdistention in this particular experimental model of lung injury.

GRANT ACKNOWLEDGEMENT. This study was supported by the Thorax foundation.

0921

DIFFERENCES IN THE PULMONARY EDEMA CLEARANCE PROFILE ACCORDING TO THE PRESENCE OR NOT OF AN ALVEOLAR INJURY

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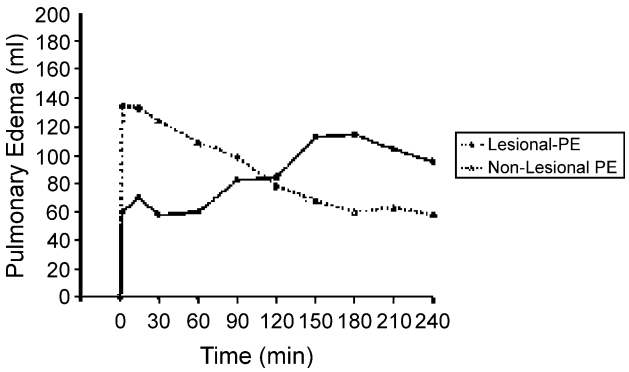
INTRODUCTION. To analyse the profile of lesional pulmonary edema (LPE) clearance caused by oleic acid (OA) and its differences with a non-lesional PE (NLPE).

METHODS. Experimental study on 18 pigs, anesthetized an in mechanical ventilation during 4 hours. Two experimental groups, for induced PE of different etiology, were studied. LPE group (n=8): PE was induced through OA infusion (0.1ml/kg i.v). NLPE group (n=10): PE was produced by instilation of 4 ml/kg of saline solution through tracheal tube. After the PE, clearance was measured every 30 minutes through the Extravascular Lung Water using the PICCO® system along with other cardio-respiratory parameters. To compare quantitative variables, the Mann-Whitney test was performed and a $p<0.05$ was considered significant.

RESULTS. After the OA injection, there was a rapid increase of PE. However, it was significantly less than the one in the NLPE group (after 2min, 60±52 vs. 135±51ml; $p<0.05$). During the next measurements the edema formation in the LPE group continued until it developed into 95±104ml at 4 hours (8.7ml/h). On the other hand, in the NLPE group there was a reduction in the edema, mainly during the two first hours.



CONCLUSION. PE caused by OA instead of presenting clearance, undergoes an increase during the first 4 hours. This behaviour differs from the one noticed in the NLPE model. These differences can be explained by the persistence of a systemic inflammatory process in the LPE group.

0922

MDCT QUANTITATIVE AND QUALITATIVE IN ARF AND ARDS PATIENTS AT DIFFERENT PEEP VENTILATION PATTERN CUT-OFF VALUE OF PEEP

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INTRODUCTION. To compare quantitative MDCT evaluation of pulmunary gas volume, FRC (functional residual capacity) volume, pulmonary tissue volume, to clinical findings in ARF(acute respiratory failure) patients (1).

METHODS. Twenty-eight ARF(Acute Respiratory Failure) patients admitted to Emergency Department because polytrauma or pnemonia or cardiogenic edema or suspect of pulmunary embolism or anknown dyspnoea- chest pain- air hunger. Systemic arterial blood samples were withdrawn 10 min before the CT scan.. Functional respiratory pameters were measured in mechanically ventilated patient and functional respiratory tests were obtained in spontaneous breathing patients. A volumetric acquisition (GE 16 MDCT) from apex to diaphragma in 7sec was performed during continued respiration or PCV mode (pressure-constant ventilation). Data were analysed by an Advantage Workstation wiith 3D- Reformat Imaging, Volume Density masks, Volume Density Histograms. Statistic analysis: Gaussian distribution Linear Regression model, ANOVA table. Correlation (Pearson r) assume Gaussian distribution (2).

RESULTS. In our study we find significant correlation between functional respiratory dynamic tests reflecting a decrease of maximum flow and lung hyperinflation (FEV1/SVC, PEF) and MDCT lung gas volume fraction and mean lung CT attenuation; a significant correlation resulted between diffusing lung capacity tests (DLCO and DLCO/VA) and MDCT lung gas volume fraction.(2) Correlation not quite significant resulted, in spontaneous breathing patients, between quantitative CT measuraments and functional respiratory tests (TLC,RV,FRC) and arterial blood analysis. We found correlation in mechanically ventilated patients between TLC and mean CT lung attenuation –MDCT lung gas volume at ZEEP (zero end expiratory pressure) and at increased PEEP(positive end expiratory pressure) of 5-10 cm H2O values, FIG.1.

CONCLUSION. Multi-slice scanners allow image acquisition with high temporal resolution and reduction of image artefacts; high technology workstations can yeld complex visual image post processing (VR, Air-way Navigator, MPR) and in the same time quantitative analysis from row data to measure lung volumes and to quantify lung aereation. In this study we found significant correlation between MDCT data and dynamic respiratory tests and diffusing lung capacity tests. Because not all patients could cooperate during CT examination we found only in mechanically ventilated patients a correlation between MDCT gas volume measuraments and ventilation parameters.

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GRANT ACKNOWLEDGEMENT. A. IMPERATORI

0923

MEASUREMENT OF SPECIFIC LUNG ELASTANCE TO PREVENT VENTILATOR-INDUCED LUNG INJURY

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INTRODUCTION. Mechanical ventilation is an essential tool to assure adequate gas exchange in patients with ALI/ARDS. However, several animal and human data suggest that mechanical ventilation can induce or worsen lung damage and produce ventilator-induced lung injury (VILI), even in healthy lungs. Physiological triggers of VILI are stress (i.e., transpulmonary pressure, PL) and strain (i.e., Tidal Volume/Functional Residual Capacity, TV/FRC). The link between stress and strain is a constant, the specific lung elastance (ELsp), which is equal to the transpulmonary pressure when lungs are inflated with a volume equal to the FRC, according to the following formula: ELsp=PL/(TV/FRC)(1). Aim of this study was to evaluate if specific lung elastance was similar between ALI/ARDS patients and healthy subjects.

METHODS. We studied ALI/ARDS patients, during sedation and paralysis, and healthy subjects underwent general anaesthesia. The FRC was measured by the helium dilution technique. To measure ELsp, the lungs were inflated by an air-filled supersyringe with a volume equal to the FRC. The transpulmonary pressure was computed as the delta-airway pressure minus the delta-esophageal pressure.

RESULTS. 49 ALI/ARDS patients and 27 healthy subjects were enrolled. General characteristics for ALI/ARDS patients were: mean age 60.2±15.8 yrs, BMI 24.2±4.0 kg/m2, PaO2/FiO2 227.6±79.9, and for healthy subjects: mean age 55.2±15.8 yrs, BMI 23.1±2.1 kg/m2, PaO2/FiO2 359.3±111.9. ELsp was 13.97±3.86 cmH2O in ALI/ARDS patients and 13.43±3.17 cmH2O in healthy subjects (P=0.547).

CONCLUSION. These data show that the specific lung elastance is quite constant between healthy and sick lungs, allowing in clinical practice that stress or strain should be measured while the other value can be derived to set a protective mechanical ventilation.

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0925

USE OF NON-INVASIVE VENTILATION (NIV) IN BELGIAN INTENSIVE CARE UNITS (ICU): EVALUATION OF PRACTICE AND OUTCOME

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INTRODUCTION. The Belgian Federal Board for Intensive Care Medicine assessed the use of NIV in daily ICU practice and evaluated outcome of patients treated with NIV.

METHODS. A prospective survey was set up by a general questionnaire, sent to all Belgian ICUs. Each patient receiving NIV on any of 3 consecutive days (15, 16 and 17.11.2006) was included in the study. Afterwards, a second questionnaire was sent concerning outcome of these patients (pts) at ICU discharge or ultimately on December 15th, 2006.

RESULTS. 37 ICUs (representing 576 ICU beds and 489 pts) participated to the survey. On November 15th, the occupation rate was 83%. 33% of ICU patients were treated with invasive ventilation and 7% of patients received NIV. In 12/37 ICUs no patient was on NIV. 73 patients were included in the study. Patient characteristics were (median values): age (66 years), APACHE II (16), gender (60% male). Indications for NIV were: postoperative respiratory insufficiency (30%), extubation failure (22%), COPD exacerbation (15%), acute pulmonary edema (30%). A face mask was used in 77% of cases. In 45% of patients NIV was applied continuously untill resolution of respiratory insufficiency. NIV was prematurely discontinued in 39% of patients because of clinical failure (50%), shock (17%), or excessive airway secretions (10%). NIV was successful in 61% of pts with a median duration of 2 days. Overall ICU mortality was 21%; mortality rate in pts failing on NIV was 55% vs. 5 % in pts with successful NIV. APACHE II score, age, weight, and respiratory rate and PaO2 at onset and during NIV were different between NIV responders and non-responders.

CONCLUSION. NIV was used most frequently in the setting of postoperative respiratory insufficiency and for extubation failure. NIV was prematurely discontinued in 39% of pts especially for clinical failure. Disease severity and gazometric response are predictive for NIV success. Mortality in NIV non-responders is significantly higher than in non responders and exceeds overall ICU mortality.

Poster Sessions
Non-invasive ventilation – Imaging of the lungs
0924-0937

0924

ASTHMATIC STATUS TREATED WITH NONINVASIVE VENTILATION

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INTRODUCTION. The most severe form of acute asthma, asthmatic status, frequently requires endotracheal intubation and mechanical ventilation which may develop related invasive procedure complications. Some of them could be minimized using non invasive ventilation (NIV). The aim of this study is to analyze asthmatic status patients' characteristics treated with NIV and the factors associated to its failure.

METHODS. We performed a prospective observational study including all asthmatic status patients that required NIV. We established the need for NIV when there was dyspnea and: respiratory rate $>$ 30, PaO2/FiO2 $<$ 250, pHa $<$ 7.35 or respiratory accessory muscular activity. Exclusion criteria were active upper gastrointestinal bleeding and the impossibility to find an appropriate interface. We considered NIV success when endotracheal intubation was avoided and the patient was discharged from the ICU alive and without respiratory failure. Continuous variables were expressed as mean $\pm$ standard deviation, and categoric variables were recorded as percentages. Comparison between categoric variables was made by Ji2 test and Mann Whitney-Wilcoxon test for comparison between categoric and continuous ones.

RESULTS. During the study period, from 1997 to 2005, 47 patients were admitted in the ICU with asthmatic status diagnosis and NIV required. Female was the predominant sex (76.6%), mean age was 61 $\pm$ 21 years and SAPS II was 39 $\pm$ 12 points. At admission, gasometric parameters were pHa: 7.23 $\pm$ 0.14, PCO2: 67 $\pm$ 23, PaO2/FiO2: 181 $\pm$ 50 and respiratory rate 37 $\pm$ 7. Patients were treated with BiPAP mode (IPAP: 15 $\pm$ 3, EPAP: 6 $\pm$ 1). After 1 hour of NIV, gasometric parameters improved: pHa: 7.29 $\pm$ 0.08 (p$<$0.001), PCO2: 60 $\pm$ 16 (p:0.001), PaO2/FiO2: 211 $\pm$ 41 (p$<$0.001); as well as respiratory rate 30 $\pm$ 5 (p$<$0.001). NIV length was 24 $\pm$ 23 hours. NIV complications were recorded in 11 patients (23.4%) being nasofrontal ulceration the most frequent (21.3%) followed by ocular irritation (10.6%) and claustrophobia (10.6%). NIV success was obtained in 40 patients (85.1%) and ICU mortality was 10.6%. Variables associated to NIV failure were: NIV complications (15% in NIV success and 71.4% in NIV failure; p:0.005), SAPS II at admission (36 $\pm$ 11 y 47 $\pm$ 13, respectively; p:0.025) and respiratory rate at 1 hour of NIV (29 $\pm$ 3 y 36 $\pm$ 8, respectively; p:0.001). Hospital mortality was 75% in patients with NIV failure and 15% in those with NIV success (p: 0.001).

CONCLUSION. NIV could be very helpful in the treatment of severe acute respiratory failure due to asthmatic status presenting a high success rate with a lower rate of complications.

0926

A PREVALENCE STUDY ON THE USE OF NONINVASIVE MECHANICAL VENTILATION IN CLINICAL PRACTICE

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INTRODUCTION. Noninvasive ventilation offers major benefits in selected patients with acute respiratory failure requiring ICU admission. Randomized controlled trials showed that NIV reduced the risk for endotracheal intubation in patients with chronic respiratory failure(1). A recent study showed that in the expert centre NIV applied as first-line intervention in ARDS, avoid intubation in 54% of treated patients(2). A recent study showed a lack of benefit of NIV in post extubation failure (3). The aim of this study was evaluate NIV use in everyday practice in those centre with NIV expertise.

METHODS. Six-months survey, with prospective inclusion of all patients requiring ventilatory support.

RESULTS. Two-hundred and seventy-one patients out of 507 admitted in our ICU from June 2006 to January 2007 required mechanical ventilation for acute respiratory failure. Of these 271 patients 188 (69%) were immediately intubated. Of these 188 patients 103 (55%) received NIV for respiratory failure after extubation and 46 (44%) (tab1) patients failed. In 83 (31%) patients NIV was administered as first line intervention and 43 (51%) (tab1) out of these patients failed and were subsequently intubated.

TABLE 1.

GROUP	AGE (yrs)*	SAPS II*	Live/ Dead (n)	Hypoxiemia/ Hypercapnia (n)	Helmet/ Mask (n)
NIV failure n= 43	69 (58-75)	39 (31-46)	24/19	39/4	17/26
NIV failure post Extubation n=46	63 (44-77)	41 (33-52)	33/13	38/8	15/31

CONCLUSION. 1) NIV is applied in 30% of the patients requiring mechanical ventilation. 2) the failure rate is high, especially for postextubation failure patients. 3) Despite the negative published results(3), still 55% of the patients received NIV for post extubation failure. 4) Hypoxemia was the main cause of NIV failure. 5) The helmet was used to deliver NIV in 38% of the cases.

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Legend:*median value(25th- 75th)

GRANT ACKNOWLEDGEMENT. Università Cattolica del Sacro Cuore

0927

NONINVASIVE VENTILATION AS INITIAL TREATMENT FOR SEVERE COMMUNITY ADQUIRED PNEUMONIA ADMITTED IN ICU.

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INTRODUCTION. Managing community adquired pneumonia (CAP) includes antibiotic and others resources; even with adecuated anitbiotic regimen, the outcome of a number of patient with severe CAP is fatal. The use of noninvasive ventilation (NIV) in CAP appears as an atractive tool but its application stays controversial. In this study we analize the effect of using NIV on CAP admitted in our ICU.

METHODS. In this prospective study we collect every patient with CAP admitted in ICU with respiratory failure from 1st January 2006 to 31st December 2006. Patients were treated with NIV during a period not longer than 2 hours and then they were evaluated on arouse level, ventilatory situation and haemodinamic stability. If they did not need orotracheal intubation (OTI), we included them in our study protocol cosisting in standar management guided by ATS guidelines and NIV using our ICU protocol. We analize ICU days of admission, OTI needing, mortality and nosocomial pulmonary infections comparing our results with published series about CAP. We describe two groups according to NIV failure or not and check initial variables looking for factors predicting outcome of VMNI. Risk is classified according to Fine scale. Pearson's chi squared is applied to dicotomic variables and t of student for cuantitative ones.

RESULTS. In the study period 26 patients were included, 10 out of those had to be intubated (38%). Mortality was 15,8%. Infectious complications and admission days were lower in our study comparing with literature. Days of NIV are 4,5 ± 2,5 in no intubated patient vs 2 ± 1,5 in intubated ones (p<0,05). Days of admission in ICU in non intubated group was 4,7 ± 3 vs 18,9 ± 12,5 in intubated (p<0,05). The starting PO2/FiO2 was 200 ± 89 in the non intubated group vs 149 ± 79 in the the other (p 0,06). The first (A-a)O2 was 209 ± 135 in intubated group vs 349 ± 186 in the other(p< 0,05). APACHE II of the first group 13,6 ± 7 vs 17,6 ± 3,9 in the second (p< 0,05). SAPS II was 30 ± 9 in the first group vs 29 ± 11 in the second, although the maximun SAPS was 31 ± 10 in the first and 38 ± 14 in the second. Starting SOFA in the group of non intubated patients was 6,3 ± 2 and 7,4 ± 5 in intubated. Chi- squared was non significative in any variabe estimating comorbility. Mortality in the first group was 10% vs 40% in the second.

CONCLUSION. VMNI associated to the conevntional treatment in CAP patients involves a better prognosis and less morbimortality. NIV failure is related with higher mortality. Patients with worst SAPS, APACHE II and oxygenation have major risk of failure. In this cases, it should be more agresive and use OTI. This study could be a support for beginning others with a stadistic significance stronger considering that literature about VMNI in pneumonies is really few.

0928

PREVENTIVE NON-INVASIVE VENTILATION. USE IN A POLIVALENT ICU.

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INTRODUCTION. Compare de effects of a consensuated protocol of treatment with noninvasive ventilation (NIV) on programated surgery patients versus same kind of patients the year before without protocol on treatment.

METHODS. Is a prospective study of patients with thoracic, cardiac and high abdominal programmed surgery, who were admitted into our service from 1st January 2006 to 31st December 2006. The protocol of ventilatory support was aleatory and non standard, consisted on three basic phases: 1) Pre-admission individual evaluation defining the mode of physiotherapy. 2) Conventionally hospitalization to achieve the indicated physiotherapy and the apprenticeship of the non invasive ventilatory support. 3) Admission in ICU immediately after surgery, to early extubation and preventive non invasive ventilation. 4) Discharge from the ICU and continuation the physiotherapy necessary for each patient.

RESULTS. During 2006 we apply NIV to 335 patients, whom 52.3% (n= 186) were treated with preventive protocol, opposite to 365 patients treated on 2005, with only a 28% preventive applications (n= 102). The severity scores at admission (SAPS II, APACHE II) at admission were similar in the two years, compared the patients who achieve the preventive technique at 2005 opposite patients at the following year, or compared year to year patients with the preventive non-invasive ventilation versus patients without this. The days after admission in ICU during 2005 with preventive NIV were 2.56 ± 3.1 meanwhile in the group without preventive NIV were 4.1 ± 4.6; opposite, at 2006 the days after admission without preventive NIV were 2.34 ± 3.7 versus 1.6 ± 1.8 in the group who achieve the preventive non invasive ventilation. Although the difference in days was eminent in management terms, there was not statistic difference (p=0,19). The percent of complications in both groups was similar. The days of staying on hospital in the group of patients with non invasive ventilation protocolized treatment was reduced in 1.8 days (p NS).

CONCLUSION. The non invasive ventilation in preventive use, in context of an integral protocol of ventilatory treatment of patients with programated surgery becomes a landmark in clinical, such as in management, point of view.

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0929

NON INVASIVE VENTILATION AFTER EXTUBATION: FACE MASK VERSUS HELMET WITH SPECIFIC SETTINGS

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INTRODUCTION. The helmet is a new interface with the potential of increasing the success rate of non-invasive ventilation (NIV) by improving tolerance. Comparisons performed in healthy volunteers or stable COPD found that NIV with helmet decreased inspiratory effort, but less than a face mask and with a poorer patient-ventilator interaction. Specific ventilator settings may be required. The aim of this prospective, crossover, physiologic study was to compare the helmet and the face mask in patient at high risk of respiratory distress requiring early NIV after extubation and using specific settings for the helmet.

METHODS. In 9 patients, 1 hour after extubation, we evaluated gas exchange, inspiratory effort and patient–ventilator synchrony during three 20 minute-periods of NIV delivered either by helmet (H) or facial mask (FM) with the same level of pressure support (PS), positive end expiratory pressure (PEEP) and pressurization rate (80% max) and by helmet with optimized setting (H+), i.e. 50 percent increase of PS and PEEP and the highest pressurization rate (95% max). Initial measurements were performed while the patient was breathing spontaneously (SB initial) with return to a final SB condition.

RESULTS. NIV improved gas exchange (p< 0.05) and inspiratory effort (p< 0.05) with both interfaces. The H was less efficient than the FM in reducing inspiratory effort (p<0.05. The FM and the H+ provided similar unloading. The H worsened patient–ventilator synchrony, as indicated by longer trigger delays (delay, Tr-insp) and asynchrony time (delay Tr-insp + delay Trigger exp) (p<0.05). H+ decreased significantly this asynchrony time (p<0.05 between H and H+).

TABLE 1.

Main results of the study

	SB inital	FM	H	H+	SB final	p
Ti, (s) ventilator		0.84	0.75	0.70		<0.05
Ti, patient	1.12	0.84	0.94	0.84	1.13	<0.05
Delay Tr-insp (s)		0.17	0.33	0.26		<0.05
T,Asynchrony		0.33	0.59	0.54		<0.05
T Synchrony, % Ti,patient		81.7	59.0	61.7		<0.05
Pdi (cmH2O)	7.5	3.2	4.2	2.7	6.9	<0.05
PTPdi, (cmH2O.s/b)	9.8	3.7	5.2	3.5	9.2	<0.05
PTPdi, cmH2O.s/min	209.8	67.4	99.8	65.5	192.2	<0.05

CONCLUSION. These preliminary results may provide physiologic guidance for NIV settings with helmet. FM and H+ provide similar unloading but differ in their effects on patient-ventilator synchrony.

0930

COMPARATIVE EVALUATION OF PATIENT-VENTILATOR INTERACTION WITH DIFFERENT NIV HELMETS

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INTRODUCTION. Helmet has been shown to be effective in delivering NIV, despite its lower efficiency in decreasing inspiratory effort compared to the mask. Helmet physical characteristics may take a large part in improving patient-ventilator interaction as well as ventilator setting. The aim of this bench study was to evaluate 3 different helmets in terms of patient-ventilator synchrony during Pressure Support Ventilation (PSV).

METHODS. Helmet NIV (PS 12cmH2O, PEEP 5cmH2O) was applied to a mannequin, connected to a test lung (ASL 5000, Ingmar Medical). The 3 helmets (Starmed, ST; Rusch, RU and Sea-Long, SL) were tested with 2 different Respiratory Rate (RR) (20,30 breaths/min) and 2 ventilator settings (Timepress /Trexp 50/25, Timepress/Trexp 80/60) randomly applied. Patient-ventilator interaction was evaluated by analyzing inspiratory trigger delay (Delaytrinsp), pressurization time (Tpress), expiratory trigger delay (Delaytrexp), and the rate of wasted effort (WE) and autocycling phenomena (AC).

RESULTS. At 20 breaths/min and during both ventilator settings, ST and RU showed a significantly lower Delaytrinsp and Timepress compared to SL (p<0.001). Compared to SL, at 30 breaths/min and for each ventilator setting, ST and RU showed a significantly shorter Timepress (p<0.001, respectively).
Concerning the DelayTrexp, RU showed the best interaction at 20 breaths/min both at 50/25 and 80/60 (RU 0.2±0.00 and 0.01±0.00 sec vs ST 0.28±0.01 and 0.11±0.01, and SL 0.6±0.04 and 0.51±0.00 sec; p<0.001, respectively) as well as at 30 breaths/min at 50/25 and 80/60 (RU 0.42±0.00 and 0.28±0.01 sec vs ST 0.5±0.00 and 0.35±0.01 sec and SL 0.58±0.01 and 0.47±0.01; p<0.001, respectively). 80/60: RU vs ST and SL, p< 0.001, respectively) At 30 breath/min SL had a shorter Delaytrinsp than ST and RU (p<0.001); this result might be explained by the higher rate of wasted efforts (WE) (50% SL vs 0% ST and 0% RU, respectively).

CONCLUSION. The results of this study suggest that both ST and RU helmets produced a good patient-ventilator interaction, as demonstrated by the absence of AC and WE phenomena. The SL helmet showed the worst synchrony, with the longest time lags. This finding may be explained by the physical characteristics, the material of the collar and its larger inner volume compared to ST and RU (14,5 liters vs 11 Liters ST and 11 Liters RU). In conclusion, the choice of the helmet seems to deeply affect patient-ventilator interaction.

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0931

COMPLICATIONS OF NONINVASIVE VENTILATION

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INTRODUCTION. Noninvasive ventilation (NIV) therapy shows some advantages with regard to invasive modality, especially lower frequency of severe complications. But NIV is not free of risk. The aim of this study is to analyze the complications related to NIV (NIV-RC), relation with patient prognosis and risk factors for it development.

METHODS. Prospective analysis of the cohort consisting of all the pacients admitted to ICU between 1995 and 2005 with respiratory failure and treated with NIV. Without exclusion criteria. Variables were expressed by mean ± standard deviation and percentages. Comparison of variables was made by X2 and ANOVA. Variables that showed significant relation with complications in univariate analysis, were introduced in a multivariate model of logistic regression.

RESULTS. During the study were amitted in ICU 1926 patients treated with NIV. Mean age was 69 ± 14, SAPS II: 44 ± 13 and 58.8% were male. Most frequent ethiology was acute cardiogenic pulmonary edema (25%), COPD (20.9%) and pneumonia (12.2%). Do not intubate order was established in 510 patients (26.5%). Success of technique occurred in 71.3% of patients and mortality in ICU was 20.1%. 661 patients (34.3%) presented complications related to NIV. The most frequent was nasofrontal ulceration (n:589, 30.6%), followed of ocular irritation (n:289, 15%), claustrophobia (n:132, 6.9%), total intolerance (n:27, 1.4%), gastric distension (n:75, 3.9%), pneumothorax (n:16, 0.8%), respiratory infection (n:34, 1.8%), vomits (n:11, 0.6%), bronchoaspiration (n:3,0.2%) and mucous secretions desecated (n:4, 0.6%). We observed 4 nonwaited sudden cardiorespiratory arrest and one reversible injury of brachial plexus in a patient with Helmet. The appearance of complications was related with NIV failure. (29% in patients with success and 47.6% with failure; p<0.001) and with mortality (30% and 51.5% respectively, p<0.001). Many variables are associated to NIV-RC, but in multivariate analysis, predictor variables of complication were: Do not intubate order (OR:1.409, CI-95%:1.051, 1.889; p:0.022), hours of NIV (OR:1.089, CI-95%: 1.074, 1.089; p<0.001) and maximum EPAP (OR:1.112, CI-95%:1.033, 1.219; p:0.006).

CONCLUSION. Complications related to VNI are frequent but in general they are not severe. The appearance of NIV-RC is related to worse patient prognosis and the determining factor is the duration of NIV therapy.

0932

FACTORS RELATED TO NON INVASIVE VENTILATORY FAILURE IN ACUTE CHRONIC RESPIRATORY FAILURE PATIENTS

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INTRODUCTION. Non invasive ventilation (NIV) has proved to be effective in patients with severe COPD exacerbations, however its usefulness is not so much studied in other types of acute chronic respiratory failure (CRF-A) such as morbid obesity related to alveolar hypoventilation syndrome (MO/AHS).

METHODS. Prospective observational study including all patients admitted with CRF-A from January 1997 to December 2005. The indication for NIV was dyspnea, respiratory rate >30, PaO2/FiO2 <200, pHa <7.35 or respiratory accessory muscular activity. The primary goal was to determine the success of NPPV (defined as a response to therapy allowing the patient to avoid endotracheal intubation, and to survive a stay in the ICU and at least 24 hours on a medical ward). The secondary goal was to identify the variables that can predict NPPV therapy failure. Comparison between variables was made by Chi2 and Student T test. Variables related NIV failre was made bua regression logistic.

RESULTS. 535 patients have been analyzed, 403 COPD and 132 OM/AHS. Main variables in both types of patients are in Table 1: Variables, multivariate analysis, associated to NIV failure were: PaO2/FiO2 admission (OR:0.964, CI-95%:0.964 to 0.948; p<0.001), PaO2/FiO2 1 hour-NIV (OR:0.949, CI-95%:0.931 to 0.965; p<0.001), respiratory rate 1hour-NIV (OR:1.063, CI-95%:1.004 to 1.125, p:0.035), PaCO2 1 hour-NIV (OR:1.023, CI-95%:1.006 to 1.040, p:0.006) and SOFA maximum (OR:1.626, CI-95%:1.438 to 1.838, p<0.001).

Variable	COPD	MO/AHS	p-value
Age	70±9	73±10	0.003
Gender, men, n (%)	352 (87.3)	26 (19.7)	<0.001
SAPS II	42±11	39±11	0.016
pHa admission	7.22 ± 0.09	7.22 ± 0.08	0.320
PaCO2 admission	76 ± 21	75 ± 18	0.790
Respiratory Rate	32 ± 8	27 ± 9	<0.001
PaO2/FiO2 admission	177 ± 42	168 ± 41	0.039
SOFA maximun	5.4 ± 3.2	5.3 ± 3.0	0.953
NIV Succesful, n (%)	355 (88.1)	122 (92.4)	0.164
Hospital Stay, days	15.4 ± 14.1	16.1 ± 10.7	0.561
Hospital Mortality, n (%)	78 (19.4)	8 (6.1)	0.561

CONCLUSION. NIV may be used successfully in COPD patients as well as in OM/AHS patients with acute exacerbation of chronic respiratory failure.

0933

THE ROLE OF VENTILATOR SETTING AND CHOICE OF THE INTERFACE ON PATIENT-VENTILATOR INTERACTION DURING NIV.

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INTRODUCTION. It has been widely demonstrated that patient-ventilator interaction depends on the interface used and on ventilator settings, as well. The aim of this study on healthy subjects was to evaluate patient-ventilator synchrony during Pressure Support Ventilation (PSV) delivered through a facial mask (MNIV) or an helmet (HNIV) with different rates of pressurization (Timepress) and expiratory trigger sensitivity (Trexp).

METHODS. 9 healthy subjects underwent PSV NIV delivered with the helmet (HNIV) and a facial mask (MNIV). The volunteers controlled the RR at 15 and 30 breaths/min and were ventilated with a PB840 (Tyco, HealthCare), with 9 different combinations of Timepress and Trexp (Timepress /Trexp 50/25, 50/5, 50/60, 20/25, 20/5, 20/60, 80/25, 80/5, 80/60), randomly applied. Patient-ventilator interaction was evaluated by analyzing inspiratory trigger delay (Delaytrinsp), expiratory trigger delay (Delaytrexp), time of assistance (Timeass), and the rate of wasted effort (WE) and autocycling phenomena (AC).

RESULTS. Our data showed that SwingPdi was slightly but not significantly reduced during MNIV compared to HNIV both at 15 and 30 breaths/min, while at 50/60, 20/5, 20/60 and 80/25 this difference was significant (p<0.05). At both RR, the Delaytrinsp was lower with MNIV than with HNIV, with a significant difference at 50/25 and 20/25 (p<0.05). At 15 breaths/min, the Timeass was significantly longer during MNIV than HNIV (p<0.001). At 30 breaths/min Timeass during MNIV was significantly reduced compared to 15 breaths/min (p<0.05); however a slight but not significant difference persisted between MNIV and HNIV. During the whole course of the study we did not detect WE or AC phenomena with both interfaces.

CONCLUSION. Patient-ventilator interaction is remarkably affected by the interface utilized. Our results indicate that MNIV is more efficient than HNIV in reducing the inspiratory effort, producing a shorter inspiratory delay and a longer time of assistance especially at low RR. Interestingly at both 15 and 30 RR MNIV was able to assist almost the 80% of the inspiration compared to HNIV, confirming the independence of Timeass from the neural inspiration and a less efficient patient-ventilator interaction with this interface.

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0934

LOCALISATION OF RADIOGRAPHIC INFILTRATES IN PATIENTS WITH ASPIRATION FOLLOWS ANATOMY ONLY IN ABSENCE OF ARDS

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INTRODUCTION. Patients with aspiration of gastric contents are expected to more frequently develop right-sided opacities due to a steeper insertion of the right as compared to the left main stem bronchus. Lower lobes are thought to be more frequently affected due to gravitational forces. However, it is not known to which extent this concept can be confirmed radiographically in ventilated patients with aspiration and whether the distribution of opacities is different in patients with non-aspiration pneumonia.

METHODS. In the ongoing VALID study, a randomised, double-blind study of rSP-C surfactant (Venticute®) in patients ventilated due to pneumonia or aspiration of gastric contents, the investigators document a patient's chest radiograph opacities to the right upper (RU), left upper (LU), right lower (RL), and left lower (LL) quadrants at study entry. Presence or absence of a formal ARDS diagnosis (requiring bilateral diffuse opacities) is also documented. Differences between left and right as well as upper and lower quadrants were assessed by McNemar test.

RESULTS. 133 patients with aspiration and 407 patients with non-aspiration pneumonia were evaluated (Table 1). Patients with aspiration without ARDS showed differences between upper and lower quadrants of both sides (p<0.001) and between right and left sides (RU vs LU; p=0.04 and RL vs LL; p=0.008). In the presence of ARDS, only differences between upper and lower quadrants were significant (RU vs RL; p=0.007 and LU vs LL; p=0.04). In patients with non-aspiration pneumonia without ARDS, differences between right and left sides as well as between upper and lower quadrants were highly significant (p<0.001). In the presence of ARDS, differences were highly significant for RU vs RL, LU vs LL, and RU vs LU (p<0.001) but not for RL vs LL.

TABLE 1.

Distribution of radiographic opacities in the four quadrants (%)

Diagnosis	ARDS	n	RU	LU	RL	LL
Aspiration	No	67	37.3	19.4	85.1	62.7
Aspiration	Yes	66	80.3	75.8	97.0	90.9
Pneumonia	No	155	43.9	24.5	78.1	55.5
Pneumonia	Yes	252	79.8	66.7	98.0	95.2

CONCLUSION. In the ongoing VALID study, patients with aspiration show a predominance of right sided opacities as long as ARDS has not developed. Interestingly, patients diagnosed with non-aspiration pneumonia also seem to show a predominance of infiltrates in the right lung, suggesting sub-clinical aspiration as a cause of the pneumonia. Upper quadrants are less affected in patients with ARDS and much less affected in patients without ARDS.

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0935

LUNG PRESSURE GRADIENTS DURING MECHANICAL VENTILATION USING COMPUTER TOMOGRAPHY

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INTRODUCTION. Inhomogeneous distribution of pressure represents a potential hazard during mechanical ventilation (MV) of patient with acute respiratory failure (ALI). Computer Tomography (CT) allows to calculate lung volume distribution during MV preserving topographic information. We assumed that alveoli reach an equal plateau pressure (Pplat) during prolonged Inspiratory Hold Maneuvers (IHM). Object of the study was to estimate intra-lung pressure gradients during MV.

METHODS. Three pigs, after general anaesthesia, underwent multiple spiral CT (Somatom Sensation 16, Siemens, Erlangen, Germany) covering the whole lung during IHM, at 12 lung volumes, separated by steady state Tidal Ventilation (ssTV). Then, during ssTV a fixed scanning level was continuously exposed to CT (cycling time 0.75s), obtaining Dynamic Exposures (DE). The sequence was performed at two levels of applied PEEP and repeated after inducing Acute Lung Injury (ALI) by administration of oleic acid. From the CT images shot during IHM, by applying matrix mathematics (MatLab, MathWorks, Natick, USA), we calculated the air Volume Map (VM). Matching couples of VM pertaining to consecutive delivered volumes, we calculated the static Compliance Map (CM) by dividing the volume gradient by the corresponding Pplat gradient. Applying VM coming from DE to CM we obtained the pressure map (PM) of the lung during ongoing MV. From the PM, the interquartile range (IR) of pressure distribution and the pressure gradient map (PG) between neighbour voxels were calculated.

RESULTS. IR of pressure distribution during ALI was significantly higher ($p<0.001$) than during healthy state of the lung. No difference in IR was found comparing different PEEP levels. In the ALI group, PG maps showed higher pressure ridges at the borders between affected and unaffected areas than in the healthy state.

CONCLUSION. The described method permits topographic mapping of pressure gradients during MV. Higher pressure ridges and larger IR of pressure distribution reflected inhomogeneity as shown by ALI. Although the technique needs further development, it may be useful to detect regional iatrogenic injury related to MV.

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0936

COMPARISON OF ELECTRICAL IMPEDANCE TOMOGRAPHY (EIT) AND POSITON EMISSION TOMOGRAPHY (PET) TO MEASURE ALVEOLAR VENTILATION AND VOLUME IN NORMAL PIGS

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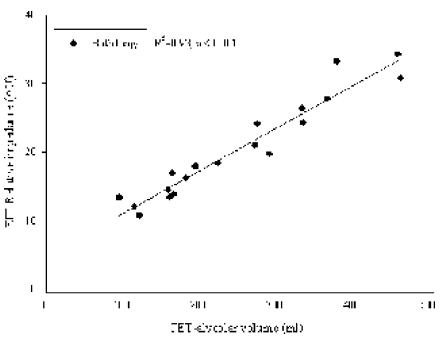
INTRODUCTION. EIT is a lung imaging technique which can provide regional lung volume at the bedside. Our goal was to validate EIT with PET as a reference technique which can quantify regional alveolar ventilation (VA) and volume (V).

METHODS. In 5 tracheotomized, anesthetized healthy pigs, we compared both techniques at 6, 8, 10 and 15 ml/kg tidal volumes on zero end-expiratory pressure and $FIO_2$21%. A ring of 16 electrodes was placed around the mid-chest for EIT capture. PET study was performed by using ^{13}N-N_2. V, VA and V/VA were determined during ^{13}N-N_2 washout by fitting the data to a two-compartment model(1). EIT signal was continuously monitored and recorded during tracer washout so that PET and EIT signals were simultaneously measured. PET values were compared torelative variations of impedance (Z) obtained with EIT on regions of interest drawn in the whole, half anterior and half posterior lungs. PET planes were selected to match the lung area tracked by the EIT.

RESULTS. A strong correlation ($R2>=0.90$) was found between V and Z over both and right and left lungs (figure 1). The same was true for V/VA but not for VA and Z.



CONCLUSION. Calibration of EIT against PET performed very well regarding alveolar volume.

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0937

CHANGES OF VIBRATION RESPONSE IMAGE AS A FUNCTION OF POSITIVE END-EXPIRATORY PRESSURE

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INTRODUCTION. Vibration Response Imaging (VRI) is a new modality that measures and displays lung sounds generated during the respiratory process. Lung sounds are detected by two arrays of 18 microphones attached to the back of the patient. A dynamic image is created, revealing the regional movement of gas during the breathing cycle. This non-invasive bedside technology was used to image the lung of critically ill patients at different levels of Positive End-Expiratory Pressure (PEEP).

METHODS. Nine critically ill patients (5 females and 4 males, average age 69±17 years) were recorded with VRI at two or three levels of PEEP: ZEEP (0 cm H2O), PEEP 5 (5-6 cm H2O) and PEEP 10 (8-10 cm H2O). The patients were ventilated on pressure support mode of mechanical ventilation. Regional distribution of vibration was calculated at mid-inspiration using proprietary software. Statistical analysis was done using Wilcoxon Matched-Pairs Signed-Ranks Test.

RESULTS. Eight out of nine patients showed significant vibration increase in the lower lungs when increasing PEEP from 5 to 10 ($p=0.016$). Changes in the other lung regions (middle, upper) were not significant. Conversely, one patient showed decreased vibration in the lower lungs and increased vibration in the upper lung when increasing PEEP. This may be explained by a decrease of gas exchange due to a local obstruction in the lower lung regions at higher PEEP.

CONCLUSION. For the majority of the patients, vibration, as a surrogate of ventilation, was significantly greater in the lower lung segments when increasing PEEP from 5 to 10 cm H2O. Vibration Response Imaging may provide an efficient assessment tool for setting PEEP at the bedside.

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Poster Sessions
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0938

IS REFEEDING SYNDROME, A PROBLEM IN CRITICALLY ILL PATIENTS?

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INTRODUCTION. Refeeding syndrome is the metabolic disturbance which occurs at cellular level and causes shifts in electrolytes, fluids and micronutrients. These can precipitate hypophosphataemia, hypokalaemia, hypomagnesaemia, dysarrhythmias and cardiac failure. But,in patients in critical care units, who are monitored continually,is there a significant risk? Not all patients who are enterally fed develop refeeding syndrome (Crook et al, 2001)(1). Aim of the study was to determine whether ventilated patients would tolerate a full volume enteral feed without increased risks of refeeding syndrome compared to the incremental feeding.

METHODS. This was a prospective randomised controlled pilot study comparing incremental feeding to target full feeding in the critically ill patients. Forty patients were included in the study. Five patients (3 in study / 2 in control groups) were withdrawn due to early deaths or extubations. Patients in the study group were fed full feed depending on the body weight(upto 75 mls/hr) whereas the patients in the control group were fed incrementally (starting from 30 mls/hr). There were no significant differences between the two groups with regards to patient characteristics, the severity of illness, use of sedative and vasoactive medications.

RESULTS. Low electrolyte levels were corrected using the protocols. The amount of supplements required to correct electrolyte imbalance were recorded. In the study group, there was an increased requirement for phosphate (p-value 0.01) which was very significant. The increased supplements for magnesium in the study group and the increased supplements for potassium in the control group were not statistically significant. Similarly, the difference in the glucose levels and insulin requirements were not statistically significant, although this pilot study showed more insulin need in the control group. Also,the incidence of regurgitation,aspiration and deaths were not statistically different between the two groups.

Supplements given	Study group Full feed	Control group Incremental feed	p-value
Phosphate - 48 hrs mmol/l mean[variance]	24.70 [676.47]	6.66 [94.11]	0.01
Magnesium - 48 hrs mmol/l mean[variance]	38.82 [373.52]	28.88 [481.04]	0.16
Potassium - 48 hrs mmol/l mean [SD]	78.24 [83.68]	134.7 [107.8]	0.274
Glucose levels-24 hrs mmols/l Mean (SD)	8.5 [2.9]	7.7 [1.9]	0.4
Insulin need - 24 hrs units, Mean (SD)	72 [54.2]	56 [43.8]	0.4
Arrhythmias yes/no	1/16	5/13	0.1774

CONCLUSION. This pilot study clearly indicates that there are no increased risks of refeeding syndrome when initiating full feed in the intensive care units. Initiating with full feed will achieve the target caloric absorption earlier than incremental feeding. However, these patients need to be monitored closely as they may need electrolyte supplements especially phosphate.

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0939

EFFECT OF I.V. GLUTAMINE ON PLASMA GLUTAMINE, ARGININE AND ADMA IN SHOCK

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INTRODUCTION. Low plasma glutamine (GLN) is associated with mortality (1). Arginine (ARG) is a precursor of the vasodilator nitric oxide (NO), while asymmetric dimethylarginine (ADMA), derived from proteolysis of methylated ARG residues, is a NO synthase inhibitor. Accumulation of ADMA is related to oxidative stress, impairing its degradation, and to renal- and liver failure. High plasma ADMA is associated with mortality (2). We studied whether early iv GLN in septic shock or cardiogenic shock (SS or CS) would normalise plasma GLN and ARG, and/or influence plasma ADMA concentration and ARG/ADMA ratio.

METHODS. In a double blind RCT, patients with septic or cardiogenic shock (SS or CS) were included to compare a continuous GLN infusion (day 1 in ICU 0.5 g /kg/d, day 2-5 0.3 g /kg/d) to placebo. Amino acids were determined before start, at 24 h and at day 5, 4 h after cessation of GLN infusion. Patients were enterally fed with Impact (ARG-enriched). Values in median (IQ range), comparisons with Mann Whitney-U or ANOVA repeated measures.

RESULTS. 16 patients were randomised to GLN (75% SS), 16 to placebo (75% SS). AA were measured in 24 patients (see Table). At baseline, plasma GLN was not different between the GLN and the placebo group. However, plasma GLN was lower in SS patients (306 mumol/l, 265-397) than in CS (457 mumol/l, 364-492), p = 0.02, whereas ADMA tended to be higher in CS (58 mumol/l, 41-76) than in SS (36 mumol/l, 30-49), p = 0.05. GLN infusion increased plasma GLN during infusion (p<0.001 between GLN and placebo). Plasma ARG (p=0.02), ADMA (p=0.03) and ARG/ADMA (p=0.005) increased over time, but were not different between GLN and placebo groups.

TABLE 1.
Plasma concentrations of amino acids in placebo and glutamine patients

	Placebo Pre	Placebo 24 h	Placebo day 5	Glutamine Pre	Glutamine 24 h	Glutamine day 5
Age (yrs)	67 (52-67)			72 (65-81)		
SOFA	10 (8-12)			10 (8-12)		
GLN mumol/l	305 (220-485)	261 (182-376)	517 (380-632)	338 (262-430)	641 (412-944)	469 (380-614)
ARG mumol/l	21 (19-29)	26 (24-51)	109 (83-157)	25 (22-37)	47 (38-53)	74 (49-131)
ADMA mumol/l	0.39	0.42	0.77	0.45	0.52	0.67
ARG/ADMA	70 (52-85)	96 (59-131)	167 (92-264)	75 (49-88)	84 (71-129)	88 (86-222)

CONCLUSION. Plasma GLN is lower in SS than in CS, while ADMA tends to be higher in CS. GLN infusion temporarily increases plasma GLN, but does not influence plasma ARG, ADMA and ARG/ADMA ratio. During ARG-enriched enteral feeding, both ARG and GLN seem to recover.

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GRANT ACKNOWLEDGEMENT. We received a grant from Fresenius Kabi for amino acid determinations.

0940

NASAL BRIDLES — AN ALTERNATIVE TO THE BULLRING?

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INTRODUCTION. Nasoenteral feeding tubes are prone to displacement that interrupts feeding, compromises nutritional intake and increases the need for repeat procedures that can be time consuming, invasive, uncomfortable and unnecessary. Based on the procedure described by Popovich et.al.(1) nasal "bullrings" have been used to secure nasogastric (NG) tubes within our Critical Care Unit for a number of years with minimal complications reported. As a result of increasing requests for this method of securing tubes at ward level the Nutrition Support Team (NST) evaluated a nasal bridle fixation device for NG and nasojejunal (NJ) tubes in selected patients.

METHODS. Patients were referred to the NST for placement of the nasal bridle if they had pulled out at least 3 NG tubes or had a NJ tube placed endoscopically. Nutrition Nurse Specialists (NNS) placed all nasal bridles over an 18-month period. Nursing care and monitoring resources were provided, and the patient was regularly reviewed by the NNS following placement. The bridle cost was recharged to the ward.

RESULTS. 90 nasal bridles were used to secure feeding tubes in 77 patients. 83 nasal bridles used in 71 NG fed patients and 7 nasal bridles for 6 NJ fed patients. There were 12 failed attempts at bridle fixation as a result of patient anatomy, epistaxis and equipment, although 5 were successful on the second attempt. Half of the patients were nil by mouth and had no other means of receiving nutritional support. Patients were fed for an average of 15 days using a bridled NG tube and 25 days using a bridled NJ tube, with an overall range of 2 to 63 days. Minor complications were observed in 25%, primarily bridle/tube removal by the patient or due to redness, swelling or indentation of the nostril. 30% of bridles were removed as they were no longer required, 20% for reasons unrelated to the bridle and 25% of patients died. 32 of the NG fed patients were referred for gastrostomy insertion, 24 of which were placed, average waiting time 17 days. 8 were cancelled due to deterioration in clinical condition or return to oral diet.

CONCLUSION. The nasal bullring and bridle are additional fixation devices that are essential for certain patients that repeatedly remove their nasoenteral feeding tubes. Significant cost savings include fewer feeding tubes and equipment, x-rays, and endoscopy procedures, together with improved delivery of nutrition and better utilization of staff time. Complications of both fixation devices are minor. The bridle itself is costly but has the advantage that it is a licensed nasoenteral fixation device that can be placed reasonably quickly at the bedside, avoids the need for sedation and is more comfortable and discreet for the patient when compared with the bullring.

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0941

CATHETER RELATED BLOOD STREAM INFECTION, MICROBIOLOGICAL CAUSES IN A TOTAL PARENTERAL NUTRITION POPULATION

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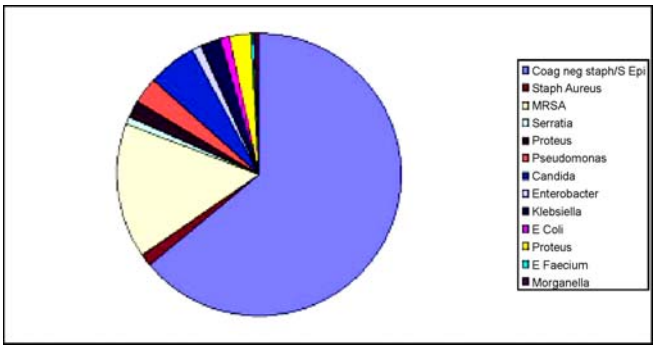
INTRODUCTION. To examine the microbiological causes of catheter related blood stream infection (CRBSI) in a total parenteral nutrition (TPN) population over a 10-year period (1997-2006).

METHODS. 525 bed university hospital. Hospital-wide, comprehensive TPN service based at Department of Intensive Care. TPN committee meets quarterly to examine prospectively collected data to examine CRBSI incidences.

RESULTS. 1197 patients, 2093 CVCs were included in study population. 184 CRBSI episodes occurred involving 159 patients throughout the study period. As can be seen from Figure 1, most common microbiological cause of CRBSI has consistently been Coagulase negative staphylococcus or Staphylococcus Epidermis (64%). A surprisingly high proportion was due to MRSA (15.4%), and Candida (5.7%).



CONCLUSION. Our literature review could not find any published guidelines on empiric antimicrobial therapy for treatment of suspected CRBSI. Vancomycin, which is generally the first line agent used to treat suspected CRBSI is reasonable given the high proportion (64%) of CRBSI being caused by Coagulase negative staphylococci or Staphylococcal Epidermis. Obvious problems lie in the high proportion of causative organisms that would not be sensitive to Vancomycin as seen by high proportion of MRSA and candida organisms. This should especially be kept in mind for patients who do not demonstrate defervescence of sepsis following CVC removal.

0942

NUTRITIONAL SUPPORT OF HEAD INJURED ICU PATIENTS MAY BE IMPROVED BY ORGANIZING A NUTRITIONAL SUPPORT TEAM

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INTRODUCTION. Head injured patients are frequently malnourished due to high catabolic rate, imbalance between nutritional supply and demand, delayed gastric emptying impeding enteral nutrition and frequent nutrition interruption. We tested the hypothesis that a nutritional protocol implemented by multidisciplinary nutritional support team (NST) consisted of a physician, dietitian and a registered nurse will improve at least the nutritional support of these patients.

METHODS. Over a period of one year, fifty one (43 M, 8 F, aged 34±13, APACHE score 16±6) head-injured patients (GCS 5,5±2) were prospectively included in the study. Patients were randomly assigned to the intervention or control group. In the intervention group, the NST assessed by indirect calorimetry the daily metabolic needs of the patients, implemented the nutritional support as soon as possible and solved specific nutritional problems such as treatment of gastric intolerance, diarrhoea etc. In the control group the NST assessed the daily metabolic needs of the patient and informed the attending physician who was responsible for the prescription and implementation of the nutritional support of the patient.

RESULTS. Both groups at baseline had similar demographic data and caloric needs/day (1862 ± 279 vs 1792±260 p=ns) during the first 10 days. However, in the intervention group nutrition started earlier (31 vs 76 hours) and patients received significantly more calories per day compared to the control group (Table 1).

	Intervention Group (n=26)	Control Group	p
REE (kcal/day) - measured	1862 ± 279	1792 ± 260	0.28
REE (kcal/day) - estimated	1752 ± 201	1692 ± 186	0,20
Time (hours) elapsed for enteral nutrition	31 ± 11	76 ± 22	**<0,01**
Days of Enteral nutrition	22 ± 13	16 ± 6	0,024
1st day (kcal/day)	379 ± 172	270 ± 111	**<0,01**
3rd day (Kcal/day)	830 ± 157	524 ± 202	**<0,01**
7th day (kcal/day)	1363 ± 189	622 ± 172	**<0,01**
10th day (kcal/day)	1432 ± 156	813± 235	**<0,01**
Days in the ICU	24 ± 7	28 ± 8	0.062

CONCLUSION. Our data suggest that the constitution of a NST in the ICU may improve enteral nutrition in head injured ICU patients, which may be beneficial for a shorter ICU stay of these patients.

0943

INCIDENCE AND PATTERNS OF ABNORMAL LIVER FUNCTION TESTS ON THE GENERAL INTENSIVE CARE UNIT

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INTRODUCTION. The interpretation of deranged liver function tests (LFT) is a common clinical problem faced by critical care physicians. There is little descriptive data in the literature which adequately illustrates the nature of the problem. We undertook a retrospective analysis of data within our institution to identify the trends in LFT and ascertain the frequency of abnormal results.

METHODS. The results of all LFT requests by the General Intensive Care Unit of a large teaching hospital in South London, between 1st December 2006 and 28th February 2007 were obtained from the Chemical Pathology department.

RESULTS. During the three months studied 1655 sets of LFT were performed on 355 patients representing 1472 patient-days. All patients had daily LFT checked as part of a routine 'ITU profile'. LFT were checked twice in 152 patient-days, three times in 12 and four times once. Bilirubin was above the normal range in 36% of tests, alanine transaminase (ALT) 27%, alkaline phosphatase (AKP) 21% and gamma-glutaryl transferase (gammaGT) 45% (table). Average bilirubin rose from 19.8mumo/l on admission to 48.7mumo/l on day 13 and fell gradually thereafter. ALT peaked on day 5 (52.7 IU/l, 91.61 IU/l, p<0.01). AKP and gammaGT increased later after admission to a peak on days 17 and 13 respectively and then plateaued. Values of AKP and gammaGT were correlated (r^2=0.51) whilst there was only very weak correlation between ALT and AKP or gammaGT.

	Bilirubin	ALT	AKP	gammaGT
Normal range	1053 (64%)	1211 (73%)	1305 (79%)	906 (55%)
1-2xULN	394 (24%)	249 (16%)	244 (15%)	325 (20%)
2-5xULN	145 (9%)	122 (7%)	101 (6%)	263 (16%)
5-10xULN	24 (1%)	34 (2%)	5 (<1%)	105 (6%)
>10xULN	28 (2%)	40 (2%)		53 (3%)

Distribution of LFT in 1655 tests performed in three months on the General ICU

CONCLUSION. We have demonstrated that abnormal LFT are a significant problem on the General Intensive Care Unit. They are checked daily on a routine basis and in 10% of cases were repeated on the same day. Our data suggest two patterns of abnormal LFT, peaking at different times during the ITU stay, correlating with a clinical distinction between 'hepatitic' and 'cholestatic' liver dysfunction. The causative factors behind abnormal LFT are likely to be multifactorial and may be related to pre-existing liver conditions, the acute illness prompting admission to the ITU, diseases evolving during the ITU stay or critical care therapeutic interventions. The cost of performing each 'set' of LFT was £4 (~ €6, $8) equating to £26,480 (€39,720, $52,960) per year. Given the high prevalence of LFT outside of the normal range, prospective studies to investigate their clinical significance and causes are required.

0944

LOW ALBUMIN IS UBIQUITOUS ON THE GENERAL INTENSIVE CARE UNIT AND IS ASSOCIATED WITH A LONGER LENGTH OF STAY BUT A LOWER RISK OF DEATH

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INTRODUCTION. Serum albumin level falls with acute and chronic illness and albumin levels outside of the normal range are common in the critically ill. Serum albumin is routinely tested daily but the significance of abnormal values is not clear. We planned to define the range of serum albumin at admission and trends during stay on the General Intensive Care Unit and association with length of stay and 30 day mortality.

METHODS. Levels of serum albumin in patients admitted to the General Intensive Care Unit of a large teaching hospital in South London, between 1st December 2006 and 28th February 2007 were obtained from the Chemical Pathology department. Mortality statistics were obtained from the hospital electronic patient record.

RESULTS. 1655 blood tests were performed during this three month period with an average serum albumin level of 18.6g/l. Only 35 (2%) were greater than 35g/l, the lower limit of the normal range. A total of 355 patients, 57 of whom died within 30 days (16%), had a first admission to the general ICU during the study period. The average age was 58.4yrs (SD 18.1), 55% were male and the mean length of stay was 3.9 days (range 1-26 days). The median albumin on admission was 22g/dl. Levels of albumin progressively declined during the ICU stay. Patients with albumin less than 22g/dl on admission were older (60.7 yrs v 55.8 yrs, p<0.05). An albumin less than 22g/dl at the time of admission was associated with a longer length of stay (4.6 days v 3.1 days p<0.001). Albumin greater than 22g/dl at the time of admission was associated with a greater 30 day mortality (OR 2.1; 1.17-3.77).

CONCLUSION. Serum albumin in the critically ill patient is almost invariably below the lower level of what is considered the normal range and falls further as the length of time spent on the ICU increases. Lower levels of albumin at the time of admission may reflect chronic illness prior to presentation since they are more common in older patients and result in an increased ICU stay. The statistics suggesting that higher levels of albumin are associated with greater mortality may reflect the poor outcome associated with sudden catastrophic illness. The causes of low albumin are multifactorial and prospective studies are needed to elucidate these and their consequences.

0945

IS THERE ANY DIFFERENCE IN NUTRITIONAL SUPPORT BETWEEN MEDICAL AND NON-MEDICAL ICU PATIENTS?

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INTRODUCTION. Early nutrition in the critically ill patient will improve outcome and facilitate more rapid rehabilitation. Recent data suggest that nutritional support (NS) is a very important part of the management of the critically ill patient, whether the acute illness begins as a medical or a surgical process. The goals of our study were to quantify the NS administration and to compare NS in medical patients (MP) and non-medical patients (NMP)(trauma and surgical).

METHODS. Prospective analysis of ICU patients admitted consecutively. Exclusion criteria were: NS for <2 days, age <16 years and length-of-stay (LOS) < 3 days. Patients were followed for the first 7 days of NS. Data collection included: demographic data, NS (route, target volume and delivered volume), reasons for interruption and suspension of NS. Chi-square, Mann-Whitney U and T-test were used in statistical analysis.

RESULTS. Fifty patients were included: 26 were MP (52%)and 24 NMP (48%). A total of 327 nutrition days (ND) were analyzed: MP 166 days and NMP 161 days. Mean age of MP was higher than NMP (64+11.3 vs. 49.3+22.3; p=0.006). Most patients were male (61.5% vs. 87.5%; p= 0.037) without differences regarding weight, SAPS II score on admission, target volume of NS and vasopressors use. NMP were put on sedatives more frequently than MP (p<0.05). NS was started earlier in MP (mean: 29.8 h +14.6 vs. 38.9 h +14.9; p=0.035), mainly by enteral route (92.3% vs. 79.2%; p=ns). Target volume of NS was achieved in 70% of the patients (MP 73.1% vs. NMP 66.7%; p=ns). MP received > 90% of what was prescribed in 80% of ND and NMP in 76.6% (p=ns). NS was interrupted in 29 ND in MP and 33 in NMP (p=ns), mainly due to gastrointestinal dysfunction (47.4% vs. 57.6%; p=ns). GI dysfunction was responsible for reduction of enteral feeding in 8% of ND in MP and in 9.8% in NMP (p=ns). There was no difference in ICU LOS and mortality between the 2 groups (p=ns).

CONCLUSION. Although NS was started earlier in MP with statistical significance, most of the patients received > 90% of prescribed NS in both groups. No statistically significant difference was found between MP and NMP regarding: route feeding, target dose achievement and NS interruption or reduction.

0946

HOW IS IRON PRESCRIBED IN FRENCH INTENSIVE CARE UNITS?

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INTRODUCTION. Blood loss and iron deficiency (ID) are important factors of intensive care anemia(1). However, neither recommendation nor study focusing on iron treatment exists. The aim of this study was to evaluate French intensivists' (I) practices of iron supplementation.

METHODS. We collected 128 questionnaires (containing 19 items) from French I, working in mixed (45%), surgical (31%) or medical (24%) intensive care units. They where separated in 2 groups ((P) prescribing iron $\geq$1 time / week; or not (NP), $\leq$ 1 time / month). Comparisons were done using Mann-Whitney or Chi-2 tests, as appropriate. Iron treatments (IV or oral) efficacy and tolerance were quoted from 1 to 10 and compared by a Wilcoxon rank test. p<0.05 significant.

RESULTS. All I (73% males, mean age 36±8 yrs) considered having anemic patients and 94% having patients with ID. 72% of I judged ID frequent (concerning >10% of their patients). 73% diagnosed ID using biology tests; with iron tests for 90% and blood numeration for 84%. Only 25% of I were P. 20% declared using IV iron, 35% oral iron and 44% both. 20% used blood transfusion for ID correction. Treatment was ended after a calculate dose or duration in 29%, after anemia or iron tests normalization in 32% or was ended by the discharged physician (29%). IV iron was considered more efficient (7±2 vs 6±2, p<0.001) and tolerated (7±2 vs 6±2, p<0.001) than oral iron. There was no characteristics difference between P and NP (according to age, sexe, ICU type, hospital type). P answered more often having ID patients (p=0.04), and having more patients with ID (p=0.03). But, P did not performed biology tests for ID diagnosis more often than NP (p=0.26) ; and P did not consider treatment efficacy (p=0.68 et 0.17 for IV and oral) or tolerance (p=0.32 et 0.06 for IV and oral) higher than NP.

CONCLUSION. Intensive care anemia and ID are considered to be frequent by the French intensivists interrogated, and a large proportion of them ($^3/_3$) declared using biology tests to assess ID. Iron treatments are judged efficient and quite well tolerated. However, only 25 % of I are frequently prescribing iron treatments. The efficacy and the tolerance of these treatments do not seem to influence the doctor choice, since they are not different for P and NP. This underscore that ID is a clinically relevant problem but, to date, insufficiently explored.

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0947

MINIMISING RISK

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INTRODUCTION. Enteral tube feeding is the preferred method of nutrition support in the critically ill patient. It is more physiological, cheaper and associated with fewer complications than parenteral nutrition. The majority of patients that receive enteral nutrition are fed using a nasogastric tube (NG). The main clinical risk associated is of NG tube misplacement. The Trust guidelines for NG feeding were revised as a result of the 2005 National Patient Safety Alert "Reducing the harm caused by misplaced nasogastric feeding tubes." The aim of this review was to identify measures used within the Critical Care Unit targetted at reducing the risks associated with enteral nutrition and to assess compliance with these strategies.

METHODS. The potential risks of enteral feeding were identified as misplaced nasogastric feeding tubes and incorrect feed prescription or administration. Documentation employed to reduce these risks was identified within the standardised fluid prescription chart and nursing care plan, both of which are completed daily. Both documents were reviewed on each patient for the previous 1 to 5 days. The feed administration set was examined to determine when it was set up. The feed infusion was checked against the feed prescription.

RESULTS. 15 patients and their notes were reviewed giving a total of 54 patient days. The majority (73%) were receiving NG feeding and 13% were fed via a gastrostomy tube. A fluid prescription chart is written daily and has a section for enteral feed. This was prescribed correctly on 85% of occasions (9% not documented, 6% incorrectly). The correct feed was administered in 100% of enterally fed patients on the day of review. The nursing care plan has a section to record enteral tube type, length at nose and confirm tube position check on each shift. The external NG tube length was correctly documented in 16% of cases (72% had no documentation, 12% ticked box without documentation of method). The method used to check tube position was correctly documented in 8% of cases (34% had no documentation, 58% ticked box without documentation of method). In the Critical Care Unit enteral nutrition is delivered continuously and although reported as standard practice, the administration set was only labelled with the time and date of renewal in 20% of cases, potentially increasing risk of microbial contamination or unecessary set renewal.

CONCLUSION. Standardised documentation for medical and nursing staff within Critical Care encompasses strategies to promote practice to minimise the risks associated with enteral tube feeding. However, compliance in practice is poor or poorly documented. Education and training regarding procedures and appropriate documentation should improve compliance and a review will be undertaken in 6 months.

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0948

BEDSIDE PLACEMENT OF SMALL BOWEL FEEDING TUBES

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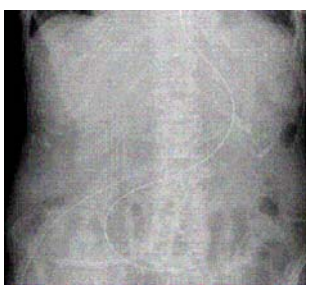
INTRODUCTION. Enteral feeding is the preferred route of feeding for the majority of ICU patients. Often gastric feeding fails to meet feeding requirements due to delayed gastric emptying caused by drugs or pathology 1. Small bowel tube feeding has been advocated as a way of overcoming problems with gastric emptying however placement of small bowel feeding tubes can be difficult and time consuming 2 leading to delay in instigation of feed and failure to reach calorific requirements. We present our bedside method of small bowel feeding tube placement which has proved rapid and successful.

METHODS. Following a review of the literature one of the authors (NW) developed a technique for placement of small bowel feeding tubes. Patients were placed 45 degrees right lateral and 30 degrees head up. A size 8 french 110 cm flocare® polyurothane feeding tube with guide wire (manufacturer Nutricia Healthcare SA) was inserted to 70 cm. 30 minutes after administration of 10mg of metoclopramide and 250 mg of erythromycin iv the tube was advanced to 100cm at the nose over at least five minutes. The wire was left in situ and and an X-Ray was taken to confirm position.
NW has been using this technique successfully for over a year. Here we present details of the last 5 patients on whom this technique was used.

RESULTS. All 5 insertions were successful with position confirmed radiologically in each case (see image). The mean time from start of procedure to confirmation of placement was 91.8 minutes.



CONCLUSION. We believe with this technique small bowel feeding tubes can be quickly, easily and reliably placed at the bedside in ICU.

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0949

THE USE OF AN ENTERAL DIET ENRICHED WITH ARGININE IS ASSOCIATED WITH INCREASED TOXICITY ON HUMAN LYMPHOCYTES OF PATIENTS WITH SEVERE SEPSIS

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INTRODUCTION. The use of an enteral nutrition with eicosapentaenoic acid (EPA from fish oil) and gamma-linolenic acid (GLA from Borage Oil) but not enhanced with arginine has been associated with improved outcomes in patients with severe sepsis and septic shock (Pontes-Arruda et al, 2006). The use of arginine enhanced diets, particularly in patients with severe sepsis, remains controversial. The level of toxicity of a diet to human lymphocytes may be evaluated by its capacity to increase cell death by apoptosis and necrosis (Cury-Boaventura et al., 2004). The aim of this study is to compare the toxicity of the EPA+GLA diet with an EPA+Arginine diet on human lymphocytes obtained from patients with severe sepsis.

METHODS. 45 patients with severe sepsis requiring mechanical ventilation were randomized to receive either: an EPA+GLA diet (Oxepa, Abbott Labs), a high lipid diet not enriched with EPA or GLA used as control (Pulmocare, Abbott Labs) or an EPA+Arginine enhanced diet (Impact, Novartis). Caloric goals were calculated using the Harris-Benedict equation x 1.3. The first day patients achieved 75% of BEE x 1.3 was considered as study day 1. Blood samples were collected at baseline, Study Day 4 and Study Day 7 to access lymphocyte proliferation, and cell membrane integrity (a marker of necrosis) and DNA fragmentation (a marker of apoptosis) in accordance with the protocol previously described by Cury-Boaventura et al.

RESULTS. On study day 4, the EPA+arginine enhanced diet was associated with a significant decrease in lymphocyte proliferation as compared with the EPA+GLA and control diets (44% x 93% x 65%, EPA+arginine, EPA+GLA and control diet respectively, $p<0.001$), increased DNA fragmentation (46% x 17% x 34%, $p<0.001$) and increased loss of cell membrane integrity (65% x 83% x 70%, $p<0.001$). Similar results were observed on study day 7.

CONCLUSION. This study demonstrates for the first time that an arginine enhanced enteral diet is associated with increased human lymphocyte toxicity as well as compromised lymphocyte proliferation in patients with severe sepsis. This mechanism may help explain, in part, some of the negative associations with arginine and sepsis (Heyland et al. 2005).

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0950

EFFECT OF EARLY NUTRITION SUPPORT IN BURNS CHILDREN

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INTRODUCTION. The aim of our study was to study the specific features in the development of protein disorders, to evaluate the effect of enteral nutrition and to discover and gastrointestinal complications associated with early enteral nutrition support by children with severe burned condition.

METHODS. We studied 64 pediatric patients aged from 6 months to 5 years old with burn injury of more than 15% of total body surface area (TBSA). Starting from the 1st day after burn shock, the patients received a total parenteral nutrition and enteral tube infusion of Regidron solution + pectin supplement (1% solution). From the 2nd burn shock day, the children received nutritional support combining a parenteral nutrition and a partial enteral tube nutrition with peptide formulae (in 50% concentration on the 1st day). On the following 3-5 days, provided the enteral nutrition product was well-tolerated, the portion of parenteral nutrition was reduced and the portion of enteral nutrition increased. Enteral feeding was administered into the stomach by nasogastric tube or by jejunostomy feeding tube. Statistical analysis of data was made using "Statistica", the Student's t-test was used for mean values in the sample.

RESULTS. Monitoring of total protein and its fractions over time demonstrated that hypoproteinemia was as high as 48,4-54,1 g/L and maintained at that level for up to 2-3 weeks. On the 1st-2nd day post-burn albumin was decreased by 25% in all the children with severe burns. Within the following 2 weeks, we observed a persisting hypodysproteinemia, hypoalbuminemia that resolved on adequate nutrition at 4-5 weeks. We see complications as gastroesophagal reflux in 5% patients, tube displacement in 4%, gastrointestinal complications associated with enteral nutrition therapy - diarrhea in 32,3 %, constipation in 14%, vomiting in 5,5%, bleeding in 6,7% cases.

CONCLUSION. We considered the persistent hypoproteinemia after severe burns to be the result of pronounced catabolic protein decay, and also a decreased synthetic function of the liver. Elevation of the patient's head of bed greater than 30 degree, to use jejunostomy feeding tube to the ligament Treiz to prevent mechanical complications. To provide a required diet and compensate the energy and protein deficiency in burn children, it is necessary to administer (at the earliest possible stage) a combined parenteral and enteral nutrition support with increasing lactose-free formula and peptide formulae reduce gastrointestinal complications.

0951

EARLY IV GLUTAMINE IN SHOCK PATIENTS, CLINICAL RESULTS OF A PILOT STUDY

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INTRODUCTION. Early iv glutamine has beneficial effects in animal studies on outcome of septic shock and myocardial ischemia/reperfusion injury. In preparation of a larger study aiming to determine whether early iv GLN in patients with shock reduces organ failure, we performed this pilot study to evaluate GLN plasma concentrations and clinical safety.

METHODS. In a double blind RCT, including patients with septic or cardiogenic shock, a continuous GLN infusion (day 1 in ICU 0.5 g /kg/d, day 2-5 0.3 g /kg/d) was compared to placebo. SOFA scores and outcome were measured. This pilot study was powered for the effect of iv GLN on plasma concentrations of amino-acids (reported separately). Clinical endpoints were measured to evaluate safety of this nutro-pharmacological intervention. Patients were enterally fed with Impact (ARG-enriched). Values, presented in median (IQR) or percentage, were compared with Mann-Whitney U or Fischer's Exact test.

RESULTS. 16 patients were randomised to GLN, 16 to placebo. In both groups 75% of patients had septic shock.

	Placebo	Glutamine	p
Age (yrs)	67 (52-72)	72 (65-81)	0.07
APACHE II score	26 (22-35)	26 (20-31)	0.60
GLN pre (µmol/l)	383 (305-577)	324 (254-409)	0.21
SOFA score	10 (8-12)	10 (8-12)	0.81
delta SOFA score	2 (0-2)	2 (0-2)	0.37
Insuline (U/day)	61 (36-94)	84 (42-115)	0.35
LOS ICU (days)	4.1 (2-10)	6.6 (4-15)	0.22
LOS Hospital (days)	25 (15-34)	15 (7-38)	0.42
Predicted mortality (%)	55 (0.37-0.79)	65 (0.39-0.75)	0.76
Hospital mortality (%)	50%	44%	1.00

CONCLUSION. This pilot study on the safety of early iv GLN as nutro-pharmaceutical in patients with shock did neither show clinical benefit nor adverse effects. The results justify a suitably powered clinical trial.

0953

PREDICTION OF CHANGES IN SERUM SODIUM LEVELS IN RESPONSE TO INFUSION THERAPY: AN ANALYSIS OF CURRENTLY PROPOSED FORMULAS

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INTRODUCTION. Dysnatremias are common electrolyte disorders in critically ill patients. Both, hyponatremia as well as hypernatremia are associated with an excess mortality. Infusion therapy often is guided by various formulas being proposed to assess the influence of infusion solution administration on serum sodium levels. The aim of the study was to test the accuracy and applicability of currently available formulas for the prediction of serum sodium in clinical practice.

METHODS. In a retrospective analysis, the following data were extracted from a database of critically ill patients with hypernatremia: demographic and prognostic factors: age on admission, height and weight, ICU length of stay (LOS), gender, cause of admission classified by organ system, type of admission, SAPS II scores on admission and ICU mortality; and on a daily basis: routine blood lab, including electrolytes, parameters of renal function; urinalysis; administered medication, including infusions, enteral and parenteral nutrition; total fluid input and output, total sodium and potassium input and output. The following formulas were analyzed: Tonicity balance, Adrogué-Madias formula, Barsoum-Levine formula, Kurtz-Nguyen formula. Additionally, we proposed a new formula, based on electrolyte-free-water-clearance (EFWC). T-tests were used to compare the predictions of the diverse formulas.

RESULTS. 661 patient days in the CCU were analyzed. The Barsoum-Levine formula showed the highest accuracy in predicting serum sodium, was the only one yielding non-significant differences compared to measured serum sodium (p=0.64). Mean deviation of the Barsoum-Levine formula was 3.3 mmol/L, in one case 21 mmol/L. EFWC-based formula was the second most appropriate formula with mean deviation of 3.6 mmol/L (min=0, max=51) ($p<0.01$). The other formulas resulted in even higher significant differences from measured serum sodium.

CONCLUSION. All formulas at test did not correctly predict serum sodium levels after infusion therapy in the critically ill and thus, should not be used for guiding infusion therapy at an ICU.

Poster Sessions
Electrolytes, acid-base, endocrinology 0952-0965

0952

FLUID RESUSCITATION IN THE CRITICALLY ILL PATIENTS: ROLE IN THE DEFINITION OF ACID-BASE DISORDERS IN ACCORDING TO PHYSICAL-CHEMICAL APPROACH

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INTRODUCTION. Critically ill patients share complex disorders of the acid-base balance which are the results of peculiar physiopathological mechanisms and often of fluid resuscitation (infusion volume and acid-base property). Stewart approach, defining the acid-base properties of different resuscitation fluids, elucidates the effects of their administration. Aim of our study was to assess a possible variation of SBE, SID and SIG in relation to the type of fluids used for resuscitation in ICU.

METHODS. We collected data of 73 patients admitted in ICU in the space of six months. We measured pH, PaO2, PaCO2, sodium, potassium, chlorine, magnesium, calcium, lactates, haemoglobin, blood urea nitrogen, creatinine, phosphate and albumin. We calculated standard bicarbonate, SBE, the anion gap, AG corrected for albumin, the apparent SID, the effective SID and the SIG. Of each patient we registered the daily fluidtherapy.

RESULTS. We found a significant decrease in SID ($p<0,05$) in relation to a positive water balance, that confirms the tendency to dilutional acidosis during overfilling. The administration of crystalloids, in particular Ringer Lactate, caused a decrease in SIG and an increase in SBE, which defines a tendency of alkalization because of Atot dilution and SID of the solution (28 mEq/l). The administration of colloids, as 6% hydroxyethyl starch, showed an increase in SIG and a decrease in SIDe. Albumin administration reveals an increase in SIG and a decrease in SID and in SBE. The definition of effective SID of solutions explains the acidifying effect of hydroxyethyl starch (SIDe 0 mEq/l) and albumin, weak non volatile acid, which with its net negative charge, antagonizes the dilutional alkalosis.

CONCLUSION. Fluid resuscitation with Ringer Lactate decreases or eliminates the risks of metabolic acidosis correlated to the infusion of great volumes of saline solution, unlike colloids administration, which has a net acidifying effect. Stewart approach still now helps us to understand.

0954

SEVERE HYPERLACTATEMIA WITH NORMAL BASE EXCESS

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INTRODUCTION. Despite normal pH, PCO_2, HCO_3^- and base excess (BE), critically ill patients frequently have complex and severe acid-base disorders. Our hypothesis was that severe hyperlactatemia might be hidden by the presence of alkalinizing processes that could normalize BE.

METHODS. We prospectively studied 1448 patients on admission. Arterial blood gases and electrolytes were determined. Then, HCO_3^-, BE, anion gap (AGAP), strong ion difference (SID) and strong ion gap were calculated. We included patients with severe hyperlactatemia ($\geq$ 4.0 mmol/l, grouped into normal or low BE (> or < -3.0 mmol/l).

RESULTS. 140 patients (9.7%) had severe hyperlactatemia. However, BE was normal in 30 (20.3%) of them. The DeltaAGAP-DeltaHCO_3^- was higher in patients with normal BE (10 ± 6 vs. -1 ± 4 mmol/l, $p < 0.0001$).

	pH mmHg	PCO_2 mmol/l	HCO_3< mmol/l	BE mmol/l	anion GAP mmol/l	Cl^- mmol/l	SID mmol/l	SIG
low BE	7.28±0.10	36±11	17±4	-9±4	23±5	107±7	27±5	13±6
normal BE	7.41±0.07*	39±12	24±4*	-0±4*	21±5	100±6*	36±5*	11±5

** p < 0.0001*

CONCLUSION. Critically ill patients frequently present severe hyperlactatemia with normal pH, HCO_3^- and BE due to associated hypochloremic metabolic alkalosis. A comprehensive evaluation of metabolic acid-base status requires Cl^- and AGAP determinations.

0955

HYPERNATREMIA IN CRITICALLY ILL PATIENTS – PATHOPHYSIOLOGY AND IMPACT ON OUTCOME

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INTRODUCTION. Hypernatremia is often seen in critically ill patients, thus the aim of the study was threefold: we A.) evaluated the prevalence of hypernatremia in the ICU, B.) identified the causes leading to hypernatremia and C.) tried to determine the impact of hypernatremia on mortality and ICU-length of stay.

METHODS. In this retrospective cohort analysis we included all patients admitted to a medical ICU during a 35 months observation period. Demographic factors, main diagnosis, length of ICU stay and SAPS II score on admission were collected for all patients. Additionally, daily laboratory findings, administered infusions, enteral and parenteral nutrition and total fluid/ sodium input and output were assessed for all patients with serum sodium levels exceeding 149mmol/L. Cox's proportional hazards regression models were used for data analysis.

RESULTS. Of 981 consecutive patients 90 (9%) had hypernatremia, 21 on admission to the ICU (2 %) and 69 (7%; 77% of hypernatremic patients) developing during the ICU stay. Mortality was increased in patients with hypernatremia (39% and 43% vs 24%, p=0.0067 and p=0.0479). Hypernatremia was an independent risk factor for mortality and associated with increased length of stay (20±16 vs 8±10 days, p<0.0001). The main mechanisms were an increased renal free water loss (50% of cases; induced by loop diuretics, osmotic diuresis caused by urea/ glucose) and a positive sodium balance (35%). Combined mechanisms were responsible in 34% of cases.

CONCLUSION. Hypernatremia is a common phenomenon in the ICU, with most cases developing after admission. Mortality was massively increased in patients with hypernatremia and so was ICU-length of stay in patients with ICU-acquired hypernatremia. Thus, hypernatremia must be viewed as a serious electrolyte derangement which should strictly be avoided and/ or vigorously treated in any critically ill patient.

0956

SERUM SODIUM LEVELS BEFORE, DURING AND AFTER ICU ADMISSION AND THE ASSOCIATION WITH OUTCOME.

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INTRODUCTION. Electrolyte disturbances in the ICU are common. Serum sodium balance can be disturbed by many factors, including intravenous fluid infusion, drug therapy and diabetes insipidus. We investigated the incidence and prevalence of abnormal serum sodium levels in ICU patients and their relation to patient outcome.

METHODS. Over a 6-year period all sodium measurements of adults who were admitted to our ICU for at least 4 days were analyzed. Sodium levels were assessed before ICU-admission (5 to 2 days), during ICU-stay (day 1 through 7) and after ICU-discharge (2 to 5 days). 30-day survival was used as outcome measure.

RESULTS. We included 6177 patients. Sodium levels before ICU-admission were available in 2047 cases. Before ICU-admission hyponatremia (<135 mmol/L) and hypernatremia (>145 mmol/L) were present in 27% and 4% of the patients respectively. Also during ICU-stay hyponatremia was more frequently observed than hypernatremia (17% and 10% respectively). However, after ICU-discharge the incidence of hyponatremia increased again to 32% while the incidence of hypernatremia decreased to 6%. There were 1173 non-survivors (19%). The incidence of hyponatremia during ICU-stay was similar in both non-survivors and survivors. However, the incidence of hypernatremia was significantly higher in non-survivors (17% versus 8%).

CONCLUSION. During ICU-stay, the incidence of hypernatremia increased, especially in patients with a poor outcome. Hypernatriemia, as a potentially modifiable outcome parameter, deserves further study.

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0957

DOES SEVERE METABOLIC AND HYPERCAPNIC ACIDOSIS HAVE THE SAME PROGNOSIS IN ICU?

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INTRODUCTION. Acidosis seems to be associated with a worsen prognosis in ICU patients (1). The aim of our study was to evaluate the outcome of severe acidosis (pH<7.20) and to compare patients with a metabolic acidosis vs a hypercapnic acidosis.

METHODS. Prospective multiple-center observational study. Inclusion criteria: patients who were admitted or who developed a severe acidosis (pH<7.20) within their 24th hours of admission. We compare demographic data, blood gases at day 0 and day 1 and outcome with t test, Mann-Withney or Chi-2 when appropriated. p<0.05 was statistically significant.

RESULTS. From Nov 2006 to March 2007, we prospectively included all patients who presented a severe acidosis (pH<7.20) in their 24th hours of hospitalization. Thirteen patients had a mixt acidosis and were not included in the analysis. Fifty patients who developed a metabolic acidosis were then compared to 37 who were in hypercapnic acidosis. Patients who presented a hypercapnic acidosis were less severe (SAPSII 51±16 vs 66±25 and SOFA 7±2.9 vs 10±4.7 respectively, p<0.01), older (69±15 vs 59±17, p<0.01) and admitted mainly for medical reason (84% vs 62, p<0.05)than those admitted with metabolic acidosis. All patients who presented a metabolic acidosis had an elevated corrected anion gap (with albuminemia). Length of stay of survivors was not different between the 2 groups. Mortality of metabolic acidosis was not different than hypercapnic acidosis (54% vs 43%, p=0.54).

TABLE 1.

Blood gases in metabolic and hypercapnic patients

n=87	**Metabolic acidosis (n=50)**	**Ventilatory acidosis (n=37)**
Age	59 ± 17	69 ± 15**
pH at D0	7,08 ± 0,14	7,15 ± 0,08**
pH at D1	7,26 ± 0,13	7,32 ± 0,13
Delta pH (D1-D0)	0,18 ± 0,19	0,16 ± 0,16
Bicarbonate at D0	11 ± 5	29 ± 7**
Bicarbonate at D1	18 ± 6	29 ± 7**
PaCO2 at D0	35 ± 12	82 ± 23**
PaCO2 at D1	34 ± 8	59 ± 22**
Lactate at D0	9,8 ± 7,7	2,3 ± 2**
Lactate at D1	5,9 ± 6,9	2,1 ± 2**

** *p<0.01*

CONCLUSION. Mortality of very severe acidemic patients in ICU is about 50%. Our preliminary results suggest that in spite of a more severe initial acidosis in metabolic patients, we could not find any difference of mortality between metabolic and hypercapnic patients.

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0958

DISTRIBUTION OF METABOLIC ACIDOSIS IN CRITICALLY ILL PATIENTS FOLLOWING THE STEWART APPROACH

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INTRODUCTION. Metabolic acidosis is a common and complex disorder in the severely ill patient. Traditionally, the assessment of metabolic acidosis relies on the measurement of base excess. The Stewart approach states three independent variables dictating acid-base status: pCO2, total weak anion concentration and strong ion difference (SID). We performed a prospective observational cohort study to detect the distribution of metabolic acidosis following the Stewart approach.

METHODS. Consecutive patients admitted at the ICU were screened for pure metabolic acidosis (pH<7.30 and pCO2<45 mmHg). Blood and urine samples were taken. SIDa = (Na++Mg2++2iCa2++K+)-(Cl-+lactate-), normal value 42 meEq/l. SIDe = (bicarbonate + albumin x (0,123 x pH-0,631)+ phosphate/(10 x pH-0,47)). SIG= SIDa – SIDe, reflecting unmeasured anions. Pearson's r-square was calculated.

RESULTS. Data were collected from 54 patients. Mean APACHE II score was 30+/-9, mean SOFA 11+/-4. 24 patients were admitted after resuscitation, 14 with sepsis and 14 for other reasons. 36 were male. Mean age was 61+/-16 yrs. Mean SIDa was 33.5+/-5.4 meq/l. SIDa was below 42 in 52 out of 54 patients. The 2 patients with SIDa above 42 had ketoacidosis and metformine intoxication. SIG was greater than zero in all patients (mean 13.1+/-5). SIG showed an inverse correlation (r2=0.32) with pH. SIDa did not show a linear correlation with pH (r2=0.01) but Cl-/Na+ ratio did (r2=0.38) and lactate did (r2=0.64). Serum creatinin and SIG were correlated (r2=0.38), indicating the presence of unmeasured anions in acute renal failure partly explaining the acidosis. 39% had hyperchloraemia (above 106 mmol/l) explaining the low SIDa.

CONCLUSION. This study shows that critical illness-related metabolic acidosis is most often a combination of decreased SIDa (largely the result of saline infusion) and increased SIG (indicating the presence of unmeasured anions). Renal failure is in part the explanation of unmeasured anions. The results stress the importance using resuscitation fluids with a higher SIDa, eg a lower Cl-/Na+ ratio.

0959

COMPARISON OF TWO CENTRAL LABORATORY MEASUREMENTS OF ELECTROLYTE CONCENTRATIONS ON CALCULATION OF THE STEWART PARAMETERS FOR ACID-BASE DIAGNOSIS.

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INTRODUCTION. Acid base diagnosis can be oriented by Stewart method (1) modified by Fencl (2). Three parameters are calculated: SIDa (apparent Strong Ion Difference), SIDe (effective SID), and SIG (Strong Ion Gap). However, biochemical measurements have some variabilities. We hypothesize that different measurement technologies could significantly modify parameters of the Stewart method.

METHODS. 180 consecutive routine blood samples from cardiac surgery patients were anonymously studied during a period of three months. After centrifugation, plasma ionogram, bicarbonate and albumin concentrations were simultaneously measured by two different central laboratory automated blood chemistry analysers [Modular® (ROCHE) (M) and LX20® (BECKMAN) (L). SIDa, SIDe and SIG were then calculated. All data were compared with a Student t-test for paired values and the Bland-Altman method.

RESULTS.

TABLE 1.

Mean value, mean differences, limits of agreement and range

	Mean value with M	Mean value with L	P	Mean difference	r2	inf limit of agreement	sup limit of agreement	inf range	sup range
Na (mmol/L)	138.1±3.5	136.7±3.3	<0.001	+1.4	0.75	-2.1	+4.8	-4.0	+5.0
Cl (mmol/L)	106.5±4.7	105±4.5	<0.001	+1.7	0.87	-1,6	+5.0	-3.0	+7.0
K (mmol/L)	4.7±1.1	4.7±1.1	0.46	0	0.99	-0.3	+0.3	-0.5	+1.0
HCO3 (mmol/L	22±2.9	24.1±2.8	<0.001	-2.1	0.71	-5.3	+1.1	-6.0	+2.0
Albumine (µmol/L)	400.8±90	340.9±82	<0.001	+4	0.94	+1	+7	-49	+163
SIDa (mEq/L)	39.8±3	39.9±3.4	0.51	-0.1	0.51	-4.9	+4.6	-10.4	+6.3
SIDe(mEq/L)	31.4±4	32.3±3.8	<0.001	-0.9	0.83	-4.1	+2.3	-5.0	+3.3
SIG (mEq/L)	8.4±2.9	7.6±3.2	<0.001	+0.8	0.25	-5.0	+6.5	-9.1	+9.4

M: Modular ® (ROCHE), L: LX20 ® (BECKMAN), inf: inferior, sup: superior

CONCLUSION. Even if correlations between both central laboratory analysers were acceptable for electrolyte and albumine concentration measurements, there are significant differences between the two measurement methods for most electrolytes except for K+. Difference is high for SIDa, SIDe, and SIG between both biochemical analysers. This must be taken into account for the interpretation of acid-base disorders with the Stewart method.

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0960

ETIOLOGY OF METABOLIC ACIDOSIS IN THE INTENSIVE CARE UNIT USING FLOW CHARTS

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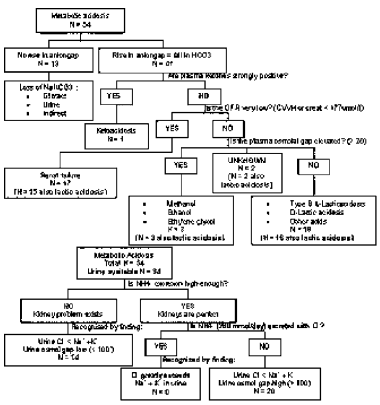
INTRODUCTION. Decisive steps to categorise metabolic acidosis in ICU patients are not always precisely taken. Justified therapy might therefore be withheld. In a prospective observational cohort we studied the etiology using systematic categorisation models.

METHODS. Included were patients with pure metabolic acidosis (PH<7.30 and PCO2<45). Blood and urine samples were taken to calculate serum and urine anion gaps. All patients were systematically reviewed with Halperin and Goldstein flow charts to categorise the metabolic acidosis.

RESULTS. In 54 patients mean APACHE II score was 30+/-9, mean SOFA 11+/-4. 24 patients were admitted after resuscitation, 14 with sepsis, 14 for other reasons. 36 were male. Mean age was 61+/-16 yrs.



CONCLUSION. Most patients had combined L-lactic and other acidosis. Urine analysis appears crucial in identifying different causes of metabolic acidosis. All patients had a positive urine aniongap, suggesting type 1 renal tubular acidosis (with low urine osmol gap) or unmeasured urine anions (with high urine osmol gap), eg ketoacid anions, drug metabolites or radiologic contrast.

0961

EFFECT OF PLASMA EXCHANGE (PE): THROMBOTIC THROMBOCYTOPENIC PURPURA VERSUS (TTP) HEMOLYTIC AND UREMIC SYNDROME (HUS)

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INTRODUCTION. Thrombotic microangiopathy (TMA)is commonly differentiated based on clinical grounds in TTP (which is dominated by neurologic abnormalities) or HUS (which is dominated by renal dysfunction). Recent studies have demonstrated that severe deficiency of the protease (ADAMTS13) that cleaves von Willebrandt Factor causes the developpement of TTP but not HUS, and is often associated with autoimmmune inhibitors of ADAMTS13. In this context, time course of TMA during plasma exchange could depend on underlying diagnosis.

METHODS. We analyzed retrospectively daily platelets count evolution during PE therapy in a subset of patients considered at admission as TMA for 6 years. Patients were included if they presented TMA (excepted complication of pregnancy or bone marrow transplantion). TTP, HUS and TTP-HUS were classified a posteriori by two experts: for this classification purpose, patients medical records, admission laboratory finding, ADAMTS13 activity when available were display to experts: TTP (neurological impairment, ADAMTS13 activity<5%+/-inhibitor), HUS (renal impairment, normal ADAMTS13 activity), or TTP-HUS if overlap.

RESULTS. Thirty patients underwent 506 PE for 33 TMA. Twenty-eight patients were included, 2 presented relapses (recurrence after complete remission), 7 presented acute exacerbation(fall in platelets count after initial improvment).
Ten TMA were classified HUS, 11 TTP and 10 HUS-TTP.
Platelets count increases significantly on day 2 in TTP versus day5 in HUS. There is no significantly increase of platelets count in HUS-TTP group during PE.
More exacerbations were observed in TTP (7/11) versus HUS (0/10). Thrombosis complications are frequent in our serie: 8/11TTP, 2/10 HUS.

CONCLUSION. Our study suggests than PE are effective not only in TTP but also in HUS. Platelets count increases later in HUS, exacerbations are more frequent in TTP.
Thrombotic complications appear to be particularly frequent, and often associated with an exacerbation of TTP. Systematic research of such complications may be recommended if TTP exacerbation is observed without any cause.

0962

ENDOGENOUS VASOPRESSIN AND COPEPTIN RESPONSE IN MULTIPLE TRAUMA PATIENTS

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INTRODUCTION. Endogenous arginine vasopressin (AVP) levels in multiple trauma patients are unknown. AVP is considered to play an important role in severe hemorrhage and may be used as a rescue vasopressor in uncontrolled hemorrhagic shock.

METHODS. In this prospective study, 87 multiple trauma patients (Injury Severity Score >15) were enrolled. On admission to the emergency department (ED), demographic, clinical and laboratory data were documented and blood was sampled for determination of AVP (radioimmunosassay) and copeptin, a stable fragment of the AVP pre-cursor (immunoluminometric assay). In patients requiring intensive care unit (ICU) therapy, blood and data sampling was repeated at 4, 6, and 24 hours after ED admission. Linear logistic and mixed effects regression analyses were used for statistical analysis.

RESULTS. On ED admission, AVP (43.2±84.9 pmol/L) and copeptin (155.1±185.5 pmol/L) were significantly increased. Plethysmographic oxygen saturation was the only parameter independently associated with AVP (regression coefficient -0.126, CI95% -0.237 to –0.014, p=0.03). No correlation was observed between AVP and survival (p=0.62), hemodynamic variables (systolic arterial pressure, p=0.24; mean arterial pressure, p=0.59; diastolic arterial pressure, p=0.74; central venous pressure, p=0.36), or brain trauma (p=0.46). In ICU patients, AVP decreased during the first 24 hours (p<0.001), and was independently associated with heart rate (p=0.02) and blood glucose (p=0.009). Copeptin concentrations were correlated with AVP (r^2=0.718, p<0.001).

CONCLUSION. In conclusion, AVP was significantly increased in multiple trauma patients and seems to be an integral part of the neuroendocrine response to severe injury. In ICU patients, AVP decreased to moderately elevated levels within 24 hrs after ED admission.

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FREQUENT I.V. GROWTH HORMONE PULSES IN PROLONGED CRITICAL ILLNESS: EFFECTS ON PLASMA GLUTAMINE, IMMUNITY AND INFECTION

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INTRODUCTION. Growth hormone (GH) s.c. treatment increases the number of septic complications and mortality (1). We hypothesize this may be caused by preventable immune dysfunction due to glutamine deficiency and hyperglycaemia. We ask whether low dose GH i.v. pulses influence immune status in the late phase of prolonged critical illness.

METHODS. Double-blined, single-centre, randomized trial included 3 groups of prolonged critically ill (n=10+10+10), after multiple trauma. Median (25th-75th percentile) age 36(25-47), 42(32-50), 40(25-54) yrs, APACHE 24 (17-30), 20 (17-23), 24(18-27), ISS 39(34-53), 36(28-43), 32(27-34), all diferences NS. Group 1 has been treated with i.v. (50 microg/kg.day in 8 doses, maximum during night) GH pulses (day 10-17) and i.v. alanylglutamine (0,3g/kg.day, day 4-17), group 2 with placebo and alanylglutamine, group 3 was fed with isocaloric isonitrogenous diet with no glutamine supplementation. In all groups, glycaemia was controlled with i.v. insulin by nurse-directed protocol with goal value 4.5-6.1mM. We observed mediators of inflammation (CRP, WBC, temperature, cytokines) and markers of both cellular and humoral immunity. We also tested in vitro prolipheratiove capacity of lymphocytes at a range of glutamine concentrations using 72 hrs cultivation of mixed lymphocyte population after stimulation of phytohemaglutinine and measurement of DNA content by FACS. Statistics: Kruskal-Wallis and Mann-Whitney U tests were used for comparisons where appropriate.

RESULTS. Among groups there were no diference in WBC count, plasma CRP, cytokine (IL-2,6,10, TNF-alfa) and immunoglobuline patterns as well as % of positive blood, sputum and urine cultures. The only observable diference was the absence of an increase of CD3+ and CD4+ lymphocytes between days 4 and 17 in the group 1. GH treated patients also had significantly ($p<0,001$) more days with peak temperature $>38,4\ ^{\circ}$ C. In vitro study revealed that glutamine concentration is not limiting for lymphocyte proliferation if a minimum of 0,1mM is present in cultivation medium. Moreover, glutamine concentrations observed in our patients (table) do not limit lymphocyte proliferation.

TABLE 1.

Plasma glutamine [micromol/l]. Data presented as median (25th-75th percentile)

Study group	Day 4	Day 10	Day 17
#1 GH+Ala-Gln	264 (196-319)	249 (170-316)	204 (88-275)
#2 Placebo+Ala-Gln	202 (84-384)	240 (183-384)	286 (243-379)
#3 Control group	234 (185-406)	226 (105-268)	184 (60-346)

No differences are significant (Kruskal-Wallis).

CONCLUSION. Low dose i.v. pulses of growth hormone have not clinically significant direct effects upon immune status of multiple trauma patients. Concomitant i.v. alanylglutamine supplementation prevents worsening of plasma glutamine depletion caused by GH therapy.

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0964

SEVERE HYPERSTIMULATION SYNDROME: OUR EXPERIENCE IN A GYNECOLOGICAL ICU

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INTRODUCTION. Ovarian hyperstimulation syndorme (OHSS) is a iatrogenic complication due to pharmacological ovarian stimulation to favour the possibility of a pregnancy state. OHSS is now more frequently diagnosed as a higher number of women undergoing assisted reproductive techniques. Althoug the prevalence of the severe form of OHSS is small (0.2-5%), it is important to remember that it is the consequence of a nonvital treatment with the potential for a fatal outcome. OHSS clinical profile include a bilateral ovarian enlargement, an elevated capillary membrane permeability and an acute third space fluid sequestration (ascites, hydrothorax and anasarca). These favour severe intravascular volume depletion and hemoconcentration that eventually leads to multiple organ failure. We report our experience within the Gynecological ICU.

METHODS. A prospective study has been made from January 2001 till December 2006. All data from women suffering from severe OHSS were recorded. We analized demographic and clinical features, complications, treatment and length of stay in ICU data. Statistical results are expresed in mediana, mean and percentage. Severe cases were made following Golan criteria.

RESULTS. We recorded 11 cases (2.1% of incidence). Mean age was 32.8±3 years old. Symptoms occurred 8 days (4-12.5) after embryo transfer has been done. These included abdominal pain (100%), dyspnoea (90%), severe ascitis (50%), emesis (30%), low urine output (30%), electrolyte imbalance (20%), elevated aminotransferase enzymes (AST 41±16.3 U/L; ALT 60±21.3 U/L), hyponatremia (5.6±0.45 g/dL). Renal function and hematocrit maintained within normal values. Mean ovary size was 70±27.7 mm. Paracentesis was performed in 30% of them. Women needed oxygen (50%), albumin (100%), and diuretics (100%). Women with OHSS suffered complications (sepsis, respiratory disstress syndrome, pulmonary embolism)in a 30%. Pregnancy was achieved in 50% of the cases. The median of stay in ICU was 4 days (3-5.75). None died.

CONCLUSION. Our patients developed belated severe OHSS. Clinical symptoms were abdominal pain, dyspnoea, ascites, oliguria and hypoproteinemia. Early diagnosis, careful management of fluids, treatment with albumin and diuretics and, when needed, oxygen and abdominal paracentesis, led to low number of complications. There was no mortality. Half of our patients achieved pregnancy.

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0965

ADRENAL INSUFFICIENCY IS NOT A PREDICTOR OF HOSPITAL MORTALITY IN HEMODYNAMICALLY UNSTABLE SEPTIC SHOCK PATIENTS TREATED WITH HYDROCORTISON

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INTRODUCTION. Relative adrenal insufficiency (RAI) in critical care patients is related to an adverse outcome and treatment with steroids reduces mortality in these patients.
Aim of the study: To determine the rate of RAI in patients with septic shock and evaluate the prognostic value of RAI in patients treated with hydrocortisone in our 19 bed multidisciplinary ICU.

METHODS. Retrospective analysis of 146 consecutive corticotrophin (ACTH) stimulation tests performed in 146 hemodynamically unstable patients with severe SIRS / septic shock who were on vasopressor treatment with noradrenalin. We used a low dose ACTH test to measure adrenal function and reserve. Blood samples were taken before, 30 and 60 minutes after 1 μg ACTH. Total plasma cortisol levels were measured chemoluminescent immunoassay. RAI was defined as likely when basal plasma cortisol was below 0,4 μmol/l (group 1) or when basal plasma cortisol levels were between 0,4 and 0,9 μmol/l and an increase of plasma cortisol after ACTH was less than 0,25 μmol/l (group 2). RAI was defined as unlikely when cortisol levels were between 0,4 and 0,9 μmol/l and cortisol increased more than 0,25 μmol/l (group 3) after ACTH or when basal plasma cortisol was above 0.9 μmol/l (group 4) After the ACTH stimulation test hydrocortisone (100 mg i.v. t.i.d.) was started in all patients. In patients without biochemical evidence of RAI hydrocortisone treatment was rapidly withdrawn to discretion of the intensivist.

RESULTS. Forty patients (age 63 ± 1, mean ± s.e.m., 70% male) were in group 1 (27 %), 56 (38%) in group 2, 39 (27%) in group 3 and 11 (8 %) in group 4. Hospital survival was 70%, 52%, 56% and 36% respectively. 66% of patients had RAI (group 1+2). Hospital survival in patients with RAI was 59 % and 52 % in patients without RAI (group 3+4) (chi-square statistics: NS).

CONCLUSION. Biochemically defined RAI is not a predictor of hospital mortality in hemodynamically unstable septic shock patients treated with hydrocortisone.

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IMPROVING SEMI RECUMBENT POSITIONING ON INTENSIVE CARE

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INTRODUCTION. Semi recumbent positioning with 45 degrees head up is a simple and effective method of reducing ventilator associated pneumonia[1]. It is recommended internationally by the surviving sepsis campaign[2]. Locally on our mixed general and neurosurgical unit we have set a standard of 30 degrees head up tilt for all ventilated patients.

METHODS. We performed a prospective audit of the degree of head up tilt in our patients over a 2-week period. We measured the bed tilts twice daily using a goniometer
We then photographed a mock patient on an ITU bed with measured degrees of angulation. We showed 92 staff members 9 photographs ranging from 0 to 50 degrees and asked them to identify the photographs showing 30 and 45 degrees.

RESULTS. In measuring bed tilt, we found that the degree of tilt was below 30 degrees in 86% with a mean tilt of 23 degrees.
Only 16/36 (44%) doctors and 19/56 (34%) nurses were correctly identified 30 degrees and 18/36 (50%) doctors and 19/56 (34%) nurses correctly identified 45 degrees.

CONCLUSION. In performing this audit, it was clear that many staff members felt that beds were tilted adequately when our measurements showed they were not. To rectify the problem we have placed a photograph of a bed at thirty degrees angle at each bed space and constructed a wooden angle to aid checks of head up tilt. We plan to re-audit in a year following these changes.

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0967

COLISTIN SERUM CONCENTRATIONS AFTER INTRAVENOUS ADMINISTRATION IN CRITICALLY ILL PATIENTS

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INTRODUCTION. No reliable pharmacokinetic data are available for colistin in critically ill patients. We assessed steady-state serum concentrations of colistin sulfate (which is the active form of the drug) after IV administration of colistin methanesulfonate (CMS) in critically ill patients with stable renal function.

METHODS. We performed a prospective, open-labeled, uncontrolled study in critically ill patients with stable renal function who were receiving CMS as part of a treatment regimen for sepsis from multi-resistant Gram (-) bacilli. After intravenous administration of 225 mg CMS (exception 1 patient 150 mg) every 8 or 12 hours for at least 2 days, blood samples were collected just before initiation of infusion on the sampling day and at 0.16, 1, 2, 4, 6 and 8 hours, thereafter. Serum concentrations of colistin sulfate were determined by high-performance liquid chromatography.

RESULTS. We enrolled 14 non-consecutive patients aged 62 ± 19.2 years (APACHE II score on admission 17.1 ± 6.0). At steady-state mean (± S.D.) colistin maximum and minimum concentrations were 2.93 ± 1.24 mg/L and 1.03 ± 0.44 mg/L, while the total body clearance, volume of distribution and half-life were 13.6 ± 5.85 L/h, 139.9 ± 60.3 L and 7.4 ± 1.7 hours, respectively. 78.6% of patients responded to treatment. No adverse effects attributed to colistin were observed.

CONCLUSION. In critically ill patients, colistin serum levels were similar to those found in cystic fibrosis patients treated with substantially lower doses of CMS (1) and the mean half-life was longer. CMS dosage regimens administered may be inappropriate, as these produce colistin concentrations which would probably give suboptimal Cmax/MIC ratios for many strains of Gram (-) bacilli.

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0968

IMMUNODEPRESSION AND ICU-ADQUIRED INFECTIONS

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INTRODUCTION. Immunodepressed patients (ID) who had higher prevalence in ICUs, present more risk of infections. The aim of this study was to evaluate the demography and incidence of ICU-acquired infections (I-ICU) related to invasive procedures in patients with clinical or pharmacological ID, compared to the rest of ICU hospitalized patients.

METHODS. A multicentre prospective study from April to July 2005 was performed in 102 UCIs of 93 Spanish hospitals. The number of patients admitted to ICU > 24h according to established criteria (immunodeficiency, neutropenia and immunosuppressión) was studied. Demographic characteristics, infections developed during ICU stay (I-ICU), the diagnosis according to the CDC's criteria and expressed in rate by 100 patients or for 1000 days, etiology and resistance patterns were analyzed.

RESULTS. Among 11,461 studied patients, 799 (6,97%) presented ID. Characteristics are shown in Table 1. Invasive procedures: Mechanical ventilation (MV): 41,7/61,2%; Central venous catheter (CVC): 71,4 / 91,2 %; Parenteral Nutrition (PN):12,7 / 29,1 %; Extrarenal depuration (ERD): 3,4/10,3 %. Nosocomial infections and outcome in table 2. The incidence of multiresistant bacteria infection/colonization was: ESBL 0,79 /1,75 %; MRSA 1,8/ 2,6 %; Acinetobacter 1,7 / 4 %; multiresistant P aeruginosa 0,9 /1,7 %. There were differences in infection etiologies: BGN more frequently in ID, mainly A baumnannii 8,1/18,3 % and also have higher resistance patterns. ID required more antibiotics before ICU admission 28,3/56,5 % and during ICU stay 56,9/ 88,8%. The number of antibiotics/patient was 2,1 / 3 respectively.

TABLE 1.

	Patients N	Age	APACHE II	Coronary	Medical	Surgical	Trauma
Total	11.461	61,4	14,1	27,2	38,1	24,5	10
ID	799/6,9%	56,8	20,1	4,5	6	9,9	26,5

TABLE 2.

	I-ICU % patients	ID o/oo	NAP %	UI %	PB+CB %	LOS (d)	Mortality %
Total	14,2	19,4	6,1	14,1	3,3	7,3	10,8
ID	25	25,2	10,8	4,8	6	9,9	26,5

CONCLUSION. Patients with ID, 7 % of the population, presented more risk factors, medical pathology and higher severity. Predisposition to more antibiotic-resistant organism infection was confirmed, being necessary a superior antibiotic usage.

0969

CURRENT INFECTION CONTROL RECOMMENDATION ARE NOT ALWAYS NECESSARY TO REDUCE MRSA INFECTION RATES IN ICU

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INTRODUCTION. There are recommendations for control and prevention of Methicillin-Resistant Staphylococcus Aureus (MRSA) (1). These recommendations however, are based on large series and case reports rather than randomised trials (2). Of those recommendations, only two (handwashing and adequate staffing) are reliably carried out in our ICU as even conventional 'deep cleaning' has been shown to be unreliable (3).

METHODS. All patients admitted to ICU at University Hospital Birmingham between June 2002 and May 2006 were retrospectively studied so that any microbiological sample where MRSA was cultured was correlated with the date of ICU admission. Isolation of MRSA was classed as prior to-, during-, or after- an ICU stay. Isolates dated within 48 hours of a change of site within the hospital were counted as being acquired in the previous site.

RESULTS. The number of patients admitted to ICU already infected/colonised with MRSA in 2002 was 265 and 172 new cases occurred. By 2005 the number of new cases in ICU had fallen significantly to 52 despite the number of patients admitted to the ICU already carrying MRSA was 243 (p=0.001, 4*2 Chi squared = 60.05 Degrees of Freedom = 3).

CONCLUSION. There has been a steady decline in the number of primary MRSA infection occurring in our ICU whilst the number of cases admitted has remained constant. Colonisation pressure from patients admitted to ICU is an independent predictor for MRSA acquisition on ITU. The reasons for our decline in MRSA infection remain unclear as full recommendations to inhibit MRSA spread can not be implemented.

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PREVENTION OF SPREAD OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS IN A CARDIAC SURGERY CENTER

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INTRODUCTION. In Greece Methicillin-Resistant Staphylococcus aureus (MRSA) prevalence ranges from 11.1% to 90.9% of the Staphylococci isolated. In our institution prophylactic measures include the mandatory screening of all newly employed health care workers and patients admitted from other hospitals. The aim of this survey was to elucidate the efficacy of the above preventing strategy.

METHODS. A prospective quality control study was conducted from 1997 to 2005. Patients admitted from other hospitals remained isolated for 48 hours and were screened for MRSA by nasal swabs. Infected patients were treated with a glycopeptide in combination with rifampin and carriers with mupirocin. Furthermore all newly employed health care workers were screened for MRSA and carriers were treated with mupirocin.

RESULTS. Throughout the 9-year study period among 62313 hospitalized patients 15270 were attended in the Department of Cardiac Surgery. Total infection rate was 5.4%. MRSA prevalence was 0.37% (n: 56). Infection associated with MRSA was identified in 30 patients (0.2%). In 10 patients MRSA was detected in tracheal secretions, in 4 patients in swabs taken from donor site infection and in 4 patients from superficial sternal surgical wound. In 10 patients the pathogen was isolated from cultures of the surgical site drainage. The remaining 2 patients were defined as having severe sepsis. Mortality rate was 30%.

CONCLUSION. The prompt determination, isolation and appropriate treatment of MRSA patients admitted from other institutions combined with the detection and elimination of carriers among new health care workers prevented further spread of the pathogen.

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EXPERIENCE IMPLEMENTING A VANCOMYCIN INFUSION POLICY ON AN INTENSIVE CARE UNIT

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INTRODUCTION. Intravenous vancomycin remains the drug of choice for many infections in the intensive care unit (ICU), including methicillin-resistant staphylococcus aureus. Conventional b.d. doseage regimes may not achieve sustained concentrations above the minimum inhibitory concentration. Continuous infusions have been shown to lower mortality in susceptible staphylococcus aureus infections compared with b.d dosage. We describe an audit following the sucessful introduction of a vancomycin infusion protocol.

PROTOCOL. All patients receive a vancomycin loading dose,adjusted for weight and renal function. A continuous infusion of standard concentration is then commenced. Concentration of infusion depends on whether venous access is peripheral (5mg/ml) or central (10mg/ml). A serum vancomycin level is requested with routine morning blood tests. The target range is 15-25 mg/l. The daily dose is titrated by altering the infusion rate.

AUDIT. 30 consecutive patients who received > 24 hrs vancomycin were reviewed. Results are presented as morning vancomycin level post load and initial infusion(level 1) and then consecutive daily morning levels (levels 2,3,4,5,6)

RESULTS. Mean vancomycin levels were consistently within the target range, although the standard deviations were large (Table 1). Problems identified with the protocol were:
(1)Inadequate loading dose in patients with renal failure. (2)Standard concentrations given peripherally or centrally were confused by staff. (3)Patients already on vancomycin b.d before ICU admission were inappropriately converted to the infusion. Unusual outlying levels were frequently, but not always, due to poor protocol compliance. Following the audit, the loading dose regimen was altered, the protocol was re-written to clarify problem areas, and a program of staff education was implemented. We are currently completing the audit cycle.

TABLE 1.

Daily Vancomycin Levels (mg/l)

	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
Mean	15.1	18.1	21.0	21.3	22.4	21.2
Standard dev	6.2	7.1	8.5	6.1	4.0	5.0
Range	4.8-31.6	9-36.5	7.5-38.8	8-28.5	14.5-30.1	15.5-29.6

CONCLUSION. A vancomycin infusion protocol was sucessfully introduced on our ICU. The protocol titrates the rate of infusion of vancomycin formulated as a standard concentration. The protocol maintains therapeutic levels within the desired target range for most patients. Outlying vancomycin levels are typically the result of non-compliance with the protocol. Effective ongoing education resolves many of the problems associated with the regimen which, once understood, is readily implemented.

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CLINICAL EVALUATION OF EXECUTION OF EARLY GOAL DIRECTED THERAPY IN SEPTIC SHOCK

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INTRODUCTION. To evaluate the efficacy of early goal directed therapy(EGDT) inseptic shock.

METHODS. Two hundred and three patients with septic shock were assigned into treatment group (n=98) and Control group (n=105). According to the state of organ function at the beginning of treatment and multiple Organ dysfunction syndrome(MODS) evaluation scores, each group was categorized into three strata: Stratum A (mild organ dysfunction), stratum B (medium organ dysfunction) and stratum C (severeorgandysfunction). Mortality and incidence of organ dysfunction in each group were analyzed.

RESULTS. At stratum A, themortality and incidence of organ dysfunction in treatment group were significantly lower than those of control group: 27.78% (1554 cases) vs. 37.50% (1848 cases), 31.48% (1754 cases) vs. 43.75% (2148 cases), both P<0.05. There was no significant difference between treatment group and control group in patients of stratum B: 75.86% (2229 cases) vs. 76.92% (2026 cases), 55.17% (1629 cases) vs. 57.69% (1526 cases) and stratum C: 93.33% (1415 cases) vs. 96.77% (3031 cases), 40.00% (615 cases) vs. 41.93% (1331 cases), all P>0.05.

CONCLUSION. In the earlier Period of septic shock, EGDT can remarkably decrease the patients/mortality and incidence of organ dysfunction, but cannot improve survival rate and prognosis in patients in advanced stage of septic shock.

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0973

TAP WATER FILTERS REDUCE THE RISC OF LEGIONELLA INFECTIONS IN ICU PATIENTS

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INTRODUCTION. Legionella in the hospital water supply carries a serious risk of health-care acquired infections to immunocompromised patients, e.g. in intensive care units. Therefore pathogen-free water should be provided for high risk patients. Various approaches to eliminate Legionella have been tested, none of them being 100% efficient and none without negative side effects. The latest product introduced, point-of-use water filters which can be easily mounted on water taps, seems to have the required advantages.

METHODS. We prospectively studied the ability of Pall-Aquasafe Faucet Water Filters (Pall Corporation) to eliminate Legionella from tap water in our ICU. 30 water samples were collected from 5 faucets over a 12 week period. Five samples, 1 from each faucet, were collected before installing water filters and again prior to removing them after 4 weeks. This routine was repeated 3 times. All samples were cultured for Legionella spp. and number of colony forming units (CFU) per litre was determined.

RESULTS. 15 filtered and 15 unfiltered water samples were collected. In filtered water we isolated Legionella at low levels in 2 of 15 samples. In contrast, Legionella was isolated from 14 out of 15 samples of unfiltered water (Fig. 1). One of the positive samples from filtered water was due to an easily recognizable leak from the connector upstream of the filter. The other contaminated filter system showed no obvious signs of malfunction.

TABLE 1.

	Pall Filter CFU per Litre	No Filter CFU per Litre
1. period	0 - 0 - 5 - 0 - 0	550 - 850 - 5.000 - 6.000 - 400
2. period	5 - 0 - 0 - 0 - 0	6.000 - 54.000 - 15 - 4.000 - 515
3. period	0 - 0 - 0 - 0 - 0	41.000 - 700 - 50 - 0 - 50

CONCLUSION. The Pall-Aquasafe Faucet Filter effectively reduces the concentration of Legionella species in tap water in the ICU, but close attention should be paid to the integrity of the system. This system has the potential for reducing ICU-aquired Legionella infections.

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DO WE NEED ACTIVATED PROTEIN C?

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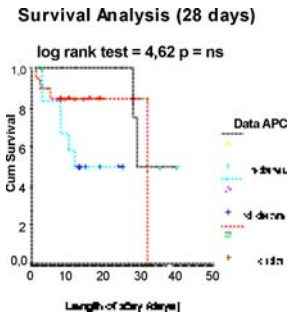
INTRODUCTION. Therapy with activated protein C (APC) (24 μg/Kg/minute/96 h) has been associated to a decrease of mortality and ameliorate of organ dysfunction/failure in patients with severe sepsis. Objective: Evaluate the impact on the outcome of activated protein C in acute ill patients with severe sepsis.

METHODS. Design: Multicentric, prospective, observational cohort study conducted during one year and half. We selected patients admitted to 3 polivalent ICU. Inclusion criteria: all patients treated with APC. We collected for each patient: demographics data, SAPS II and SOFA score and number of organ failure at admission, when we started the treatment, and at the end of the treatment. We also collected intrahospital mortality, 28 day mortality rate and survival according to the moment of prescription of activated protein C (< 12 hours; 12-24 hours and later 24 hours after admission).

RESULTS. We enrolled 37 patients: age of 53 ± 17,2, SAPS II score 42,9 ± 14,6 SOFA 7,9 ± 2,8, with a length of stay 14,8 ± 9,9, mortality rate – 18,9% and at 28º day – 32,4%. Main clinical presentation: severe sepsis with ARDS after community acquired pneumonia (21,6%). Time to started the treatment: less than 12 hours 21 patients (56, 8%) with a mortality rate 19%; 12-24 hrs 12 patients (32, 4%) with a mortality rate 50%, and after 24 hours 4 patients (10,8%) with a mortality rate 50%.
Adverse effects: Three patients (8,1%) stop the perfusion because of hemorrhagic complications.
Survival analysis revealed as depicted in the plot:



CONCLUSION. Although the controversy of clinical application activated protein C in this sample there we found different patterns of clinical response according to the prescription time, nevertheless the survival rate was not related with the time of activated protein-c prescription.

0975

PRELIMINARY RESULTS OF A CANDIDA SCORE FOR EARLY ANTIFUNGAL TREATMENT IN CRITICAL CARE PATIENTS.

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INTRODUCTION. The incidence of infections caused by Candida species in critical care has substantially increased in recent years. Recently, Candida infections have been increasing specially in critical care patients. Invasive candidiasis has been associated with severe sepsis, septic shock and multiple organ failure with a clinical scenario very similar to bacterial infections. This infection is a diagnosis challenge with an estimated mortality rate of 40%.
Objective: To evaluate the impact of a Candida Score to early antifungal treatment in a general critical care unit.

METHODS. The Candidemia incidence rate ratio from July until December 2005 was compared to the same period in 2006 after the implementation of Candida Score System (Software Stata 8.0). Surveillance cultures of urine, tracheal and digestive samples from each patient were obtained weekly. According to Leon (1), patients with at least two positive sites and sepsis or with total parenteral nutrition or a recently surgical intervention, received antifungal treatment (fluconazole or Caspofungin) - preemptive treatment.

RESULTS. The incidence after the Candida Score implementation was reduced from 1,91 (2/1049 patients day) to 0,92 (1/1081 patients day) with no statistical significance (p = 0,3).

CONCLUSION. In this preliminary report, the Candida Score seems to be a good tool to reduce the incidence of Candida infections in a general critical care unit. In a large population, the use of Candida Score system may assist in identify critical patients candidates to preemptive antifungal treatment.

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0976

VENTILATOR ASSOCIATED PNEUMONIA IN A MEDICAL ICU

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INTRODUCTION. An important indicator of the quality in medical assistance is the control of nosocomial infection (NI). Intensive Care Units (ICU) are areas with elevated NI rates. Many of these NI are associated with the use of external devices: mechanical ventilation, urinary catheters and central venous catheters. The aim of this study was to know the incidence of ventilator associated pneumonia (VAP) in our ICU, the trends in the infective flora and the use of antibiotics in two periods of time: the first period (A): from November 1.994 to January 1.995 and the second period (B): from May to July 2.006.

METHODS. During three months in A and three in B, the mechanical ventilation associated infection rates were determinated following the recomendations of the National Nosocomial Infection Surveillance System (NNIS) in the USA in 308 patients in A and 256 in B, admitted to our 21 beds ICU. We also determined the the most frequent microorganisms recovered and the specific antibiotics used.

RESULTS. The VAP rates were 28.8 pneumonia per 1000 mechanical ventilation days in A and 16.7 in B. Pseudomonas aeruginosa and Escherichia coli were the microorganisms recovered most frequently in A; Acinetobacter baumannii and Enterobacter aerogenes in B. Among the antibiotics, we used third generation cephalosporins, quinolones and macrolides in A and sulbactam-ampicillin, amikacin and linezolid in B.

CONCLUSION. 1)During the last year we have detected a significant decreasing tendency in the VAP rates in our ICU. 2)This nosocomial infection surveillance study has allowed us to know the most frequent microorganisms causing VAP in our ICU: currently is Acinetobacter baumannii; eleven years ago was Pseudomonas aeruginosa. According to this, we can start an appropiate empirical antibiotherapy. 3)The use of NNIS rates is advisable because it allows us to know the impact of VAP in our unit. We can also perform comparative studies between periods of time in our unit and comparative studies with other units of similar characteristics.

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0977

WHAT BOTHERS THE PATIENT IN AN INTENSIVE CARE UNIT? A INTERDISCIPLINARY PERSPECTIVE

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INTRODUCTION. Our intensive care unit (ICU) was one of the first to iniciate a humanization program in daily routine in 1996. The program suffered changes, the ICU grew up in number of beds and complexity, and had great renewal of the members of our interdisciplinary group. To improve our knowledge and quality of care, we evaluated the stress factors for the patients from our staff members perspective, putting them in the patients place.

METHODS. Between October and December of 2005, a research form was used. The following itens were analysed: profile of the interviewed, evaluation of the environment of the ICU and the stress factors for the patients. The results were compared with the survey form filled by the patients after ICU discharge.

RESULTS. The entire ICU team answered the research (n=75). The mean age is 29,98 years (SD 6,50), 61.33% of female, 62.70% married, 38.70% protestants and 37% catholics and ICU professional experience of 4,96 years (SD 4,78). Our ICU is noisy for 73,33%, very illuminated for 73,33%, easy-going for 72%, organized for 49,33%. According to the team, factors that bothers the patient are: anxiety (77.33%), fear (70.66%), loneliness (70.66%), noise (68.67%), bed bath (65.33%), lack of privacy (58.66%), distortion of time perceptions (50.66%). The patients (n=71) described as main complaints after ICU discharged: anxiety (59.15%), sleeplessness (52.11%), lack perception of time (50.70%), pain (42.25%), noise (33.80%), loneliness (32.39%), fear (22.53%), bed bath (19.71%) and lack of privacy (11.26%).

CONCLUSION. The study showed differences of ICU team opinions and the patients complaints. When the team is placed in the patients perspective they may experience a better view of how harmfull is an ICU and how much we can do to improve it. This is our daily challenge: take care with quality, respect and affection.

0978

FAMILY NEEDS OF CRITICAL CARE TRAUMA PATIENTS IN CYPRUS ASSESSED WITH QUALITATIVE METHODOLOGY

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INTRODUCTION. The relatives of critically ill patients have increased needs in this crisis period. Family centered quality improvement interventions can be implemented effectively after capturing their experiences, recognizing their needs and evaluating how they should be met/being met. This subject has not received adequate attention with regard to qualitative approach. A quantitative study from our group has shown that certain (dominant) coping mechanisms may protect mental health / QOL. The aim of this study was to explore critical care family needs in Cyprus and discuss potential interventions.

METHODS. A descriptive qualitative research design with focus groups interviews from ICU patients' caregivers was used to explore family experiences and needs. Three focus groups were used to elicit the experiences and needs of families with a relative in ICU at the time of hospitalization and after discharge to the community. A number of 18 relatives (10 male/8 female, age 16-60) from different families were participated. Qualitative data analysis was based on the 5-steps framework approach (familiarization, identifying a thematic framework, indexing, mapping and interpretation).

RESULTS. Four major categories of needs were emerged from the focus groups: 1) information and communication, 2) support - human and structures, 3) assurance –to be assured about the quality of care received 4) proximity-able to be physically close to their ICU patient. Information and communication was far more prominent need than the others. The majority of needs were perceived as not being adequately met and the main resources expected to meet their needs were physicians, nurses and the hospital environment.

CONCLUSION. The findings of this study indicate important areas of unmet needs of families having patients in critical care, that require relevant family-centered quality improvement interventions, aiming to improve family care and modulate recruitment/use of coping mechanisms.

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0979

IS IT POSSIBLE TO ARRIVE AT 0% AVOIDABLE LOSSES IN ORGAN DONATION?

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INTRODUCTION. Donation rates have not kept pace with demand, resulting in a critical deficit of available healthy organs. Donor detection is influenced by the legal system, family refusal and underreporting caused by erroneous knowledge of donation criteria and lack of familiarity with the procedure.
The aim of this study is evaluate possible donor losses in the Vall d'Hebron University Hospital during 2002-2006) and compare two detection systems (Using GSC detection follow-up and Spanish Quality Guarantee Program) introduced in our hospital.

METHODS. All deaths in critical care units (ICU) were reviewed, with emphasis on neurological cases. We contrasted this deaths with pre-existing coordination registers to ascertain discrepancies in protocols (donor maintenance, brain death diagnosis (BDD), family information).

RESULTS. 1928 deaths were included. Neurological cases 482, of which 250 were brain deaths. 99% were detected by the Transplant Coordinator (CT). 145 (58%) became real donors. 50 (20%) were rejected due to medical contraindications, 40 (16%) because of family refusal. 5 (2%) maintenance problems and 5 (2%) other. Only in 9 (3.6%) cases did we find discrepancies in protocols which led to the losses of donors (2 delay in donor maintenance, 2 erroneous medical contraindications, 1 BDD and 4 cases in family information).

CONCLUSION. 1. It is indispensable for all clinicians involved in the process to know and carry out the protocols
2. In spite of having two excellent protocols in place avoidable losses still exist

0981

PROTECTIVE EFFECTS OF HEMODILUTION AND ISCHEMIC PRECONDITIONING AGAINST REPERFUSION INJURY IN PIG HEART

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INTRODUCTION. We investigated the protective effects of isovolumetric hemodilution and ischemia preconditioning against myocardial injury due to reperfusion through a pig myocardial ischemia reperfusion model.

METHODS. Eighteen mini-pigs were used in an acute myocardial ischemia model. They were randomly divided into three groups, with 6 pigs in each group: the control (group I, n=6), ischemia pre-treatment (group II, n=6), ischemia pretreatment plus blood dilution (group III, n=6). Cardiac output (CO), Sv02 and blood flow of coronary artery were measure, and then the oxygen supply to the myocardium and oxygen consumption were calculated. The MDA, SOD activity, CPK and CK-MB were also determined 20 min and 60 min respectively before and after the forceps clamping. A sample was taken from the left atrial appendage to determine the rate of expression of heat shock proteins Hsp70 mRNA.

RESULTS. When ischemia lasted for 20 min, the heart rate (HR) of group I and II slowed down dramatically while that of group III accelerated slightly. The MAP, CI and SVR of all three groups significantly decreased from control values($P<0.01$), but the magnitude of decrease in groups II and III were lower than those of group I ($P<0.05$). Also the SVR of group III was significantly lower than group II($P<0.05$). After reperfusion at 20min and 60 min, the HR of groups I and II was significantly lower than that of the controls ($P<0.01$). The HR of group III was significantly higher than that of groups I and II($P<0.05$), but was not significantly higher than control value($P>0.05$). The decreased MAP and CI of groups II and III were significantly lower than those of group I ($P<0.05$). In addition the SVR of group III was lower than groups I or II($P<0.05$). The values of CPK, CPK-MB of all three groups were significantly higher than the controls after reperfusion at 20min and 60min ($P<0.05$-0.01 respectively). However groups II and III increased less than those of group I. The values of CPK and CPK-MB in group III were lower than that of group II($P<0.05$). The MDA value of group I was dramatically higher than that of groups II and III after reperfusion at 20min and 60min ($P<0.05$), while the value of group III was lower than that of group II after reperfusion at 60min ($P<0.05$). The expression of Hsp70 mRNA in group II and III was higher than that of group I $P<0.05$,also, Hsp70 mRNA in group III was higher than group II($P<0.05$) after reperfusion at 20min and 60min.

CONCLUSION. Isovolumetric hemodilution can increases the protection of preconditioning against the ischemic myocardial injury caused by reperfusion.

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Poster Sessions
Improving (micro) circulation 0980-0993

0980

CLINICAL PROFILE AND PROGNOSIS OF PATIENTS WITH ACUTE CORONARY SYNDROME AND NORMAL CORONARY ARTERIES

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INTRODUCTION. The purpose of this study was to examine the main clinical characteristics of patients with Acute Coronary Syndrome (ACS) admitted in Intensive Care Unit (ICU) with normal coronariography, to analyze the morbility and mortality of these patients in the follow-up and to evaluate which variables are related to it.

METHODS. Retrospective study of 53 patients admitted in two ICUs from 2000 to 2006 with diagnosis of ACS (Acute Myocardial Infarction [AMI] or Unstable Angina [UA]), who underwent coronariography during their admission which ruled out the presence of significant lesions in coronary arteries (normal coronariography=NC). Demographic, clinical, and echocardiographic variables were registered in both groups. Patients from NC group were matched by age ($\pm$ 5 years), sex and diagnosis of ACS (AMI/UA) with a same number of patients admitted in ICU during same period of time, and with significant lesions on coronariography (abnormal coronariography=AC). Demographic and clinical variables were compared in both groups, as well as the incidence of a composite end-point of cardiovascular death, readmission for ACS or heart failure at 12 months. Statistical analysis was performed with 15.0 SPSS statistical package, using chi square for categorical variables, t-test for quantitative variables, Kaplan-Meier curves and Cox regression.

RESULTS. Among 53 patients with NC, mean age was 57 ± 12 and 51 % were women. 64 % of patients had AMI which corresponded to ST-Elevation in 19 % cases. AC patients underwent revascularization before discharge in 95 % of cases. There was no difference comparing cardiovascular risk factors between both groups. In the multivariate model, the only two independent predictive variables of NC were lower CPK levels in patients with AMI in the NC group(633 ± 429 vs 1584 ± 1903; $p<0.02$) and the presence of segmental contractility alterations by echocardiography, less observed in patients with NC than in AC patients (37.8% vs 62.2%; p=0.016; Odds Ratio=2.8; 95% CI=1.26-6.33). In the 12-month-follow-up, the occurrence of the composite end-point was similar in both groups (23% in NC vs 19% in AC; p=ns).

CONCLUSION. In our study, demographic characteristics of patients with NC were similar to patients with AC. However, patients with NC had fewer segmental contractility alterations by echocardiography and lower levels of CPK in AMI subgroup than in patients with AC. The prognosis at 1 year was similar in the two groups with no significant difference in the incidence of cardiovascular death, readmission for ACS or heart failure, which could have been influenced by the relative short follow-up, the limited sample power and the initial high revascularization rate in the AC patients.

0982

DOUBLE AND TRIPLE ANTIPLATELET THERAPY ARE EQUALLY EFFECTIVE BEFORE CORONARY INTERVENTION IN NON ST- ACUTE CORONARY SYNDROME

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INTRODUCTION. Introduction of new invasive strategies and antiplatetelet treatment for non ST-elevation acute coronary syndrome (NSTACS) are emerging as a current concern. Benefit of these combinations of antiplatelet medications is not verified before invasive procedures are performed, when clinical status is unstable, and when the time of invasive procedures is uncertain. We describe early outcome comparing double and triple antiplatelet treatment with data from the a regional registry in Spain.

METHODS. The Castilla-La Mancha NSTACS Registry includes high-risk (considered as the presence of ST-segment changes or elevation of biomarkers of cardiac damage) patients admitted to intensive care and coronary units, during a twelve months period, from seven public hospitals. Antiplatelet therapy was choosen following institution protocols. We selected for the study those patients receiving one of the following therapies: Double (DA)-aspirine plus IIb/IIIa glycoprotein inhibitor- or triple (TA) antiplatelet treatment -aspirine plus clopidogrel plus IIb/IIIa glycoprotein inhibitor-. Both treatments were compared for the following variables: chest pain plus ST-segment changes, reelevation of markers of cardiac damage (reAMI), shock and death. The variables were recorded and evaluated during the stay of the patients in the intensive care and coronary units, before cardiac catheterism. Statistical analysis: variables were compared by the Chi-square and Fisher exact test. $P< 0,05$ was considered statistically significant.

RESULTS. For hundred and eighty-two patients were registered. Three hundred and thirty-four patients were included in the study because they were treated wiht one of the antiplatelet combination studied. Median age was 66 for DA and 70 for TA groups,respectively. Rate male/female was 1,63. DA and TA were institued in 127 and 207 patients, respectively. No antiplatelet combination (DA or TA) was associated with a better outcome during intensive care and coronary stay. Variables and results are shown in Table 1.

	DA N (%)	TA N (%)	p
Chest pain and ST-segment changes	11 (8,6)	9 (4,4)	0,174
reIAM	2 (1,6)	4 (2)	1
Shock	5 (4)	1 (0,5)	0,31
Death	3 (2,4)	4 (2)	1

CONCLUSION. TA offers no benefit over DA, in high risk NSTACS, before coronary interventions. Optimal antiplatelet therapy has to be stablished to improve clinal satatus before coronary angiography is performed.

0983

DESFLURANE — IMPROVED SPLANCHNIC MICROVASCULAR OXYGENATION AND HAEMODYNAMIC STABILITY COMPARED WITH SEVOFLURANE

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INTRODUCTION. Maintenance of adequate microcirculatory haemoglobin oxygenation [$_{\mu}HbO_2$] is crucial for the integrity of the splanchnic mucosa [1]. Although the negative effects of volatile anaesthetics on systemic macro-haemodynamics are well known their microcirculatory effects on oxygenation of the splanchnic mucosa remain unclear.

METHODS. Chronically instrumented dogs (Foxhounds, 30±1 kg, n=5) were randomized and anaesthetized either with sevoflurane [SEV] or desflurane [DES]. The animals were mechanically ventilated (FiO_2 0.3, $etCO_2$ 35 mmHg) and the concentration of the respective volatile anaesthetic was gradually increased from 1.0 to 1.5 and finally to 2.0 MAC, each concentration maintained for 30 minutes. The $_{\mu}HbO_2$ was continuously measured by reflectance spectrophotometry in the gastric mucosa [2]. Systemic haemodynamics (cardiac output [CO], mean arterial pressure [MAP]) were continuously recorded. Oxygen delivery [DO_2] was calculated from intermittently obtained arterial blood samples (i.e., O_2-content) and CO. Statistics: Means±SEM, ANOVA, $p<0.05$.

RESULTS. During anaesthesia with DES $_{\mu}HbO_2$ was significantly higher even at 1 MAC compared with SEV (67±3 vs. 57±1%), without significant difference in DO_2 (19.5±3.2 vs. 14.4±1.3 $mlkg^{-1}min^{-1}$). DO_2 decreased significantly though with both agents at higher concentrations (2.0 MAC: DES 15.5±1.4; SEV 8.2±1.0 $mlkg^{-1}min^{-1}$). $_{\mu}HbO_2$ however, remained almost unchanged with DES (63±2%) even at 2.0 MAC, in contrast to SEV, where it was significantly reduced (41±5%).

CONCLUSION. Desflurane preserves splanchnic oxygenation and provides better haemodynamic stability compared with sevoflurane even at higher concentrations. Sevoflurane exerts its negative effect both on systemic oxygen delivery and regional microvascular oxygenation. Thus the use of desflurane could be favorable in patients at risk for splanchnic hypoxia.

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0984

THE EFFECT OF INTRAVENOUS MAGNESIUM SULFATE ON EXTUBATION TIME AND ACUTE POSTOPERATIVE PAIN IN ELECTIVE CORONARY ARTERY BYPASS SURGERY

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INTRODUCTION. The delay time in extubation and acute postoperative pain are among the major concerns in CABG patients undergoing cardiac bypass. In this study the effect of magnesium sulphate solution on postoperative pain scores and delay in extubation in elective CABG was assessed.

METHODS. In a double-blind, randomized, placebo-controlled clinical trial, 218 patients scheduled for elective CABG were selected and randomly assigned into 2 groups. After matching, intravenous magnesium sulphate was administered for one group, intraoperatively and placebo to the 2nd group. All the cases were handled similarly regarding anesthesia and surgery.

RESULTS. Pain in the first group (MgSO4) was significantly less after the operation (Table 1). Also the magnesium sulphate patients were extubated sooner compared to the placebo group (Table 2).

TABLE 1.

Pain scores in the two groups (based on a maximum VAS score of 10)

	Magnesium Sulphate	Placebo	P value (for t test)
6th	3.5 (0.6)	5.2 (0.7)	<0.0001
12th	3.1 (0.5)	4.7 (0.6)	<0.0001
18th	2.8 (0.6)	4.3 (0.4)	<0.0001
24th	2.6 (0.4)	3.6 (0.5)	<0.0001

**Data are presented as mean± (standard deviation)*

TABLE 2.

Postoperative time (in minutes) between patient entry to the ICU and extubation

Magnesium Sulphate	Placebo	P value (for t test)
378 (36)	468 (42)	<0.0001

**Data are presented as mean± (standard deviation)*

CONCLUSION. The results demonstrated significantly decreased post operative extubation time and acute pain scores due to intravenous magnesium sulfate infusion in elective CABG.

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0985

ASSESMENT OF THE MICROCIRCULATION IN PATIENTS WITH PULMONARY HYPERTENSION BY ORTHOGONAL POLARIZATION SPECTRAL (OPS) IMAGING IN THE PEDIATRIC ICU

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INTRODUCTION. Pulmonary hypertension is a life threatening clinical condition, well known in patients with congenital diaphragmatic hernia (CDH). Despite protocolized treatment modalities, combining artificial ventilation, sedation, vaso-active drugs, and nitric oxide inhalation, this condition leads to the need for Extracorporeal membrane oxygenation (ECMO) in about 50% of the cases.
The aim of our study was to assess the microcirculation in CDH-patients and to evaluate the effect of the different therapeutic modalities, like inhaled nitric oxide (iNO) and extracorporeal membrane oxygenation (ECMO), using orthogonal polarization spectral (OPS) imaging1.

METHODS. All consecutive patients diagnosed with CDH were evaluated for pulmonary hypertension by clinical parameters like oxygenation index and cardiac ultrasound. Their microcirculation was studied by measuring the microvascular network of the buccal mucosa. Serial measurements were done, starting as soon as possible after admission until the mechanical ventilation was stopped. Therefore we used a CYTOSCAN E-II Backfocus type device (Cytometrics, Philadelphia, PA). During analysis the functional capillary density (FCD) was determined.

RESULTS. 36 patients were included. In 10 patients we were able to obtain images before NO was started and evaluate the effect of NO. No change in buccal microcirculation was found after start of NO, regardless to the fact of the patient being a responder or a non-responder to NO. 23 patients (64%) received ECMO. Mean FCD in patients who did not received ECMO was higher (FCD = 5,5 +/- 0,8 cm/cm2) during the first days of admission in comparison to patients receiving ECMO, measured before ECMO (FCD = 4,4 +/- 1,0 cm/cm2). In all survivors, the microcirculation normalized before they were weaned off the ventilator.

CONCLUSION. This technique has a high feasibility. Microcirculatory parameters in patients who need ECMO seem to be worse in comparison to those who survive without ECMO. Consistent to the fact that iNO could not be demonstrated to have effect on systemic blood pressure or systemic regional blood flow2, we found no effect on the systemic microcirculation following iNO.

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0986

SUBLINGUAL MICROCIRCULATORY IMPROVEMENT WITH FLUID LOADING IN PRELOAD-DEPENDENT ICU PATIENTS

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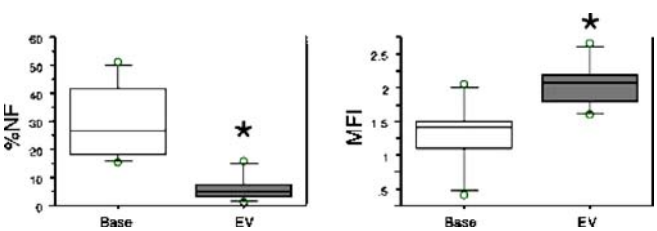
INTRODUCTION. Respiratory changes in pulse pressure (ΔPp, reflecting preload-dependency) are now widely accepted as accurate predictive indicators of macrocirculatory response to FL (>15% increase in cardiac index) in ICU patients[a]. However, relation between FL and microcirculatory parameters has not been yet investigated. The aim of this study was to assess sublingual microcirculatory changes induced by FL in preload-dependent ICU patients.

METHODS. After approval from our local institutionnal review board, six mechanicaly ventilated, preload-dependent patients ($\Delta Pp > 13\%$) under deep sedation and in sinus cardiac rythm were prospectively included. FL consisted in 500 mL bolus of either cristalloids or colloids over 15 min. Before (Base) and after FL, microcirculatory videos were obtained on the sublingual site with orthogonal polarized spectral imaging (MicroScan®) and analyzed off-line with dedicated expert software (AVA®). Validated microcirculatory parameters of small vessels (10-25μm) were then recorded: proportion of non-perfused microvessels (%NF) and microcirculatory flow index (MFI)[b]. Values are median[interquartile range] and analyzed with non-parametric Wilcoxon test.

RESULTS. In all Included patients (age: 62[50-67], APACHEII: 23[22-40]), FL corrected preload-dependency (ΔPp_{Base}: 14%[14-24] vs. ΔPp_{FL}: 8,5%[7-12], p = 0,018) and increased mean arterial pressure (MAP_{Base}: 66,5mmHg[64-67] vs. MAP_{FL}: 79,5mmHg[69-91], p < 0,01). FL also greatly improved microcirculatory parameters (see figure).



CONCLUSION. In preload-dependent ICU patients, treating hypovolemia with FL improves sublingual microcirculation.

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0987

CAN NEAR INFRARED SPECTROSCOPY DETECT FUNTIONAL MICROCIRCULATION ABNORMALITIES IN SEPTIC PATIENTS

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INTRODUCTION. The near infrared spectrometry (NIRS) assesses the haemoglobin saturation in the tissue (StO_2). Performance of a dynamic test resulting in a transient regional ischemia can provide additional information on the functional integrity of the local microcirculation (washout effect) through the analysis of the slope of the StO_2 re-ascension after occlusion release.

OBJECTIVE. To examine whether 1) baseline StO_2 and the StO_2 re-ascension slope are altered insevere sepsis and septic shock patients in comparison with healthy volunteers, and 2) these new regional perfusion variables correlate with classical systemic perfusion variables.

METHODS. We included 27 patients in severe sepsis (n=3) and septic shock (n=24) within the first 48 hours after ICU admission. Cardiac index (CI) was obtained from a transpulmonary thermodilution device (PiCCO", Pulsion Germany). The thenar muscle $StO_2$was continuously measured whit Inspectra" StO_2 model 640 (Hutchinson Technology) and after transient forearm ischemia induced by pneumatic cuff inflation (220 mmHg) until StO_2 went down to 40%. The rate of StO_2 re-ascension after cuff deflation was calculated. We also compared the first measurements of StO_2 and the rate of StO_2 re-ascension in the septic patients with those collected in 9 healthy volunteers.

RESULTS. Overall, 115 sets of measurements were obtained in the 27 patients. The mean SAPS2, CI and MAP were 57 ± 21 , 3.48 ± 1.31L/min/m^2 and 76 ± 18mmHg, respectively. In comparison with healthy subjects StO_2 was not different in septic patients (79 ± 5%) and in healthy subjects (80 ± 12%). In contrast, the StO_2 re-ascension slope was lower in septic patients (0.77 ± 0.91%.sec-1) than in controls (1.95 ± 0.34%.sec-1) (p=0.004). StO_2 weakly correlated with CI (r^2=0.13 , p<0.001) and with MAP (r^2=0.05, p<0.005). StO2 re-ascension slope weakly correlated with CI (r^2=0.15 , p<0.001) and with MAP (r^2=0.21 , p<001). However, CI was lower (p<70 % (n=87) (CI= 3.76 ± 1.23 L/min.m2).

CONCLUSION. On average, septic patients are not characterized by lower than normal StO2. Low values of $StO_2$are generally associated with low CI. Slow StO_2re-ascension slopes after inducing transient regional using forearm cuff inflation seem to better detect functional microcirculation abnormalities in particular when StO_2 is in the normal range.

0988

KETANSERIN PRESERVES MICROCIRCULATORY PERFUSION IN HYPERTENSION AFTER EXTRACORPOREAL CIRCULATION

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INTRODUCTION. Up to 60% of patients undergoing extracorporeal circulation (ECC) develop early postoperative hypertension. This should be treated to avoid suture disruption, myocardial ischemia and aortic dissection. Intravenous administration of Ketanserin (K), a serotonin and alpha-1 receptor antagonist may be useful in this setting. It causes a drop in blood pressure (BP) and systemic vascular resistance while cardiac index increases slightly. However, low blood pressure may compromise tissue perfusion. Therefore we aimed to evaluate the effect of K on the microcirculation.

METHODS. After local ethics committee approval, we included 6 mechanically ventilated patients who developed a systolic BP > 110 mmHg within 2 hours after ECC for cardiac surgery. They were given a 15 mg/kg IV bolus of K. Five minutes before and 10 minutes after K administration, global hemodyamic variables were recorded. In addition, we used Side Stream Dark Field Imaging to record video clips of the microcirculation at three different sublingual sites. This technique uses green light which is absorbed by hemoglobin [1]. Clips were stored under a random number and later analyzed off line by an investigator unaware of the randomization. Vessels were classified by diameter as either small (<20mu) or large (>20mu). For each clip and each vessel type we determined vessel density and microcirculatory flow index (MFI). Both have been validated previously [2,3]. For vessel density, we drew 3 horizontal and 3 vertical equidistant lines. Flow in each vessel crossing these lines was scored semi-quantitatively: 0=no flow, 1=intermittent flow, 2=sluggish flow, 3=continuous flow. Perfused vessel density was defined as the number of crossings with flow scores greater than 1. For MFI, we divided the screen in four equal quadrants. For each quadrant and vessel type, flow was scored as above. MFI is the sum of these flow scores divided by the number of quadrants in which the vessel type is visible. Results are reported as mean±standard deviation.

RESULTS. Following K administration, systolic BP decreased significantly (129±9 vs. 100±15 mmHg, p<0.01). At the level of the microcirculation, MFI did not change significantly. However, there was a significant increase in mean perfused vessel density for large vessels (1.23±0.63 to 1.70±79 mm^{-1}, p=0.017), but not for small vessels (5.59±2.60 to 5.87±1.22 mm-1, p=0.72).

CONCLUSION. In hypertension following ECC, K effectively lowers arterial blood pressure. This may be caused by increased perfusion of large microcirculatory vessels. Perfusion of small vessels remained unaltered. This suggests that tissue perfusion was not compromised by K which may render its hypotensive effect acceptable.

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0989

INDUCED REGIONAL HYPERTHERMIA IS ASSOCIATED WITH CHANGES IN INDOCYANINE GREEN-PLASMA DISAPPEARANCE RATE

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INTRODUCTION. Whole body and regional hyperthermia in combination with chemotherapy is used for treatment of various malignant lesions. The aim of this study was to determine indocyanine green disappearance rate (ICG-PDR) as a surrogate parameter for splanchnic perfusion used as prognostic tool in critically ill patients.

METHODS. 35 patients underwent regional body hyperthermia for pelvic or abdominal tumors or metastasis. Intratumoral hyperthermia of 42 ° C with a plateau time of 60 min. was induced using an annular phased array applicator (BSD 2000; BSD Med. Corp., Salt Lake City, Utah, USA). Cardiac output (CO), blood volume and ICG-PDR rate was measured at three time points (baseline [T0], 30 minutes after reaching plateau of hyperthermia [T1] and 60 minutes after completing hyperthermia [T2]) using pulse dye-densitometry (DDG Analyser, Nihon Kohden Corp. Tokyo/Japan). Liver enzymes (aspartate aminotransferase [ASAT], alanine aminotransferase [ALAT]) were measured before (T0) and two days (D2) after hyperthermia. Statistics: Friedman-Test; Logistic Regression.

RESULTS. During plateau of regional hyperthermia all patients showed a hyperdynamic response (Table 1). During hyperthermia, at T1, ICG-PDR remained within the normal range (18-25 %/min) but was decreased compared to baseline whereas it completely recovered after finishing hyperthermia at T2 (Table 1). Transaminases were maximal 1.5 fold elevated on T0 and did not change at the follow up on D2.

	T0	T1	T2
Cardiac output (l/min)	5.2 +/- 0.3	11.08 +/- 0.5 */#	6.6 +/- 0.54
Heart rate (bpm)	73 +/- 2	102 +/- 3 */#	79 +/- 2
ICG-PDR (%/min)	24.1 +/- 1	20.8 +/- 1.2 */#	24.2 +/- 1.3
Blood volume (ml/kg)	76.4 +/- 3.3	78.3 +/- 3.3	77.4 +/- 4
Temperature (° C)	Rectal: 37.2 +/- 0.1	Rectal: 40 +/- 0.3	Oral: 36.5 +/- 0.1

T0, T1, T2 (p< 0.05 vs T0, # p< 0.05 vs T2)*

CONCLUSION. Patients undergoing induced regional hyperthermia develop hyperdynamic circulation which did not differ to induced whole body hyperthermia. The decline in ICG-PDR as a surrogate parameter for splanchnic perfusion might indicate a temporary redistribution of blood flow during regional hyperthermia.

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0990

INCREASED INTRATHORACIC PRESSURE AND ITS EFFECT ON HEPATIC FLOW IN PATIENTS WITH DIFFERENT THORACIC COMPLIANCE

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INTRODUCTION. Pulmonary compliance influences the transmission of respiratory positive pressure to the surrounding vascular structures. We evaluate the effect of Continuous Positive Airways Pressure (CPAP) on hepatic flow in patients with severe Chronic Obstructive Pulmonary Disease (COPD) and patients with Obstructive Sleep Apnea (OSA).

METHODS. We studied eight COPD patients (2 female; 6 male; age 62,3+/-6,5 yrs) with an severe obstructive pulmonary pattern at the spirometry (FEV 1 0,38 +/- 4,3 %) and eigtht OSA patients (1 female; 6 male: age 58,7 +/- 5,4 yrs) with a normal spirometric pattern, but high BMI (33,1 +/- 3,6). Each patient were investigated in a supine position before and after application of Continuous Positive Airways Pressure (CPAP) of 10 cmH2O by nasal mask. The study was performed using a sonographic equipment with multi probe (convex 3,5-5 MHz; sector 2,5-3,5 MHz) and colordoppler capability (Hitachi H 21). Portal Vein Velocity (PV), assessed near the liver hilum, was used as a measure of Portal Flow and left intrahepatic branch Resistivity Index (RI) was used as a measure of Hepatic Artery Flow. Measures were repeated twice for each value of intrathoracic pressure by two different examiners and the mean value was given for the statistical analysis. Results are given as mean +/- SD. Data were evaluated by paired t test and a value of P < 0,05 was taken as statistically significant.

RESULTS. In COPD patients CPAP determines a reduction of PV 28,3 +/- 6,1 cm/sec vs 18,7 +/- 4,2 cm/sec (P < 0,01) and an increase in RI 0,65 +/- 0,03 vs 0,81 +/- 0,04 (P < 0,05). In OSAS patients there was not significant variation: PV 22,5 +/- 8,0 vs 25,4 +/- 5,3 cm/sec, RI 0,74 +/- 0,05 vs 0,79 +/- 0,06.

CONCLUSION. CPAP is largely used for acute and chronical diseases and its haemodynamical effects are different in each clinical setting. COPD patients have an increased pulmonary compliance that allows a greater transmission of the airways pressure to the surrounding vascular structure. Increased intrathoracic pressure ed diaphragm descent determine the recuction of Hepatic flow. In obese OSA patient thoracic cage is less compliant and these effects are less pronounced.

0991

TISSULAR OXYGEN SATURATION IN SEPTIC SHOCK

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INTRODUCTION. Despite the correction of macrohemodynamic parameters (CVP, MAP, urine output, SvO2), the mortality of septic shock remains elevated. Defect of microcirculation is probably the motor of sepsis. This study was aimed at assessing the oxygen tissular saturation.

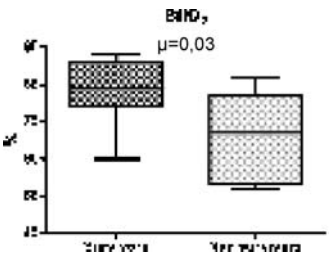
METHODS. Eighteen patients (age: 57 ± 14 yrs, SAPS II: 47 [38 – 53]) with septic shock in whom macrocirculatory goals (CVP, urine output, MAP, SvcO2) have been achieved were included. Clinical and biological parameters of microcirculation (mottling, capillary refill, serum lactates) were assessed. In the same time, thenar muscle tissular oxygen saturation (StiO2) was measured using the monitor Inspectra (Tissue Spectrometer model 325). The results were analyzed according to mortality. Non parametric t test or Chi-2 were performed for statistical analysis.

RESULTS. Results are summarized in Table 1.

TABLE 1.

Clinical and biological parameters

	Survivors (n = 11)	Non Survivors (n = 7)	
MAP (mm Hg) mean (SD)	87 (14)	96 (18)	0.1
Urine output (mL/h)mean (SD)	133 (115)	67 (70)	0.07
Mottling, No (%)	0 (0)	3 (43)	0.2
Capillary filling > 2 s, No	1 (9)	2 (28)	0.9
SvcO2 (%) mean (SD)	82 (8)	79 (4)	0.2
StiO2 > SvcO2, No (%)	6 (54)	2 (28)	0.8
Lactate (mmol/L) mean (SD)	2.6 (1.4)	3.6 (1.9)	0.1



CONCLUSION. Muscle thenar oxygen saturation seems to be of interest to predict outcome of the patients with septic shock. Management of the patients according to its value should be assessed in further studies.

0992

ACUTE PULMONARY EMBOLISM AT ICU: THROMBOLYTIC THERAPY AND MORTALITY

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INTRODUCTION. Massive and submassive pulmonary embolism (PE) is a life-threatening emergency and use to require intensive care unit (ICU) treatment. Anticoagulation and measures to attain hemodynamic stability are the primary treatment. Thrombolytic therapy is usually reserved for patients with clinically serious or massive PE. The objective of the present study was to estimate acute PE outcome at ICU and to identify factors for predicting mortality.

METHODS. we retrospectively registered all consecutive episodes of acute PE admitted at our ICU, from 2000 to 2006. The following data were collected: demographic data, risk factors, previous deep vein thrombosis, clinical presentation, radiological severity by spiral computed tomography (emboli located in main, lobar or segmental, or sub segmental pulmonary arteries), troponin T, APACHE II, shock or right ventricular failure at presentation, PE severity (massive, sub massive, non-massive), administration of anticoagulation or thrombolytic therapy, complications of treatment and mortality at ICU.

RESULTS. 43 patients were included in this study. Median age was 69 years (24-87) and 53% were male. Main risk factor for acute PE was immobilization (37.2%), 7% take oral contraceptives, 2.3% had obesity, 2.3% had a diagnosed tumour and 51.2% patients had unknown risk factors. 13 patients had concomitant deep vein thrombosis. Clinical presentation was: dyspnoea (67.4%), chest pain (39.5%), syncope (25.6%) and hypotension (2.3%). Regarding PE extension, 65.1% had central emboli, 18.6% lobar or segmental and 2.3% sub segmental. Troponin T was increased in 76.5%. Mean APACHE II score at ICU 5.7. 40.5% were categorized as massive PE and 59.5% as±admission was 12.8 submassive. Thrombolytic therapy was administered in 25 patients and only 1 patient developed complications (retroperitoneal haemorrhage). Mortality rate was 16.3%, being higher in massive PE (RR=1.7; 95% CI, 1.14-2.53; p=0.001) or in patients that developed shock at ICU (RR=1.77; 95% CI, 1.15-2.73; p=0.001). APACHE II score was a predictor of mortality (OR=1.28; 95% CI, 1.001-1.65; p=0.49).

CONCLUSION. acute PE is a frequent pathology at ICU, responsible of high mortality rates, specially in patients with massive PE or patients that developed shock during ICU stay. Factors that predict this mortality are those related to illness severity at admission. Thrombolytic therapy is a safe and effective treatment.

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CEREBRAL BLOOD FLOW AS A PREDICTOR OF CENTRAL HEMODYNAMICS DISTURBANCES IN PREECLAMTIC PARTURIENTS

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INTRODUCTION. Analysis of cerebral haemodynamics in pregnant patients with preeclampsia represents an area of special interest. The goal of this study was to estimate the strength of relationship between parameters of central hemodynamics and cerebral blood flow in patients with preeclampsia.

METHODS. After local ethic committee approval, 52 women with severe preeclampsia, ages of 16-37 years (mean age 25.2±5.5 years) were recruited for this prospective study. Cerebral hemodynamic parameters were studied with transcranial dopplerography (TDG). We used transtemporal approach and the estimated following parameters of blood flow: peak systolic velocity (PSV), end-diastolic velocity (EDV), time averaged velocity (TAV), systolic-diastolic ratio (S/D), pulsative index and resistance index (RI). The following central hemodynamics parameters were estimated by echocardiography: stroke volume (SV), cardiac output (CO), cardiac index (CI), end-diastolic volume (EDV) and total peripheral resistance (TPR). Pearson's correlation coefficient (r) was calculated to estimate the strength and direction of a linear relationship between recorded parameters.

RESULTS. Statistical analysis of collected data revealed high correlation between parameters of cerebral blood flow and central hemodynamics. Very high positive linear correlation was found between CO and PSV (r = 0,81); between CO and EDV (r = 0,77); between CO and TAV (r = 0,78). Relatively high positive correlation was found between CI and PSV (r = 0,72); between CI and EDV (r = 0,60); between CI and TAV (r = 0,66). High negative linear correlation was revealed between TPR and several parameters of cerebral blood flow (PSV – TPR: r = -0,90 ; EDV – TPR: r = -0,83 ; PSV – TPR: r = -0,84).

CONCLUSION. Cerebral blood flow monitoring can be used to predict disturbances of central hemodynamics in pregnant women with preeclampsia. TDG can be considered to be an effective method of assessment of severity of this pregnancy complication.

Poster Sessions
Evaluation of cardiac function II 0994-1007

0994

TRANSESOPHAGEAL ECHOCARDIOGRAM (TEE) IN THE INTENSIVE CARE UNIT (ICU)

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INTRODUCTION. The TEE is a diagnostic technique that enables the clinician to know the heart function and the diagnosis of cardiac lesions. The aim of this study was to analyze the usefulness of TEE in critically ill patients.

METHODS. The study included the patients who had been admitted to our department since 1-1-2005 to 31-12-2006 and a TEE was bedside performed by staff with training in echocardiography and TEE.

RESULTS. A total sum of patients 611 (445 males and 166 females) was included. Their mean age was 55.44±16. The reason for their admission was shock (36%), polytraumatism (18%), sepsis (16%), cardiac failure (12%), respiratory insufficiency (10%) and others (8%). The 61% of all studies were carried out in the day of the admission. Additionally 24% carried out from the first day to the end of the week. The main diagnosis obtained with TEE were: segmental wall motion abnormality and/or wall thickening (20%), systolic dysfunction of Left Ventricle and/or Right Ventricle (12%), moderate pericardial effusion and/or cardiac tamponade (6%), endocarditis (5%), severe mitral or aortic regurgitation (4%), hypovolemia (4%), aorta dissection (4%), traumatic rupture of the thoracic aorta (2%), prosthetic valve dysfunction (2%), dynamic left ventricular outflow tract obstruction (2%), intracavitary thrombus (2%), aortic and/or mitral stenosis (1,5%), minor abnormalities (13,5%) and normal studies (22%).
After the TEE was done, new diagnosis emerged in 358 patients (58,5%) and in 328 patients (53,6%) the treatment was modified, requiring surgery 105. No relevant complications were found.

CONCLUSION. 1.- The TEE is a bedside diagnostic technique that offers crucial data for the treatment of the critically ill patient.
2.- The TEE offered new diagnosis in more than 50% of the patients.
3.- The echocardiography should be part of the training in the intensive care unit medical staff.
4.- The TEE does not present severe complications when skilled personnel performed it.

0995

DIFFERENTIAL ELECTROCARDIOGRAPHIC PATTERN IN THE ACUTE PHASE OF TAKO-TSUBO SYNDROME COMPARED TO ANTERIOR MYOCARDIAL INFARCTION

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INTRODUCTION. Electrocardiographic (ECG) changes of Tako-Tsubo syndrome (TTS) are similar to the changes of anterior myocardial infarction (AMI). In order to adequate the treatment it is important to look for differential ECG patterns.

METHODS. 10 patients (p.) (100% were female) with diagnostic criteria of Tako-Tsubo syndrome (angina, "ischemic" ECG changes, normal coronariography and typical ventriculography) were compared to 29 p. (20% female) with an AMI and anterior wall involvement due to an occlusion of the left anterior descending coronary artery below the first diagonal branch. The mean age of the STT group of patients was 70±6 years old compared to 53±13 years old in the AMI group (p=0,0006). Statistical tests used were: T-test for quantitative variables and Fisher test for categorical variables. The odds ratio (OR) and a confidence interval (IC) of 95% were also calculated.

RESULTS. See Table 1.

TABLE 1.
ECG pattern in the acute phase

	TTS (n=10)	AMI (n=29)	OR	CI 95%	p
↑ST and + T precordial leads	30% (3)	79% (23)	0,11	0,02-0,57	0,008
↑ST and +/- T precordial leads	20% (2)	0% (0)	10,92	0,71-167,74	0,061
- T precord leads and inferior wall	20% (2)	0% (0)	10,92	0,71-167,74	0,061
↑ST + T precord and inferior wall	40% (4)	17% (5)	3,20	0,65-15,70	0,197
Mirror pattern	0% (0)	45% (13)	0,03	0,001-0,96	0,016

CONCLUSION. The typical ECG pattern of the hyperacute myocardial infarction (↑ST segment and + T wave) is not frequently observed in the TTS. Other features of the TTS that can help with the differential diagnosis are the lack of a mirror pattern, the female sex and the age of the patient.

0996

LEVOSIMENDAN, COMPARED TO PLACEBO, PROVIDES RAPID, CONSISTENT, AND SUSTAINED SYMPTOMATIC IMPROVEMENT: REVIVE II

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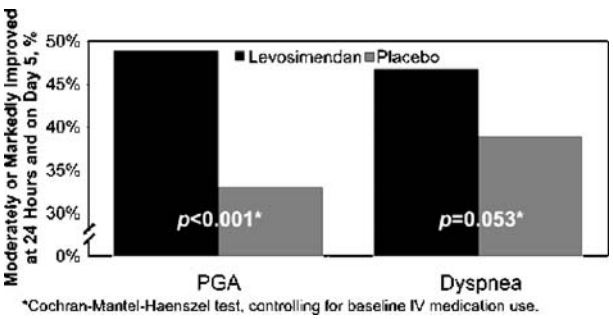
INTRODUCTION. Levosimendan, a vasodilator and enhancer of cardiac contractility, improves both patient global assessment for heart failure (PGA) and dyspnea when analyzed at individual time points. The potential benefit of levosimendan within individual patients was evaluated at both 24 hours and 5 days to determine the sustainability of symptomatic improvement.

METHODS. REVIVE II enrolled 600 patients with acute decompensated heart failure (ADHF) and dyspnea at rest. Patients assessed their change in PGA and dyspnea, relative to baseline, on separate 7-point categorical scales (from markedly worse to markedly improved) at 6, 24, and 48 hours, and Days 3 and 5. To test the consistency of patient responses for PGA and dyspnea, a post hoc analysis was conducted: patients indicating moderate or marked improvement at both 24 hours and 5 days were classified as "Improved", all other patients were considered "Unimproved."

RESULTS. For PGA, 48% more patients treated with levosimendan (144/295, 49%) were classified as "Improved," at both 24 hours and on Day 5, compared with placebo (98/297, 33%; p<0.001). The results for dyspnea were similar (138/295, 47%; and 115/296, 39%, respectively; p=0.053).



CONCLUSION. Levosimendan provides symptomatic improvement in patients with ADHF during an early period of hospitalization, a critical period impacting patients' ultimate outcome. Furthermore, these initial benefits are maintained more often in patients receiving levosimendan compared to placebo.

GRANT ACKNOWLEDGEMENT. Abbott & Orion Pharma.

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CARDIAC FUNCTION INDEX (CFI) COMPARED TO OTHER CARDIAC PERFORMANCE MEASUREMENTS IN CRITICALLY ILL PATIENTS

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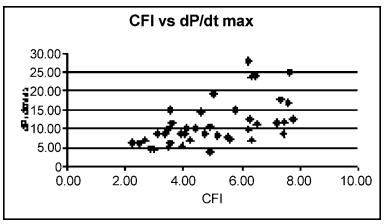
INTRODUCTION. Several minimally invasive devices estimate cardiac performance. The Cardiac Function Index (CFI), derived by transpulmonary thermodilution (Pulse-induced Contour Cardiac Output (PiCCO), PMS), is an index of cardiac systolic function, calculated from the Cardiac Index (CI) and the Global End-Diastolic Volume Index (GEDVI). CFI is dependent on filling status of the (left) cardiac ventricle. Other parameters of cardiac performance like PAR score and dP/dt max are dependent on pressures and cardiac contractility, respectively. We studied the correlation of CFI with dP/dt max and PAR score. We hypothesise that these indicators of cardiac performance in ICU patients can not be compared, because of their dependency on various cardiac parameters.

METHODS. Consecutive patients with a PiCCO system for haemodynamic monitoring on our ICU were included in this study. PiCCO scores CI, CFI (i.e. CI/GEDVI x 1000) and dP/dt max were noted at time of calibration. PAR scores (i.e.(central venous pressure/mean arterial pressure)x heart rate) were calculated at the same moment. All variables were evaluated for their correlation using Pearson's correlation coefficient.

RESULTS. 41 measurements were taken of 21 mechanically ventilated patients. Reasons for admission were septic shock, major surgery, heart failure or other. Cardiac indexes ranged from 1.92 to 5.79 l/min/m2, and GEDVI ranged from 520 to 1321 ml/m2. CFI, ranged from 2.83 to 7.78 l/min. Non-significant correlations were found between CFI and PAR (r2=0.04), CI and PAR (r2=0.0009), PAR and dP/dt max (r2=0.003). Significant but relatively weak correlations were found between CFI and dP/dt max (r2=0.32)(Fig.1) and CI and dP/dt max (r2=0.30). In the 21 individual patients (with only the first recording used) the same results were found: a correlation coefficient (r2) for CFI and dP/dt max was 0.14 and CI and dP/dt max 0.34.



CONCLUSION. CFI and CI are weakly correlated with dP/dt max, CFI and PAR score as well as dP/dt max and PAR are not correlated However, as the CFI is only useful when there is no right heart failure, which can be frequently seen in (septic) ICU patients, this indicator for cardiac performance might be used solely with knowledge of existing or new right heart failure.

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MONITORING CARDIAC OUTPUT USING ARTERIAL BLOOD PRESSURE; FLOTRAC™

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INTRODUCTION. Cardiac output (CO) is an important variable to evaluate hemodynamic condition of ICU patients or the reaction to changes in drug therapy. In this study CO is monitored with a pulmonary artery catheter COTD, CCO and FloTrac™. In this study accuracy of changes in cardiac output is analysed with crosstabulation and intraclass correlation of reliability (ICC).

METHODS. In 30 patients after cardiothoracic surgery, the cardiac output (CO) was monitored on predefined moments after operation (1, 2, 4, 8, 12 and 24 hr). In this study we compared changes in cardiac output between an arterial pressure based algorithm; FloTrac™ (APCO) (Edwards Lifesciences, Irvine, Ca, USA) and data collected with intermittent bolus cardiac output (COTD) and continuous (CCO) using a pulmonary artery catheter (139HF75P CCO catheter/Vigilance, Edwards Lifesciences, Irvine, Ca, USA). Each bolus cardiac output was calculated as an average of three measurements taken over approximately 5 minutes. APCO values were determined over the same time interval as COTD. CCO values were taken immediately prior to bolus determinations, and also present a 5 minutes average. Negative en positive changes in CO, were dichotomized and calculated in cross tabulation as percentages of agreement (accuracy). Intraclass correlation coefficient was assessed to test agreement in repeated measurements (two-way mixed, random effect model, absolute agreement).

RESULTS. 168 matched sets of data were available for statistical analysis from 30 cardiothoracic patients (heart valve surgery with CABG and/or left ventricle remodelling with heart valve surgery). Female/male ratio = 6:24, mean age ±SD = 67.2 ± 9.0 years [range 42-78years], mean body mass index ±SD = 26.4 ± 3.8 kg/m [Range 16.9 – 32.3kg/m]. COTD values during the observation period ranged 1.5 to 8.7 L/min. Accuracy of CO changes between COTD and CCO was 89.3%, between COTD and APCO 74.4%. Intraclass correlation was 0.806, CI95% = 0.675–0.876 (COTD - CCO), and 0.668 CI95% = 0.448-0.787 (COTD - APCO).

CONCLUSION. Changes in CO are well observed with both monitoring systems, COTD, CCO as APCO with FloTrac™. The agreement to detect cardiac output changes using these monitoring sytems is substantial and almost perfect.
We found strong associated values between accuracy (cross tabulation) and ICC.

GRANT ACKNOWLEDGEMENT. This study was supported by Edwards Lifesciences, LLC.

0999

THE HEMODYNAMIC IMPACT OF A LOADING DOSE PRECEDING A 24-HOUR CONTINUOUS INFUSION OF LEVOSIMENDAN IN PATIENTS WITH ACUTE HEART FAILURE

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INTRODUCTION. Levosimendan is an intravenous treatment under evaluation for acute heart failure (AHF). The elimination half-life of levosimendan is about 1 hour and steady state is achieved in about 4-5 hours following the start of a continuous infusion. A loading dose along with continuous infusion has been used to reduce the time taken to reach PK steady state. A population pharmacokinetic and pharmacodynamic (PK/PD) model was developed to evaluate the effect of a levosimendan loading dose vs. no loading dose on hemodynamic variables.

METHODS. A population PK/PD model was constructed using data in patients with NYHA Classes II-IV congestive heart failure from eight clinical studies. The combined dataset included infusion of various doses (0.25 – 70.6 mg), rates (0.05 – 0.6 mcg/kg/min) and durations (5 min – 7 days), with or without an initial loading dose. Relationships of the exposures of levosimendan and its metabolites and the hemodynamic response variables including pulmonary capillary wedge pressure (PCWP), heart rate (HR) and systolic blood pressure (SBP) were used to simulate the hemodynamic response at infusion dosing regimens of 0.2 mcg/kg/min for 24 hours with and without loading infusion dose of 12 mcg/kg (administered over 10 minutes).

RESULTS. The maximum predicted hemodynamic response difference due to the loading infusion dose of 12 mcg/kg was -1.5 mmHg, -1.4 mmHg and +1.5 bpm for PCWP, SBP and HR at 1, 1 and 2 hours, respectively. At 6 hours, the hemodynamic response differences between the two regimens (with and without loading dose) were negligible.

CONCLUSION. Simulations predict that a loading dose prior to a continuous infusion has minimal effects on PCWP, HR or SBP, during the first 6 hours after dosing compared to a continuous infusion not preceded by a loading dose.

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LEVOSIMENDAN POPULATION PHARMACOKINETIC/PHARMACODYNAMIC MODEL PREDICTS HEMODYNAMIC RESPONSES IN PATIENTS WITH ACUTE HEART FAILURE

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INTRODUCTION. Levosimendan is an intravenous treatment under evaluation for acute heart failure (AHF). A population pharmacokinetic/pharmacodynamic (PK/PD) model was developed for levosimendan and hemodynamic data from patients with AHF in 2 Phase 3 studies (REVIVE II, N=600 and SURVIVE, N=1327) were used to validate the model.

METHODS. A population PK/PD model was constructed using data in patients with NYHA classes II-IV congestive heart failure from eight Phase 2 clinical studies. The combined dataset included infusion of various doses (0.25 – 70.6 mg), rates (0.05 – 0.6 mcg/kg/min) and durations (5 min – 7 days), with or without an initial loading dose. The model was used to predict the hemodynamic responses for the validation dataset based on patient's dosing history and covariates. The hemodynamic response variables were heart rate (HR), systolic blood pressure (SBP) (all averaged using time–windows of 12 hours each over 120 hours). In REVIVE II and SURVIVE trials (the validation dataset) loading doses were 6-12 mcg/kg for 10 minutes, followed by 0.1 mcg/kg/min for 50 minutes, then 0.2 mcg/kg/min for the remaining 23 hours.

RESULTS. The mean predicted time courses of HR and SBP responses followed a similar trend as the mean observed time courses of HR and SBP responses for the REVIVE II trial. The mean predicted and observed HR changes from baseline slowly increased and reached steady state by Day 3. The mean predicted and observed peak HR responses were approximately 7 beats/min (bpm). The mean predicted and observed SBP changes from baseline rapidly decreased within the first 24 hours and reached the maximal effect by Day 2. The mean predicted and observed peak SBP responses were approximately -7 mmHg. Similarly, the model provided reasonable predictions for HR and SBP in the SURVIVE trial. The mean predicted and observed peak HR responses were approximately 5 to 6 bpm. The mean predicted and observed peak SBP responses were approximately -5 to -6 mmHg.

CONCLUSION. The model validation exercise showed that the PK-PD model developed using the Phase II data was successful in predicting the average time course and magnitude of hemodynamic responses (HR and SBP) from 2 Phase 3trials in patients with AHF.

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TRANSIENT SYSTEMIC LOW FLOW STATE INDUCES CARDIAC DYSFUNCTION AND INTERLEUKIN-6 RELEASE

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INTRODUCTION. Inflammatory response has been implicated in the pathogenesis of low cardiac output state. The purpose of this study was to evaluate hemodynamic and metabolic evolution after a transient low flow state and to assess the role of inflammatory parameters in this scenario.

METHODS. Ten Large White pigs (43 ± 5 kg) were instrumented with arterial and pulmonary catheters and had a latex balloon inserted anterior to the heart. Pigs were randomized to transient obstructive shock (n=5) or control group (n=5). Shock group had the balloon inflated with 620 ± 344 ml of air to keep the mean arterial blood pressure (ABPm) 45-55 mmHg for 1 hour. Animals were followed for 6 hours and IL-6 concentrations were measured in plasma by ELISA.

RESULTS. During shock ABPm was 49 ± 4 mmHg, SvO_2 was 34 ± 8%, heart rate was 173 ± 36 bpm and stroke volume (SV) was 18 ± 12 ml/min/beat.

TABLE 1.
Hemodynamic, Metabolic and Inflammatory Parameters After Cardiac Tamponade

Data	Baseline	Post Shock	3 hours	6 hours	p value
ABPm (mmHg) shock	111 ± 19	76 ± 13 *&	82 ±10 *&	72 ± 7 *&	<0.001 #
ABPm (mmHg) control	111 ± 16	115 ± 9	102 ± 7	97 ± 8	<0.001 $
SV (ml/min/beat) shock	65 ± 9	22 ± 5 *&	38 ± 12 &	36 ± 8 &	<0.001 #
SV (ml/min/beat) control	59 ± 16	59 ± 13	54 ± 9	45 ± 12	<0.001 $
SvO2 (%) shock	73 ± 9	65 ± 8	55 ± 15 &	56 ± 13 &	0.023 #
SvO2 (%) control	75 ± 7	72 ± 6	68 ± 5 &	62 ± 6 &	0.002 $
Temp. (ºC) shock	36.8 ± 0.6	37.5 ± 0.4	39.6 ± 0.7 *&	39.7 ± 0.6 *&	<0.001 #
Temp. (ºC) control	36.5 ± 0.3	37.0 ± 0.6	38.0 ± 0.6	38.4 ± 0.4	<0.001 $
IL-6 (pg/ml) shock	189 ± 124	-	389 ± 78 *	422 ± 242 *	<0.001 #
IL-6 (pg/ml) control	93 ± 63	-	135 ± 55	118 ± 101	0.088 $

*ANOVA between groups # within groups $, *p < 0.05 vs ctrl, & p < 0.05 vs baseline*

CONCLUSION. In this model, transient cardiac tamponade caused persistent cardiovascular dysfunction. Hyperthermia and IL-6 release after obstructive shock may be associated with inflammatory response after transitory hypotension.

GRANT ACKNOWLEDGEMENT. Research and Education Institute, Hospital Sírio-Libanês.

1002

RELIABILITY OF TRANSPULMONARY INDICATOR DILUTION TECHNIQUE IN CRITICALLY ILL PATIENTS

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INTRODUCTION. In comparison to the thermo-dye dilution technique (TD) and pulmonary artery catheterisation (PAC), single transpulmonary thermodilution (ST) enables less invasive assessment of hemodynamic parameters, e.g. cardiac output (CO), global enddiastolic volume (GEDV), intrathoracic blood volume (ITBV) and extravascular lung water index (EVLWI). Previous data showed that EVLWI can be determined sufficiently accurate by single transpulmonary thermodilution using GEDV as underlying parameter. In this study, we analyzed the influence of EVLWI levels on accuracy of CO measurement by transpulmonary thermodilution and furthermore whether CO has influence on the reliability of EVLWI assessment by single thermodilution when compared to the double indicator technique.

METHODS. In this retrospective study, we analyzed 2 populations of critically ill patients. In 57 patients (38 male, 19 female, age 18-79 years) with the clinical indication for PAC and thermo-dye dilution we analyzed 572 simultaneous thermodilution measurements (TD, PAK). The difference between transpulmonary (COTD) and pulmonary artery CO (COPAC) was related to the respective EVLWI values. In another 209 patients (139 male;, 70 female;, age 10-88 years) single thermodilution derived EVLWI (EVLWIST) was compared with the clinical reference standard of EVLWI (EVLWITD) depending on CO. For each hemodynamic measurement, 15-17ml of 2% indocyanine green (4-6 ˚C) was injected by hand central venously and not coordinated with the respiratory cycle. The femoral artery thermo-fiberoptic catheter and pulmonary artery catheter were connected to a computer system (COLD-Z021, Pulsion Medical Systems, Munich, Germany). Statistical analysis was performed by linear regression (SPSS for Windows, Version 12.0).

RESULTS. There was no significant relation between differences in CO measurement by PAC and TD and EVLWI values: COPAC - COTD = 0.004 x EVLWI - 0.35 (l/min) (r=0.016, p=0.69). Furthermore, CO was not correlated with differences in EVLWI by the two techniques: EVLWITD - EVLWIST = 0.031 x CO - 0.48 (ml/m2) (r=0.057, p=0.42).

CONCLUSION. EVLWI level has no significant influence on the accuracy of CO assessment by transpulmonary thermodilution and estimation of EVLWI by the single transpulmonary thermodilution is accurate, independently from CO.

1003

DYNAMIC PRELOAD PARAMETERS DURING PRESSURE SUPPORT VENTILATION – THE INFLUENCE OF RESPIRATORY EFFORT

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INTRODUCTION. Dynamic preload parameters (DPP) predict fluid responsiveness in patients on controlled ventilations but their usefulness during pressure support ventilation (PSV) is not clear. The aim of the study is to validate DPP during PSV and to estimate their relationship to pleural pressure (Ppl) changes.

METHODS. Intubated patients ventilated on PSV in whom fluid challenge was considered were included. Hemodynamic measurements including cardiac index (CI), pulmonary artery occlusion pressure (PAOP) and central venous pressure (CVP) were obtained before and after fluid challenge. Pulse pressure variations (PPV) and stroke volume variations (SVV) were calculated offline at the same timepoints. Ppl was estimated from esophageal balloon-tipped catheter (Pes). Fluid challenge consisted of 500ml 130/0.4 hydroxyethyl starch infused within 30 minutes, increase in CI > 10% was considered a positive response. Data are presented as median (range).

RESULTS. Data from 8 patients are so far available. Large inspiratory effort was observed - Pes decreased during inspirium by 16 (3 to 25) cm H20. Nevertheless, PPV and SVV were low in most of patients: 1.6 (0.7 to 11.6) and 2.8 (0.7 to 14.5), respectively. All but one patients had PPV and SVV < 5%. Volume loading increased CI from 4.9 (2.8 to 6.5) to 5.2 (3.1 to 6.5) l/min/m2 (p=0.23). There were 3 responders to volume loading and the patient with high DPP belonged to them. Neither dynamic (PPV, SVV) nor static (PAOP, CVP) preload parameters were able to distinguish between fluid responders and non-responders. Patients with higher Pes amplitude had higher PPV (r=0.79, p<0.05).

CONCLUSION. In spite of large Pes changes during respiratory cycle, PPV and SSV were low in most of patients. More patients must be evaluated for validation of preload parameters during PSV.

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1004

BLOOD VOLUME ASSESSMENT DURING FLUID LOADING BY ULTRASOUND DILUTION METHOD

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INTRODUCTION. Currently patient's blood volume status is either assessed indirectly by different pressures or by using dilution of thermal bolus, which could be less accurate as heat diffuses out of vascular bed. Ultrasound dilution technology utilizes the decrease in blood ultrasound velocity caused by injecting isotonic saline. Isotonic saline is a non diffusible indicator during its first pass though the cardiopulmonary system. This enables an estimation of Central Blood Volume Index (CBVI, volume in heart and lungs and large vessels divided on body weight) and Total End Diastolic Volume Index (TEDVI, sum of the end-diastolic volumes of the atria and ventricles divided on body weight). The purpose of the study is to investigate the utility of these parameters in the assessment of patient's fluid status.

METHODS. Ten adult ICU patients (9 – bypass surgery; 1 – with implanted Impella Recover LP 5.0 Support System) were investigated. Cardiac index (CI), CBVI and TEDVI were measured by HCP101 (Transonic Systems Inc., USA) before and after one hour from the time of infusing 500 ml of Venofundin (BBraun). A disposable extracorporeal AV loop filled with 3 ml of heparinized saline was connected between an existing radial artery catheter and the PA catheter introducer. Reusable ultrasound sensors were clamped on the arterial and venous limbs of the loop. A peristaltic pump (Nipro, Japan) was used to circulate the blood from the artery to the vein at 8-12 ml/min for 5-7 min. Three measurements were obtained by injecting 20-25 ml isotonic saline. At the end, the system was flushed with heparinized saline until the next measurement session. Arterial pressure, heart rate, right ventricle pressure (RVP), pulmonary artery pressure (PAP) and wedge pressure (WP) were measured using a PA catheter.

RESULTS. A total of 12 paired measurements were obtained (Table 1, Mean ± SD, *- statistically significant difference (P<0.05). Before infusion, a correlation was observed between the wedge pressure and the TEDVI (R^2=0.46) and CBVI (R^2=0.33). After infusion the increase in CI correlated well with the increase in CBVI (R^2=0.50) and also with the TEDVI (R^2=0.41). High negative correlation was observed between the absolute increase in CBVI and its initial level (R^2=-0.51).

Parameter	CI, L/min/m2	CBVI, ml/kg	TEDVI, ml/kg	WP, mm Hg	PAP, mm Hg	RVP, mm Hg
Before	3.1 ± 1.0	16 ± 4.6	8.2 ± 1.9	8.6 ± 3.1	18 ± 5.4	6.7 ± 2.4
After	3.5 ± 0.9	18 ± 3.2	9.2 ± 1.9	12.5 ± 4.1	22 ± 6.0	10 ± 2.4
Change	17 ± 17 %*	15 ± 22%	13 ± 14%*	3.9 ± 3.0*	4.5 ± 3.6*	3.9 ± 1.8*

CONCLUSION. Both CBVI and TEDVI showed reasonable correlation with the initial wedge pressure. TEDVI appeared to be more sensitive to the fluid loading. New ultrasound dilution technology offers a routine way to measure the absolute values of blood volumes. More studies should be done to assess its clinical utility for the ICU patients.

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COMPARISION OF UNCALIBRATED WAVEFORM ANALYSIS CARDIAC OUTPUT (FLO TRAC VIGILEO) WITH ECOCARDIOGRAPHY CARDIAC OUTPUT IN CRITICALLY ILL PATIENTS.

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INTRODUCTION. New device may be used in intensive care to measure Cardiac Output (CO) by arterial pulse pressure waveform analysis , but few studies evaluated the reliability of this method and the correlation with other non invasive methods of CO determination 1. Aim of this study is to evaluate 1- Cardiac Output (CO wave) obtained using Flo Track TM Vigileo. 2 – The correlation with CO obtained by Transthoracic Echocardiography. (CO tte).

METHODS. 15 critical care patients admitted to a General Intensive Care were enrolled in the study. All patients were mechanically ventilated (TV 6-8 ml/Kg Pl press < 30 cmH20) and connected to an integrated monitoring system (Flow Trac TM / Vigileo TM , Ewdards Lifescience ,Irvine ,CA, USA) that attaches to an arterial cannula. After haemodynamic stabilization CO was calculated from an arterial pressure based algorithm that utilises the relationship between pulse pressure and stroke volume , primarily based on the standard deviation of the pulse pressure waveform. At the same time a TTE examination was performed (Hewlett Packard, AGILENT SONOS 5500) and CO tte was calculated by Doppler measurement of Left Ventricular Outflow area (LVOT) and Velocity – time integral. (VTI LVOT), assuming Stroke Volume = CSA * VTI. Every patients had two CO determinations at two time points by TTE during Flow track TM measurement. For each measurement of CO therm corresponding simulataneous CO wave was documenteted. A regression analysis and Bland Altman analysis was used to compare the two methods of CO determination. All data are indexed to BSA.

RESULTS. A total of 30 CO determination was performed in 15 patients. CI Vigileo correlated with Echocardiography with r2 = 0.87 , p< 0,0001. At Table 1 are reported the Bland Altman's results.

TABLE 1.

	BIAS	SD	Limits of agreements	Limits of agreements
CI wave /CI tte	0,36	0,31	-0,26	0,98

CONCLUSION. CO measurements obtained by Flo Track show agreement with CO TTE with minimal bias and good correlation , but comparative studies with invasive methods are warranted.

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1006

THE EFFECTS OF DIFFERENT NOREPINEPHRINE DOSAGES ON GLOBAL HEMODYNAMICS IN PATIENTS WITH CARDIOGENIC SHOCK.

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INTRODUCTION. The achievement of higher mean arterial blood pressure (MAP) may improve splanchnic organs' blood flow in critically ill patients. On the contrary, norepinephrine-induced rise in afterload may worsen myocardial performance. The aim of this study is to assess the effects of various norepinephrine (NE) doses (leading to MAP changes) on global hemodynamics in patients with cardiogenic shock.

METHODS. So far, we evaluated 9 patients (age 32-79 years) in cardiogenic shock (7 pts with acute myocardial infarction, 1 pt with dilated cardiomyopathy, 1 pt with decompensated aortic stenosis). 7 patients were mechanically ventilated. Routine invasive hemodynamic monitoring included arterial and pulmonary arterial thermodilution catheters. All patients required NE before the study. 5 patients were given dobutamine in constant dosages (2-10 ug/kg/min) and 5 patients received levosimendan in previous days. First data set was obtained at MAP 65 mmHg, then the dose of NE was increased during 30 minutes to achieve MAP 85 mmHg (2nd data set). Finally, the dose of NE was tapered during 30 minutes in order to achieve MAP 65 mmHg (3rd data set).

RESULTS. Data (Table 1) are presented as median, 25th and 75th percentiles (Friedman RM-ANOVA).

TABLE 1.

Hemodynamic data

	MAP 65 (1)	MAP 85	MAP 65 (2)	P
NE-dose (ug/kg/min)	0,13 (0,10;0,24)	0,30 (0,21;0,39) *	0,12 (0,12;0,26) **	<0, 005
Heart rate (b.p.m.)	85 (80;101)	90 (84;98)	85 (83;99)	NS
MAP (mmHg)	66 (65;67)	83 (82;84)*	67 (66;68)**	<0, 005
PAOP (mmHg)	19 (18;23)	24 (21;28)*	19 (18;19)**	<0, 05
SVR (dyn*s/cm5*m-2)	2400 (2041;2682)	2793 (2343;3320)*	2391 (2082;2634)**	<0, 01
Stroke volume (ml)	43 (32;52)	44 (32;47)	45 (39;47)	NS
Cardiac index (l/min/m2)	1,9 (1,6;2,3)	2,0 (1,7;2,4)	1,8 (1,8;2,3)	NS
LVSWI (gm/m2/HR)	12 (11;17)	16 (12;20)	14 (12;16)	NS
Cardiac power output (W/m2)	0,29 (0,23;0,34)	0,37 (0,32;0,44)*	0,27 (0,26;0,33)**	<0, 001

*Cardiac power output = MAP*cardiac index*0,0022. *vs. MAP 65 (1) , **vs. MAP 85*

CONCLUSION. These preliminary results suggest that short-term norepinephrine dose uptitration in cardiogenic shock patients may improve overall cardiovascular performance as indicated by the rise of cardiac power output.

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PREDICTORS OF EFFICACY IN CRITICALLY ILL PATIENTS WITH HEART FAILURE TREATED WITH LEVOSIMENDAN

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INTRODUCTION. Acute heart failure (AHF) in critically ill patients admitted to intensive care units (ICU) is usually a complex disease. Multiple co-morbidities, organ system dysfunctions and difficult to treat underlying etiologic mechanisms, such as refractory myocardial ischemia, are frequently present. Levosimendan, with its reported mechanisms of action and no demand for increased myocardial oxygen consumption, promises to be a strong weapon to revert persistent AHF.

METHODS. A prospective registry of all patients treated with levosimendan since its approval in 2004 in an eleven-bed medico-surgical ICU was performed. We present an interim analysis of our data.

RESULTS. Levosimendan was used in twenty seven patients with echocardiographic evidence of systolic myocardial dysfunction and clinical heart failure, according to a locally approved protocol. Mean age was 70.5±9.6 years and mean SAPS II was 54.4±14.2. ICU admission diagnoses were AHF (11 pts), cardiogenic shock (7), acute myocardial infarction - AMI (3) and pneumonia (3). Nineteen patients were mechanically ventilated and nine patients had cardiogenic shock, with a mean SOFA of 8.3±3.4 at levosimendan prescription day. Electrocardiographic ischemia was present in 7 patients. No significant side effects and no infusion protocol violation were reported. Mortality at day 28 and in-hospital mortality were respectively 44% (12 pts) and 51% (14 pts). Factors associated with an increased risk of death were the presence of myocardial ischemia (85% with ischemia vs 30% with no ischemia) and cardiogenic shock (77% with shock vs 27% without shock). Recent myocardial infarction (preceding 7 days) was not associated with raised risk of death.

CONCLUSION. Determining the factors that predict the efficacy of levosimendan in ICU patients with a clinical condition of AHF is essential to define the best use of this expensive drug. Our study suggests that persistent cardiogenic shock and myocardial ischemia were both independently strong predictors of inefficacy. These results suggest that levosimendan could not be viewed as rescue therapy in clinically decompensated heart failure associated with those conditions.

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EFFECT OF OCCUPATIONAL ENVIRONMENT ON BIOCHEMICAL INDICATORS OF STRESS IN CRITICAL CARE NURSES.

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INTRODUCTION. Critical care nurses experience a variety of occupational stresses [1] which can either by physical, psychological or psychosocial in nature. Occupational stress results in professional burn-out in, understaffing, high turnover of staff and low morale. It is commonly acknowledged that occupational stress exerts its effects through innervation of the Sympathoadrenomedullary and Hypothalamo-Pitutiary-Adrenocortical axes, which leads to the synthesis of the catecholamines and glucoccorticoids. Biochemical levels of stress can be assessed by the determination of urinary catecholamines and biogenic amines[2]. The principal aim of this study was to investigate whether neuroendocrine function significantly changes during work within critical care nurses. Neuroendocrine function across the working span can be assessed be timed collection of urine samples.

METHODS. 15 critical care nurses agreed to provide urine samples prior to the commencement of work (in order to determine basal levels), in the middle of the work period and 1 hr post duty in order to determine urinary concentration of noradrenaline, adrenaline, dopamine and serotonin as indicators of neuroendocrine function. Samples were acidified with HCl to prevent oxidation of the biogenic amines. Quantitative determination of catecholamines was by High Performance Liquid Chromatography with ElectroChemical Detection.

RESULTS. Basal levels for all parameters within this study were within the normal range [3]indicating that arriving at work did not produce a profound occupational stress effect. Noradrenaline and Adrenaline levels significantly increased across the working span demonstrating marked neuroendocrine activation in response to occupational stress. Dopamine although not reaching levels of significance, increased across the working span. Serotonin levels signficantly increased across the working span in response to sympathetic stimulation.

TABLE 1.
Urinary Excretion of Catecholamines and Biogenic Amines in Critical Care Nurses.

	Before Shift	During Shift	After Shift
Noradrenaline ng/ml	44.24 ± 4.51	74.34 ±7.63 (p<0.001)	82.4 ± 14.02 (p<0.01)
Adrenaline ng/ml	9.27 ±1.87	22.89 ±3.48 (p<0.001)	19.46 ±3.93 (p<0.01)
Dopamine ng/ml	183.01 ± 27.14	229.58 ± 34.13 (NS)	213.06 ± 33.44
Serotonin ng/ml	147.62 ± 20.17	257.12 ± 53.92 (p<0.05)	298.48 ± 88.86 (p<0.05)

CONCLUSION. Urinary excretion of catecholamines within this study was shown to markedly increase across the working day, within critical care nurses. This highlights a profound occupational stress effect which may ultimately lead to physical, psychological and psychosocial issues. Serotonin levels in addition increased across the working day indicating its possible modulatory role as a competitive inhibitor of the stress response.

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Poster Sessions
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PILOT EXPLORATION OF INTENSIVE CARE NURSES' PERCEPTIONS OF CARING AND ASSOCIATION WITH NURSING PRACTICE ENVIRONMENT

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INTRODUCTION. Caring is viewed as an essential element of professional nursing practice. Measuring nurses' views on care and caring is an indicator of nurses' caring behaviour. This measurement provides a valuable insight into which aspects of caring are important to nurses and effectively reveals the caring value of the nursing care provided. Although there is a vast body of literature discussing caring in nursing, little is related to the intensive care environment. The aim of this study was to gather intensive care nurses' perceptions of caring by asking them to indicate their agreement to statements about their nursing practice as constituting caring. Moreover, we explored potential associations between nurses' views on caring and organizational characteristics of the nurses' practice environment.

METHODS. This was a descriptive correlational study. The study was carried out at 10 ICUs in Athens. 65 ICU nurses were included (response rate 52,8%). The Caring Dimensions Inventory (CDI) and Practice Environment Scale (PES) were employed.

RESULTS. The most important caring dimension considered was monitoring and following up, whilst the least important was establishing a trusting relationship with the patient. In general, nurses considered of high importance the professional and technical dimensions to caring and of minor importance dimensions related to the giving of self and emotional involvement. A significant correlation was detected between the overall indexes of CDI and PES (p=0,006), suggesting that the better the nurses viewed the practice environment conditions, the higher they scored on the Likert agreement scale about the importance of various caring dimensions. Especially, the psychosocial caring dimension (p=0,007) and the dimension of appropriate self giving (p=0,000), were considered as important, by the nurses who had an overall positive perception of the work environment.

CONCLUSION. These results are preliminary and require further investigation. Nonetheless, they suggest that ICU nurses tend to pay more attention to technical and professional, rather than psychosocial aspects of care. Moreover, they provide initial evidence for an association between organizational characteristics of the nursing practice environment and nurses caring attitudes.

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STRESS IN INTENSIVE CARE NURSES: PERCEIEVED LEVELS OF STRESS AND ITS IMPACT ON ROLE FUNCTION

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INTRODUCTION. Intensive care is an area in which many aspects of nursing and health care become crystallised. This is equally true of the impending nurse shortage with many analysts listing specialist areas such as intensive care at dire risk due to problems in retaining staff and a comparative rarity of experienced nurses. Any investigations into factors affecting nurse recruitment and attrition place burnout and stress high on the agenda. Previous studies have shown that a nurse's perception of stress is more influential, with respect to the effect of stress, than any individual stressor. The aim of this study was to examine how nurses identify that they are stressed and how they perceived that stress to affect their performance.

METHODS. A questionnaire incorporating the 10-point Perceived Stress Scale (PSS) was distributed in two intensive care units in Melbourne, Australia. One hundred and sixteen questionnaires were returned (response rate of 62% and 31% in the two units). Three focus group interviews were conducted with nurses across the two units with a broad cross section of experience and responsibilities. Participants were asked to describe how they recognise they are stressed, how they recognise that stress is affecting their performance and whether they believe it is possible to identify these factors in others.

RESULTS. The overall PSS scores show that 47% of respondents have mild to moderate levels of stress. It could be tempting to underplay the level of perceived stress from these results. However when coupled with the results of the focus groups the realisation that approximately half of the nurses surveyed are operating under mild to moderate stress is of quite some concern. Common themes evident in the focus group findings include the loss of compassion, an inability to prioritise, attention to the "basics", and therefore not attending to broader issues. Participants described wanting to flee the bedside, becoming sensitive to the noise of the unit with particular sensitivity to alarms, and wanting to withdraw into their own space as signs that they are stressed. This puts patients at risk and marginalises families. Participants also described noticing a lack of organisation, a loss of patience and less than professional conduct when dealing with colleagues, patients and their families in nurses they believed were stressed.

CONCLUSION. This presentation gives voice to the experiences of intensive care nurses when they find themselves stressed. Perceived stress impacts on performance and the likelihood of nurses remaining in intensive care. This study also shows a correlation between stress and patient care. Many studies into nurse retention cite an inability to provide high-level care as a catalyst for leaving. If the impending nurse shortage with potentially catastrophic consequences for specialist areas such as intensive care is to be addressed then this is an important area for consideration.

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LIVER TRANSPLANTS: DO THEY INCREASE THE NURSING WORK LOAD?

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INTRODUCTION. Liver transplant patients usually need a ratio nurse: patients – 1:1, because of the amount of work usually spent with these patients.
Objectives: estimate the time spent on nursing activities, with liver transplant patients admitted to an ICU.

METHODS. We conducted a prospective study, in a polyvalent ICU, during 6 months. Variables included for analysis were: demographic, diagnosis, severity scores at entrance and we use the Therapeutic Intervention Scoring System – 28 (TISS-28) to estimate the time spent on nursing activities with liver transplant patients and we compare the results with others type of admission. We collect TISS 28 during the first four days of admission in all patients. Nurses activities were inventoried for 6 types of admission: Neurosurgical, Medical patients, Schedule surgery, Unscheduled surgery, Trauma and Liver transplant.

RESULTS. We enrolled 211 patients and we collected 741 days records of TISS 28. Age: 53,81±17,77(53); SAPS: 28,15±14,35(26); SOFA: 6,89±4.05(6).

TABLE 1.

TISS 28 / AGE / TYPE OF ADMISSION

N: 211	Age	Tiss 28
Neurosurgical (50)	57,62 ± 15,62 (58,5)	26,61± 4,81 (25)
Medical Patients (38)	63,68 ± 16,24 (67,5)	28,23 ± 4,86 (28)
Schedule surgery (45)	60,11 ± 14,12 (62)	28,51 ± 6,73 (28)
Unscheduled Surgery (25)	40,8 ± 19,49 (39)	31,12 ± 4,41 (31)
Trauma (12)	55,58 ± 17,62 (58)	33,41 ± 7,62 (34)
Liver Transplant (41)	40,53 ± 11,81 (39)	40,34 ± 7,06 (39)

CONCLUSION. Ours results shows that liver transplant patients needs during the first four days in UCI of a ratio nurse: patients – 1:1 as we usually have.

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NURSES AND SEPSIS: THE ROAD AHEAD!

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INTRODUCTION. Severe sepsis and septic shock are among the most frequent causes of morbidity, mortality and in-hospital resources consumption. SEPSIS24 is an initiative aimed to improve diagnosis and treatment of severe sepsis in accordance to SSC; it is leaded by physicians and nurses from the Department of Internal Medicine and Intensive Care Medicine of a brand-new, 280-bed general hospital. It comprises a computer-based workflow (using SOARIAN® from Siemens); internet-based information; an educative program with widespread courses; and 12-quality items evaluation.

METHODS. As a starting point, non-ICU nurses (which came from several health institutions, thus representing a heterogeneous sample) were asked to answer an anonymous questioner in order to evaluate their self-perceptions on sepsis diagnosis and treatment.

RESULTS. 59 nurses answered the questioner. Most (88%) do ignore the existence of SSC. Self-perceived knowledge on sepsis is mainly "moderate" (51%) or "poor" (49%). In their previous practice, "delayed diagnosis" is present in the approach of most septic patients (61%) and "lack of awareness on sepsis" by physicians (39%) and nurses (20%) is reported as the main cause of inadequate approach of septic patients. Almost all (98%) answered that SEPSIS24 initiative is "very important".

CONCLUSION. In our sample, Surviving Sepsis Campaign is still unknown to the majority of nurses; delayed diagnosis is perceived to be present in the approach of most cases of severe sepsis or septic shock; nurses' awareness on sepsis is felt to be poor; nurses are quite receptive to initiatives aimed to improve their skills on sepsis. Local initiatives in order to improve diagnosis and treatment of septic patients are essential and nurses should always be present.

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RADIAL ARTERY CANNULATION WITH DOPPLER ULTRASOUND GUIDANCE USING THE SELDINGER TECNIQUE

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INTRODUCTION. The technological advances introduce new fields in nursing. Evidence supports the use of ultrasound devices for central venous catheterization, and our good experience in peripherally inserted central venous catheters (PICC) with ultrasound guidance encouraged us to study its use in radial artery catheterization. Our aim was to compare conventional blind technique with Doppler ultrasound guidance one.

METHODS. In this randomised study, 142 critical care patients who underwent radial artery cannulation (Artery catheter Arrow 20G, Ø 0'11cm with Seldinger technique) were divided in two groups A and B. In A group radial artery was cannulated with palpation method, and ulnar collateral flow was assured with a modified Allen test. In group B radial artery was cannulated with ultrasound guidance (SonoSite iLook 25), and ulnar collateral flow was assured with Doppler ultrasonography.

RESULTS. In A group occurred the following errors: 8 No cannulation after finding, 3 Vein cannulation, 7 No Artery finding. In group B occurred the following errors:2 No cannulation after finding, 1 Vein cannulation, 0 No Artery finding.

TABLE 1.

Results

	Patients	Place Wrist	Place Forearm	Fails	Problems At 10 days	Diameter cm	Diameter cm	Diameter cm
Group A	75	75	0	18	21			
%	100	100	0	24	28			
Group B	67	5	62	3	8	0'39	0'20	0'28
%	100	7'4	92'6	4'4	11'9			

CONCLUSION. 1) The doppler ultrasonography reduces cannulation fails from 24% to a 4'4%. 2) With the ultrasound guidance it is possible to cannulate the artery in the whole forearm, reducing the long term problems avoiding the wrist flexion. 3) Ultrasound technique has better results in edematous, obese or several punctured patients. 4) The results of the technique depend on the ultrasonographic knowledge of the professional. 5) It is compulsory continuous training in ultrasonography for those professional who catheterize veins or arteries.

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ENTERAL NUTRITION IN THE ICU

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INTRODUCTION. Monitorization of enteral nutrition (EN) in the Intensive Care Unit (ICU) is fundamental and complimentary to other therapeutical strategies Adequate nutritional support contribute to the reduction in morbidity related with malnutrition, reduces hospital stay, reduces the hypermetabolic state and optimises cellular functions. Concerning this issue, we evaluated the tolerance to EN according to the ICU protocol and analysed the results obtained.

METHODS. Retrospective study of 22 patients admitted at the ICU (N=109), from June to September of 2006, with EN medically prescribed and with ICU stay over 48 hours. We performed a quantitative approach for organization and analysis of the data obtained from the clinical files.

RESULTS. Of the 22 patients, 52,3% were female and 47,6% were male, with mean age of 68 years and mean hospital stay of 12,04 days. Regarding admission diagnosis: respiratory (47,6%), cardiovascular (28,6%), surgical (9,5%), and others (14,3%). A majority of patients (80,9%) initiated early EN, (between the 2nd and 5th day) and a gradual increase in EN volume between 3rd and 4th day. Concerning the recently established EN protocol 27,4% of patients fulfilled the protocol, regarding volume prescribed, schedule and nocturnal pause. EN interruption coincided with temporary and specific situations: intolerance (12,9%), invasive techniques and diagnostic exams (37,1%), clinical instability (46,8%) and insufficient material resources (3,2%).

CONCLUSION. Early EN in the ICU, in the first 24 to 48 hours, and simultaneous application of a well planned protocol will minimize the risks of malnutrition and intolerance feed in critically ill patients. This study resulted in the readjustment of the EN protocol by a multidisciplinary EN working group concerned in improvement of the nutritional status of patients.

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FAMILIES' RECEPTION AND VISITING POLICIES IN THE INTENSIVE CARE UNIT: A MULTICENTRE PROSPECTIVE STUDY

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INTRODUCTION. Admission in an intensive care unit (ICU) is a major cause of psychological stress for the patient and his entire family. However, data concerning the reception of the patients' relatives and visiting policies in ICUs are scarce. The aim of the study was to evaluate the visiting policies of Flemish ICUs.

METHODS. A questionnaire was sent to all ICUs of Flanders (Belgium) in November 2006. The study included adult medical, surgical, or mixed ICUs and units for severely burned patients from either private, community, public, or teaching hospitals. Paediatric ICUs, coronary care units, and mid-care units were excluded. Participation to the study was voluntary. The questionnaire enclosed questions concerning; 1) time, number, and lengths of visits; 2) number, age, and type of visitors allowed at one time; 3) use and description of hospital gowning procedures; 4) use of a waiting area; 5) organization of meetings with relatives, information provided via telephone; and 6) use and description of an information leaflet.

RESULTS. Fifty-seven ICUs completed the questionnaire (75.0%). All (100%) report restricted visiting-hour policies and limited numbers of visitors. Mean total daily visiting time was 69±33 minutes. The type of visitors is restricted to only immediate relatives in 11 (19.3%). Children are not allowed in 5 (8.8%), and 46 (80.7%) fixed an age limit for visiting. Only 3 (5.3%) imposes a gowning procedure on visitors. Thirty (52.6%) are providing families with information in a special room in addition to the waiting room, whereas 6 (10.5%) report to have no waiting room available, and 9 (15.8%) provide an information leaflet. A structured first family meeting at time of admission is organized in 42 (73.7%). A final family meeting at ICU discharge is planned in only 16 (28.1%) centres, respectively.

CONCLUSION. Participating ICUs homogeneously report to have restricted visiting policies regarding visiting hours, type, and number of visitors. Reception of the patients' family can not be captured in some quantitative determinants, but depends on many other factors such as contracting for visitation, and the way information is given. These results may be a first step towards a more patient-centred approach, and a change in mentality in ICU-practice.

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COMBINING THERAPEUTIC COUNSELLING IN THE NURSING-LED OUTREACH OF INTENSIVE CARE PATIENTS

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INTRODUCTION. The diversity of acquired psycho-emotional problems as a result of critical illness and an intensive care stay is well documented[1] It is believed that these problems severely inhibit a full recovery and influence the patient's quality of life [2] Therefore a prospective therapeutic counselling inventory project was set up as part of the IC nurse-led outreach to general wards in a 855-bed teaching hospital. The main goals were to assess the incidence of psycho-emotional needs and to help patients work through the effects of their stay on IC. A further goal was to use the information gathered from patients to improve care on IC.

METHODS. For 2yr patients from the 12-bed IC who were ventilated for more than 10 days were offered counselling by an IC nurse/counsellor (BACP) for 6 sessions of 50 min. one per week. The counselling approach was Person-Centred. All sessions were supervised by a certified counselling supervisor and intensivist.

RESULTS. Of those patients who fulfilled the inclusion criteria (N= 141, N= 94 survived) only 22 were offered counselling because of time constraints. The more the counselling became known, requests for counselling increased and patient not fulfilling the 10-days criterium were included. Patient characteristics were age 63±9 yrs, sex 11M, 41% surgical patients, APACHE 15±8, mean LOS 21 ± 15 days, mean days on the ventilator 17±12. In total the number of counselling sessions was 171; 3-15 sessions per patient of 15 to 50 minutes depending on the patients energy level. All patients showed a need to talk about their IC experiences and especially to try and understand their altered physical and psycho-emotional self-images. Spontaneously they all mentioned to experience a lot of support from the counseling sessions. Stress was a factor for all patients, grief was a major issue for 9 patients, the loss of time for 3 and for 4 others preparing for death. Five patients had symptoms of post traumatic stress. Problems encountered were more complex than expected. Patients were encouraged to give information about aspects of IC. This was fed back to colleagues on the ICU.

CONCLUSION. 1. All patients in this study needed counselling and expressed having benefited from it. 2. The psycho-emotional problems encountered were more intense and complex than expected. 3. The psychological and emotional care of IC patients needs to come in line with the physical and technological IC treatment. There are indications in literature that integrating counselling into the care of IC patients in their pre, peri and post ICU care could help shorten hospital stay and improve rehabilitation (3,4).

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STAFF SATISFACTION OF A CRITICAL CARE OUTREACH TEAM

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INTRODUCTION. Following recommendations in the Department of Heath paper Comprehensive Critical Care (2000) (1), critical care outreach teams (CCOT) have been introduced in hospitals throughout England and Wales. However, the quality of evidence to support these teams is limited with mainly level 2 evidence available. Despite this, there is continued support for outreach teams from the government (2).
Due to the lack of supportive evidence for CCOT we decided to investigate staff perceptions of the impact of CCOT six years after its introduction.

METHODS. A questionnaire was sent to the main user groups of the outreach service in a large inner city teaching hospital. These were medics, nursing staff and physiotherapists with a total number of 685. Questions were asked about:the need to contact CCOT,opinions of modified early warning scores (MEWS), opinions on the benefits of CCOT, has the introduction of CCOT increased workload, does CCOT ease relocation stress, the ALERT course and any suggestions for improvements to the service.

RESULTS. Overall there was a 42% response rate. Over 75% of respondents had needed to contact CCOT, mainly for patient review or advice. However 10 (3.5%) respondents reported contacting CCOT because they were unable to contact the patient's own team. Over 90% felt MEWS helped identify critically ill patients but 16% felt the introduction of the scoring system had lead to an increase in workload, all be it a needful one. Over 90% felt that CCOT benefited both staff and patients but 18% reported an increase in their workload along with this. 80% felt that CCOT review helped ease relocation stress for patients, families and staff. 43% had attended an ALERT course with 98% reporting it helped them manage a critically ill patient.

CONCLUSION. Although there is a lack of strong evidence to support CCOT, the results of this questionnaire would suggest those using the service have found it has helped to improve the care of critically ill patients outside the intensive care environment.

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SUCCESSFUL IMPLEMENTATION OF ENTERAL FEEDING PROTOCOL IN A CLOSED ICU MODEL IS UNRELATED TO ICU NURSES' LEVEL OF RELEVANT THEORETICAL KNOWLEDGE

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INTRODUCTION. Effective and sensible clinical nutrition practice is crucial in critically ill patients and may influence outcome. This entails involvement of various professionals such as doctors, clinical dietitians, pharmacists and -particularly- intensive care nurses. Quality improvement interventions include development of clinical protocols, theoretical and on-site training. All methods are expensive and time-consuming, the most effective combination still being disputable.

METHODS. We tried to implement an enteral feeding protocol in a 17 beds, multidisciplinary, closed ICU model using 2 clinical dietitians and a nurse educator as moderators to train 73 nurses (38 of them < 1 year post-graduation). Emphasis was put on bedside training (1 month), theoretical lessons being deferred to a later stage. We compared their current theoretical knowledge (closed-type ICU model) to a similar group one year ago (open-type ICU model) using the same 22 closed-type questions survey. Level of theoretical knowledge was assessed using cumulative score. We also assessed clinical protocol implementation by performing 6 ICU snapshots (24hrs chart reviewing) during 3 weeks period.

RESULTS. Cumulative score for theoretical knowledge was not different between the 2 surveys (2006: Q no 56, mean score 11.7±3.1 out of 21.5 VS 2007: Q no 52, mean score 10.9±5.6 out of 21.5). During the snapshots 60 patient-cases of enteral nutrition protocol implementation were assessed. In 92% of cases protocol was fully implemented according to written guidelines. In a percentage of cases (23%) documentation of gastric residuals was incomplete.

CONCLUSION. Enteral nutrition clinical protocol was successfully implemented (though some aspects need improvement) despite absence of theoretical knowledge improvement. This encourages further research focusing at new, time-saving quality improvement interventions. Theoretical teaching could follow practical on-site training when circumstances demand rapid sequence implementation.

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DOES PHYSIOTHERAPY LED EARLY MOBILISATION AFFECT LENGTH OF STAY ON ICU

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INTRODUCTION. The negative effects of mechanical ventilation and the associated bed rest are well documented. Muscle wasting and weakness are prominent, which may take months to recover and are more likely with prolonged ICU stays and longer hours of ventilation [1]. To counteract these effects there has been an increasing move towards early rehabilitation on ICU. This study aimed to determine the effect of early mobilisation on length of stay on ICU.

METHODS. The study was carried out on 65 patients admitted to ICU for >24 hours over a three month period. Physiotherapists documented patients' rehabilitation status daily, allowing identification of when patients began mobilisation, defined as sitting on the edge of the bed or out in a chair. A target of day 5 was agreed locally, for those not mobilised by this point limiting factors were identified via a retrospective analysis of the patients' notes. Data were analysed using Wilcoxon Signed Ranks Test.

RESULTS. No differences were identified between the three groups analysed in terms of age or APACHE scores(see Table 1). 26% of patients were mobilised by day 5 on ICU and had a median length of stay of 4 days. Patients who met the criteria for mobilisation but were not mobilised had a significantly increased length of stay with a median of 9 days ($p< 0.001$), whilst those who did not meet the criteria for mobilisation had a median length of stay of 16.5 days.

TABLE 1.

	N	Age	APACHE II	APACHE Pred. Mortality
Mobilised on or before day 5	17	55.5	15.6	27.7
Met criteria but not mobilised	14	56.6	17.9	27.5
Not appropriate to mobilise	34	57	16.2	25.4
All Subjects	65	56.5	16.5	26.4

TABLE 2.

Length of stay on ICU median (Interquartile range)

	Met standard for Mobilisation	Did not meet standard for mobilisation
Mobilsed on or before Day 5	4 (3-6)	
Not mobilised by Day 5	9 (5.5-19.25)	16.5 (9.5-26.5)
P	<0.001	

CONCLUSION. Early mobilisation can significantly decrease length of stay on ICU, although adequate staffing is required in order to maximise the effectiveness of these interventions.

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ELECTRICAL MUSCLE STIMULATION HAS A SYSTEMIC EFFECT ON THE MICROCIRCULATION OF ICU PATIENTS

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INTRODUCTION. Recent studies have shown that electrical muscle stimulation (EMS) may be an alternative to active exercise in COPD and CHF patients with myopathy. A common finding in ICU patients is critical illness polyneuromyopathy (CIPNM). The role of EMS for the prevention of CIPNM in ICU patients has not been studied yet. The aim of our study was to assess the acute effect of EMS of lower extremities on the thenar muscle microcirculation in ICU patients using Near Infrared Spectroscopy (NIRS).

METHODS. Eleven ICU patients (?6/?5),(age:56±18years)(APACHE admission score:15±6)(SOFA admission score 7±2),10 patients on mechanical ventilation (6 pts at VC mode/ 3 pts at PS/1 patient at T-piece) and 1 patient on venturi mask, underwent a 45-min session of EMS of vastus lateralis, vastus medialis and peroneus longus muscles of both lower extremities. The stimulator delivered biphasic, symmetric impulses of 45 Hz, 230μsec pulse duration ,12 sec on and 6 sec off and an intensity of 40-80mA able to cause visible contractions. Systolic blood pressure(SBP) and heart rate(HR) were measured before and after each session in all patients. In eight patients arterial and central venous blood samples were retrieved before and after the session. Routine laboratory parameters were also recorded. Tissue oxygen saturation (StO2%) was assessed with NIRS at the thenar muscle before, during and after 3 min occlusion of the brachial artery before the beginning and after the completion of the EMS session.

RESULTS. StO2% did not differ significantly before and after the EMS session (88±7%vs.89±9%). Oxygen consumption rate (%/min) during occlusion of the brachial artery differed significantly before the beginning and at the end of the session(19±6%/min vs.23±7%/min,p=0.004). Reperfusion rate (%/min) differed significantly before the beggining and at the end of the session (305±123%/min vs.378±139%/min, p=0.007). SBP and HR increased significantly at the end of the session (92bpm±16 vs 97bpm±15 p=0.002 and 135mmHg±23 vs 140±22mmHg, p=0.02 respectively).

CONCLUSION. The data presented suggest that EMS may have a systemic effect on microcirculation. These results may encourage further studies to explore the potential use of EMS as a possible preventive and rehabilitation tool in ICU patients with CIPNM.

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EVALUATION OF MOTOR PHYSICAL THERAPY IN INTRA-ABDOMINAL PRESSURE

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INTRODUCTION. A number of different factors such as advances in the surgical techniques in abdominal surgeries, the great number of automobilistic accidents and the increase of wounds due to firearms and edged weapons contribute to the higher incidence of patients with elevated intra-abdominal pressure (IAP). Elevated intra-abadominal pressure might have a negative impact with temporary or lasting side-effects on different organs and systems. Motor physical therapy has an important role in the rehabilitation of ICU patients, also the total amount of time the patient is restricted to bed is another factor that should be taken into account. Physical therapy stimulates early ambulation, benefits both the muscular and cardiorespiratory systems and increases psychosocial integration. In addition, pre and post-operatory rest result in neuro-humoral dysfunction, skeletal mescle atrophy due to insufficient perfusion and malnutrition, all of which explain the reduction of physical capacity. The aim os this study was to evaluate the repercussion of motor physical therapy of the lower limbs in the intra-abdominal pressure.

METHODS. Our study was conducted in the ICUs of the Hospital Vita Curitiba and Hospital do Trabalhador, both located in the city of Curitiba, PR, Brazil. Patiente included in the study were those who required monitorization of intra-abdominal pressure. Data collection was abotained through a data sheet with all the pertinent variables (IAP, MAP, CF, pulse oximetry) and the time interval that should be followed. Four different tretment protocols were compared: hip flexion, elevation of headrest, triple flexion and prevention of deep-vein thrombosis. Statistical analysis was performed with the aid of Praimer software.

RESULTS. We evaluated 30 patients, 23 were male and 7 female. Mean age at admission was 44.4 years, ranging from 21 to 76. Off all patients, 80% were using mechanical ventilation, mean APACHE index was 8.43, RAMSAY 5.30 and Glasgow 6.43. In this group 23.33% eventualy died. Statistical analysis showed no significant differences prior, during or after institution of motor physical therapy. Only the avlues of IAP in the protocol of elevation of headrest at 0º and at 75º showed significat differences ($p<0,05$). All the remaning results were statistically non-significant.

CONCLUSION. Our results showed that there were no significant changes in IAP and hemodinamical variables, thus proving that physical exercises perfomed in theses patients have no deleterious effects. Conversely, IAP values only increased when headrest was elevated at a 75º, suggesting that one should be more cautions when sitting poatients with elevated intra-abdominal pressure.

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EARLY PHYSICAL ACTIVITY IN PATIENTS UNDERGOING MECHANICAL VENTILATION IN ICU

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INTRODUCTION. The goal of this study is to describe our practice in rehabilitating patients on invasive mechanical ventilation in our ICU.

METHODS. Our program aims to actively mobilize ICU patients out of their bed for physical activities as chair-sitting for 1 to 2 hours once or twice a day, tilting-up for 45 minutes on a table with or without arms supported, walking in the corridor for 15 minutes. Patients are eligible if > 18 years, invasive mechanical ventilation and ICU stay > 7 days. Patients are not eligible if sedation, agitation, confusion, shock or respiratory distress, renal replacement therapy, scheduled extubation. The program is indicated by the physician in charge and performed by the physiotherapist on a daily basis. Anthropometric characteristics of the patients, duration of mechanical ventilation before program onset, physiologic data before and after a rehabilitation session and adverse events were prospectively gathered during this prospective study.

RESULTS. Over 5 months, 225 patients were admitted and 22 patients included, among them 20 (13 men), mean±SD age 62±15 years, body mass index 27±5 were analyzed. The duration of ICU stay amounted to 531 days for the whole. A contra-indication to the program was present in 230 days: sedation (n=78 days), shock (59), renal support (48), transfer out of ICU for a procedure (17), acute respiratory distress (11), scheduled extubation (9), cognitive alteration (8). Among the 424 rehabilitation acts performed (1.4 per day), 270 were analysed. The duration of invasive mechanical ventilation and the time from ICU admission to rehabilitation onset averaged 7±8 days. Moving patients to a chair was the most frequent rehabilitation procedure (n=144, 53%) followed by tilting-up arms supported (67), walking (37) and tilting-up arms unsupported (22). 31% of interventions (n=83) were performed during invasive mechanical ventilation. During chair-sitting, heart and respiratory rates significantly declined (105±18 vs 102±17 and 26±7 vs 25±7 min-1, respectively, $p<0.05$) and SpO2 significantly increased (95.9±3 vs 96.4±3%, p=0.02). Tilting-up arms unsupported, arms supported and walking were associated with significant increase of heart rate (102±10 vs 117±17, 97±13 vs 110±17, 97±13 vs 104±18 min-1 $p<0.001$) and respiratory rate (26±5 vs 29±7, 23±7 vs 28±8, 23±6 vs 29±8 min-1, $p<0.01$) and significant reduction in SpO2 (98±2 vs 97±2, 97±3 vs 96±3, 97±3 vs 96±3%, p=0.02, 0.004 et 0.001, respectively). An adverse event was observed in 13 cases: loss of muscular tone (n=7), hypoxemia (4), unscheduled extubation (1) and orthostatic arterial hypotension (1).

CONCLUSION. Present rehabilitation program was safely applied to ICU patients once stabilization of their acute episode was reached. Further studies are required to test whether such approach may improve patient with chronic respiratory failure.

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THE EFFECT OF A PHYSIOTHERAPY LED EXERCISE-BASED REHABILITATION PROGRAMME FOR INTENSIVE CARE SURVIVORS.

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INTRODUCTION. The severe physical and psychological effects of critical illness may take months or even years to recover. A RCT using self directed rehabilitation manuals demonstrated improvement in physical recovery (1). The aim of this study was to evaluate the effectiveness of a physiotherapist led, structured rehabilitation programme for patients following discharge from critical care.

METHODS. We recruited 30 ICU survivors admitted for >48h and discharged home to our established physiotherapy led rehabilitation programme. Patients attended for a six week course of exercise and education aimed at improving both physical and psychological function. Outcome measures used were the 6 minute walk test (6MWT)(2) and the incremental shuttle walk test (ISWT)(3) for physical function. To assess psychological status the hospital anxiety and depression score was used. Data were analysed using Wilcoxon Signed Ranks Test.

RESULTS. All patients who attended the post ICU rehabilitation programme showed a significant improvement in both walking tests and depression and anxiety scores (see Table 1). A median increase of 140m (44%) was seen for the six minute walk test and an increase of 150m (75%) for the incremental shuttle walk test. 21/30 subjects also demonstrated a decrease in both anxiety and depression scores on the HADS scale, 13 (43%) of which moved out of significant to normal levels.

TABLE 1.

	6MWT m	ISWT m	Depession	Anxiety
Before	317.5 (232-378)	200 (120-280)	6 (5-9)	7.5 (5-10.75)
After	457.5 (402-510)	350 (270-540)	3.5 (2-6)	6 (3.25-8)
P	<0.001	<0.001	<0.001	<0.005

CONCLUSION. We have shown a 6 week physiotherapy led rehabilitation programme is associated with improved physical and psychological function following critical illness.

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PHYSICAL THERAPY REQUIREMENTS OF BARIATRIC PATIENTS

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INTRODUCTION. Postural deviations in obese subjects may contribute to adverse effects on bones and joints. In this sense, they may interfere with surgical outcome and long-term quality of life. The purpose of this study was to investigate the main abnormalities found in a homogeneous group of preoperative bariatric subjects.

METHODS. Patients were stratified as Group 1, bariatric candidates (n=15; 80% females; age 50.0 ± 14.2 years; BMI 42.5 ± 8.2 Kg/m2) and Group 2, non-obese adults (n=15; 93.3% females; age 32.6 ± 18.5 years; BMI 21.3 ± 1.6 Kg/m2). Posture was analyzed by means of a Symmetrograph (wall grid), which permits the exact assessment of lines and angles of body architecture. Variables included anterior, lateral and posterior angular deviation from the vertical body axis at the head, shoulders, Thales triangle (torso), spine, pelvis, knees, ankles and feet.

RESULTS. A significant adverse effect of obesity (P< 0.05) on posture involving all major skeletal compartments was demonstrated. Main aberrations were flat foot, valgus ankle, genu valgum and hyperextension of the knees, pelvic anteversion and antepulsion, protuberant abdomen and head tilt.

CONCLUSION. 1) Bariatric candidates routinely deviated their axis of gravity to compensate for excessive load, thus generating bone and joint stress and deformity ; 2) Evaluation and management of this population by a multidisciplinary team including a physical therapist is recommended.

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Poster Sessions
Perioperative metabolic control 1025-1032

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EVALUATION OF THE SUBCUTANEOUS ROUTE FOR GLUCOSE MONITORING IN PATIENTS UNDERGOING DEEP HYPOTHERMIA

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INTRODUCTION. Tight glycaemic control improves outcome in critically ill patients but requires frequent glucose measurements. Subcutaneous adipose tissue (SAT) has been characterized as promising for glucose monitoring in diabetics, but it remains unknown whether it can also be used as an alternative site in critically ill patients. In our previous study [1] we demonstrated that in cardiac surgery patients arterial blood glucose (BG) fluctuations are well described using interstitial fluid glucose measurements from SAT. The present study was performed to evaluate the correlation of glucose in SAT compared with BG in patients undergoing pulmonary endarterectomy (PEA) with deep hypothermia.

METHODS. 20 patients undergoing peroperative deep hypothermia during PEA were investigated for 24 hours. Arterial blood and SAT microdialysis samples from umbilical and upper thoracic adipose tissues were taken hourly. The glucose concentration in dialysate was calibrated using two-step approach, first using ionic reference technique to calculate the SAT glucose concentration (SATg) and second using a one-point calibration procedure to obtain a glucose profile comparable to SAT-derived blood glucose (BgSAT).

RESULTS. The correlation between BgSAT and arterial blood glucose (BG) was found with mean 0.74±0.17 (p<0.01) for upper thoracic and 0.74±0.23 (p<0.01) for umbilical region, respectively.

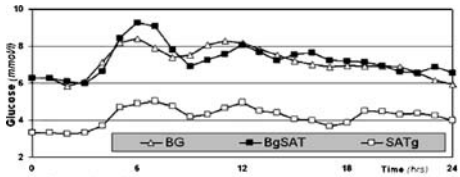

Fig 1: Correlation of blood (BG) and interstitial glucose levels (BgSAT. SATg)

CONCLUSION. The results indicate good correlation between SAT and BG even in patients with extreme hypothermia. Our data suggests that with minor limitations, glucose from SAT can be used to establish tight glycaemic control in critically ill patients.

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LACTATE CONCENTRATION AND THEIR METABOLISM AFTER HEART SURGERY

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INTRODUCTION. Lactate concentrations and their clearance can be used to estimate disease severity in the ICU. We evaluated lactate levels and their metabolism in patients undergoing cardiac surgery.

METHODS. An observational, retrospective study in 165 pts undergoing elective cardiac surgery (CABG) using CPB. Data included age, CPB time, duration of ventilation, lactate levels on admission and on 4, 8, 12 hours after admission in ICU. Lactate clearance was defined as the percent change in lactate from 0 to 4 hour, 4 to 8 hour and from 8 to 12 hour. A negative value denotes an increase in lactate. SPSS was used for statistical analysis.

RESULTS. We studied 165 pts aged years. 4 pts died from circulatory failure. Using Pearson correlation we observed a good correlation between CPB time and lactate levels on 4, 8 and 12 hours after admission (p<0,01). There weren't significant difference in lactate levels between pts with SIRS (46) and no SIRS(119). Conversely, in 76 pts who required increased doses of inotropes because of circulatory failure, we observed statistically significant higher lactates on 4, 8 and 12 hour: 3,9±2,2 vs 6,9± 4,9 mmol/L (p< 0,001), 3,7±2,1 vs 5,6±4,7 (p=0,002) and 2,6±1,7 vs 3,7±3,4 (p=0,02) respectively. There were also a higher change in lactates from 0 to 4 hour and a decay in their metabolism from 4 to 8 hour. Lac. clearance: -25,14±43 vs -36,4±49% and 2,8±31 vs 1,5±31% respectively. In 83 pts with ventilation >8 h. we observed higher lactates on 4, 8 and 12 hour: 3,9±2,2 vs 5,5±3,8 (p<0,005), 3,5±1,9 vs 5,3±3,6 (p<0,01) and 2,3±1,4 vs 4,01±3,3 (p=0,03) respectively. There were also a higher change in lactates from 0 to 4h and a decay in their decrease from 4 to 8 hour, Lac. clearance: -27,8±47 vs -32,9±44% and 6,5±31 vs -1,9±30% respectively.

CONCLUSION. Hyperlactatemia in early postoperative period was mainly related to increased lactate production after cardiac surgery. The CPB procedure for CABG change the lactate metabolism and a decreased utilization may contribute to hyperlactatemia. Lactate concentration and its clearance in early postoperative period may be used to estimate the duration of ventilation and stay in ICU and the outcome.

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RELATIONSHIP BETWEEN HYPERLACTATAEMIA AND HYPERCYTOKINAEMIA AFTER CARDIOPULMONARY BYPASS — PRELIMINARY REPORT

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INTRODUCTION. The morbidity and mortality after cardiac surgery using cardiopulmonary bypass (CPB) is related to both hyperlactataemia and hypercytokinaemia. The surgery involving CPB apparatus is widely known to be associated with increased pro-inflammatory mediators, i.e. TNF-alpha and IL-6, and it can lead to postoperative multiorgan dysfunction. A study[1] reported that hyperlactataemia over the threshold of 3 mmol/L at ICU admission after cardiac surgery suggests a population at risk of morbidity and mortality. However, the mechanism between high blood lactate levels and postoperative complications are not yet known. Therefore, we hypothesized that there might be a relationship between hyperlactataemia and hypercytokinaemia induced after CPB.

METHODS. Levels of TNF-alpha and IL-6 were measured in a) Time 1; before initiation of CPB, b) Time 2; 30 min of CPB, c) Time 3; 30 min after CPB, d) Time 4; 2hr after CPB, and e) Time 5; 24hr after CPB by ELISA. Levels of lactate was measured at a) Time A; before initiation of CPB, b) Time B; 2hr after CPB. Postoperative ICU stay and total intubation time till postoperative extubation were evaluated as postoperative morbidity scale.

RESULTS. There were no statistical differences between group A (n = 26, serum lactate level over or equal to 3 mmol/L) and group B (n = 37, serum lactate level under 3 mmol/L) in demographic data, preoperative left ventricular ejection fraction, CPB time, and aortic cross-clamp time. There was statistically significant difference in ICU stay, total intubation time, and oxygen index at ICU arrival, between the two groups($p<0.05$). Levels of IL-6 in group A were higher than group B in time point 5, with statistical difference ($p = 0.0469$).

CONCLUSION. Our results suggest that hyperlactataemia after weaning from CPB may be related to hypercytokinaemia(IL-6 in particular), and therefore to postoperative morbidity.

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PROGNOSTIC IMPLICATIONS OF LACTATE, BILIRUBIN AND ETIOLOGY IN GERMAN PATIENTS WITH ACUTE LIVER FAILURE

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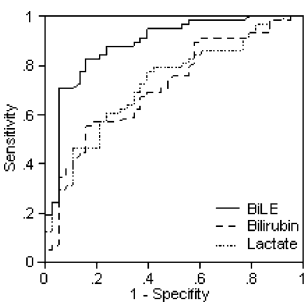
INTRODUCTION. King's College criteria (KCC) and other available predictive markers for selection of patients with acute liver failure (ALF) for liver transplantation are far from being perfect.

METHODS. We retrospectively analyzed 102 patients with ALF treated at our institution between 1996 and 2005. Baseline parameters, SAPS-III, KCC, MELD score, and a novel score of bilirubin, lactate, and etiology (BiLE score) were compared between transplant-free survivors and patients who required liver transplantation or died. The score was calculated as BiLE score = (bilirubin [µmol/l]/100) + lactate [mmol/l] + 4 [in case of cryptogenic ALF, Budd-Chiari syndrome or phenprocoumon toxicity] – 2 [in case of acetaminophen toxicity] + 0 [in case of any other ALF etiology]. Comparison with other parameters was performed using multivariate linear regression analysis and receiver operating characteristics (ROC).

RESULTS. The most common causes of ALF were cryptogenic liver failure (21%), acute hepatitis B (18%), acetaminophen ingestion (16%) and Budd-Chiari syndrome (9%). Transplantation-free survival was 38%, 44% of patients underwent liver transplantation, and 18% died without transplantation. Eight-week-survival was 77%. The BiLE score was the best predictor of death or need of transplantation with 79% sensitivity and 84% specificity. ROC analysis revealed a better performance of BiLE score when compared to bilirubin, lactate, MELD score and SAPS III (AUC: 0.87 +/- 0.04, 0.73 +/- 0.51, 0.73 +/- 0.52, 0.71 +/- 0.05, 0.68 +/- 0.59, resp.).



Receiver-Operating-Characteristic (ROC) Curves for the prediction of death or need of liver transplantation

Comparison of lactate and bilirubin with BiLE score

CONCLUSION. The simple, combined BiLE score emerged as the best predictor of poor outcome in our patient cohort and should be prospectively evaluated in other populations.

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LACTATE CLEARANCE AFTER DONOR RIGHT HEPATECTOMY IN LIVING RELATED LIVER TRANSPLANTATION AS A RELIABLE INDICATOR OF FUNCTIONAL RECOVERY OF THE RESIDUAL LIVER

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INTRODUCTION. Early postoperative changes in blood lactate concentration were used as an early and reliable indicator of the quality of the functional recovery of the graft in orthotopic liver transplantation (OLT). Recently, perioperative lactate profile was proposed, together with ICG clearance, as a reliable indicator of the residual graft viability after liver resection in cirrhotic patients. Aim of our prospective study was to test the hypothesis that the perioperative profile of blood lactate concentration could provide a reliable indication of the functional recovery of the residual liver mass after donor right hepatectomy(RH)in living related liver transplant (LRLT).

METHODS. From March 01 to Dec 06, after ad hoc informed consent,32 adults (mean age 35 ± 11, mean bw 70±12 kg) underwent RH for donation without vascular clamping and with right suprahepatic vein preservation. GRWR was always between 0.78 and 0.9.

RESULTS. All the donor are alive and well. Mean blood losses were 400±350 ml(range 100 – 1000 ml). MAP and HR did not change significantly during the various phases of surgery. Inotropes or vasodilators were never used. Lactate (LAC) blood levels were recorded at baseline (T1), before (T3) and after(T4) donor RH, at the end of surgery (T5), 12 (T6),18(T7),24 and 36 hours after RH. AST ALT, Prothrombin Activity,aPTT, bilirubin were measured at the same time intervals as part of the standard biochemical monitoring in the donor. ICG clearance (LiMon,Pulsion) was recorded in the last four cases after RH. LAC, normal at baseline (T1, 1.30±0.37 mMol) increased slightly but significantly during liver manipulation (T2, 2±0.47 mMol, $p< 0.004$), increased further during hepatic resection (T4, 3.45 ±1.25 mMol, $p< 0.0001$ vs T1)and peaked at the end of surgery (T5, 4.3 ± 1.2 mMol, $p< 0.001$ vs T1). Significant decrease of LAC was recorded 12 hours after RH (T6) and LAC returned to normal values in all the pts at T7 (1,29 ± 0.5 mMol, range 0.7 – 2; ns vs T1 ; $p< 0.0001$ vs T5). 36 hours after start of surgery all the pts had LAC level below 1.2 mMol (range 0.6 – 1.2).

CONCLUSION. These findings suggest that LAC levels in this setting reflect the metabolic impairment of the liver during and immediately after the liver resection (possibly related to the actual residual mass) and, in the early post resective period,the quality of the functional recovery of the residual liver. If confirmed in larger series, postoperative lactate profile might constitute a simple, reliable, reproducible and cost effective method of monitoring functional recovery of the residual donor liver after right DH in LRLT.

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CONTINUOUS POSTOPERATIVE BLOOD GLUCOSE MONITORING AND CONTROL USING A CLOSED-LOOP SYSTEM IN PATIENTS UNDERGOING HEPATIC RESECTION

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INTRODUCTION. Hyperglycemia induced by surgical stress often causes dysregulation of liver metabolism and immune function resulting in impaired postoperative recovery. This study aimed to evaluate the usefulness of a closed-loop system providing continuous monitoring and strict control of postoperative blood glucose, in patients after hepatic resection.

METHODS. Nineteen patients who underwent hepatic resection for primary liver tumor between August and December 2006 were enrolled in the study. Following surgery, blood glucose was continuously monitored by the STG-22TM closed-loop system. Glucose levels were controlled using either a manual injection of insulin according to the commonly used sliding scale (manual insulin group, n = 9) or a programmed infusion of insulin determined by the control algorithm of the STG-22TM (programmed insulin group, n = 10). The total amount of insulin used in the first 16 hours after hepatic resection in the 2 groups was measured.

RESULTS. In the manual insulin group, postoperative blood glucose rose initially and reached a plateau of approximately 250 mg/dL between 4 and 7 hours after hepatectomy and then returned towards normal levels by 16 hours. In the programmed insulin group, blood glucose was steadily lowered, reaching the target zone (90 – 110 mg/dL) by 12 hours post surgery. Total insulin administered per patient during the first 16 hours post surgery was significantly higher in the programmed insulin group (183 ± 188 IU) compared to the manual insulin group (8 ± 7 IU; $P < 0.001$). No hypoglycemia was observed in either group.

CONCLUSION. Postoperative hyperglycemia was observed for up to 16 hours in hepatectomized patients. In this postoperative hyperglycemic state, the STG-22TM safely and quickly achieved glycemic control, indicating its clinical value in the postoperative management of hepatectomized patients.

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EFFECTS OF AN INTENSIVE INSULIN THERAPY ON CLINICAL OUTCOME AND ON THE INCIDENCE OF HYPOGLYCAEMIA IN SURGICAL CRITICAL CARE PATIENTS

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INTRODUCTION. Hyperglycemia is common in critically ill patients, even in those patients without diabetes mellitus. In recent studies intensive insulin therapy to maintain tight glycemic control reduced mortality and morbidity. The main study in this field was done in surgical patients, most of them were patients after cardiothoracic surgery. The aim of this study was to assess the effect of an intensive insulin therapy protocol on a heterogenous population of surgical critically ill patients.

METHODS. Retrospective observational study. 117 consecutive patients admitted to the intensive care unit (ICU) after initiation of the protocol (intensive insulin therapy group) and 130 patients admitted just before initiation of the protocol. The setting was a 9-bed surgical ICU of a university hospital. Patients were admitted after abdominal, thoracic, vascular and urological operative procedures and received either conventional insulin therapy (blood glucose level < 150 mg/dl) or intensive insulin therapy (blood glucose level 90-120 mg/dl). Primary end point was defined as mortality on ICU. Secondary end points were in-hospital mortality, length of stay on ICU and incidence of hypoglycemia (blood glucose level < 65 mg/dl). Statistics (significance level p < 0,05) were calculated using exact two-side Fisher-test (Mortality, length of stay) and Chi-Quadrat-Test (Hypoglycemia).

RESULTS. There was no significant effect of intensive insulin therapy on mortality (Table 1) and length of stay (conventional insulin therapy: 9,84+/-9,7 days vs. intensive insulin therapy: 11.32 +/- 10,7 days, p=0,255). The rate of hypoglcemia was significantly higher in the intensive insulin therapy group (Table 2).

TABLE 1.

Mortality

	Conventional insulin therapy (n=130)	Intensive insulin therapy (n=117)	p-value
Death on ICU (number of patients / %)	34 (26,2%)	24 (20,5%)	0,364

TABLE 2.

Hypoglycemia

	Conventional insulin therapy (n=130)	Intensive insulin therapy (n=117)	p-value
Hypoglycemia (<65 mg/dl) (number of patients / %)	9 (6,9%)	21 (17,9%)	0,011

CONCLUSION. Intensive insulin therapy showed no effect on mortality and length of stay in critically ill patients after surgical procedures but was correlated with an increased risk of hypoglycemia. If this has an influence on outcome should be examined in further investigations.

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6% HYDROXYETHYL STARCH 130/0.4 (HES) SUPPORTS MAINTENANCE OF STABLE VALUES IN BLOOD GLUCOSE IN ANESTHETIZED ACIDOTIC PIGS

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INTRODUCTION. Tris-hydroxymethylaminomethane (THAM) is described as a potential strategy for acidosis-control despite permissive hypercapnia due to lung protective ventilation (1). One adverse side effect of THAM is hypoglycaemia. We investigated whether a starch based colloid (HES) is able to counteract hypoglycaemia due to its potential glucose delivery via degradation.

METHODS. Anesthetized pigs (43±3kg) (n=6/group) underwent mixed acidosis model due to low tidal ventilation and infusion of a lactic acid (0.2 M) and HCl (0.2 M) diluted in normal saline (final acid concentration 0.4 M). Randomization to HES or 4% gelatine (GEL)-treatment was made, the respective infusion started (4.8 ml/kg/h) and paralleled with acid infusion (2.2 mmol/kg/h). In total, colloid to crystalloid ratio was 1:4. Measurements were taken prior to acidosis (baseline, BS), after achieving the scheduled pH of 7.19-7.24 (acidosis, AC), after 3h of acid infusion (intermediate measures, IM), and after 2h of pH-correction with THAM (2.1 mmol/kg/h) at the end of the experiment (final value, FV). Blood was drawn via central venous catheter and analysed using an ABL 700. Non parametric tests were used for analyses.

RESULTS. To maintain physiological blood glucose (BG) 1.2-3 ml/kg/h G 5% had to be substituted in 4 pigs in the GEL-group (starting 1 h after AC earliest). In contrast HES treated pigs showed stable BG-levels until IM. After IM, in 3 pigs 1.1 ml/kg/h was given for BG-maintenance. In total, based on similar body weights, 1110 ml glucose were needed in the GEL-group vs. 250 ml in the HES-group.

CONCLUSION. HES could not completely counteract hypoglycaemia during THAM application but retarded the decrease in BG and reduced the overall substitution of BG when compared to GEL-treated animals.

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Poster Sessions
Perioperative risk and prognosis 1033-1046

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REDUCTION IN COMPLICATIONS WITH THE USE OF ULTRASOUND FOR INSERTION OF CENTRAL VENOUS CATHETERS FOR COMPLEX MAJOR SURGERY PRIOR TO ICU ADMISSION

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INTRODUCTION. The objective of our study was to assess the effects of the introduction of ultrasound guidance for central venous catheter[CVC] insertion in patients presenting for major oncological surgery prior to admission to the ICU. Previous work at our institution had shown an 10.5% complication rate (multiple attempts, failure, pneumothorax or arterial puncture), with a 13.8% (11/88 procedures) complication rate for trainees and a 4.7% (3/64 procedures) complication rate for consultants using the landmark technique.

METHODS. This was a prospective non-randomized audit examining consecutive procedures conducted in 286 patients over 18 months. The choice of whether to use ultrasound was left to the treating physician. The setting was the theatre complex at the Royal Marsden Hospital, a comprehensive cancer centre.

RESULTS. The study showed a significant decrease in complications (13/286 vs 16/152, ARR 6.8%, 95% CI 1.5-12.0%) following the introduction of ultrasound. Ultrasound use resulted in significantly fewer complications than no ultrasound use (3/169 vs 10/117, ARR 6.7%, 95% CI 1.3% - 12.2%). Reduction in complications was limited to insertions performed by trainees (1/93 vs 8/67, ARR 10.8%, 95% CI 2.8– 18.9%) while those done by consultants were unaffected (2/76 vs 2/50, NS).

TABLE 1.

Complication rates for trainees and consultants

Outcome	Landmark Technique	Ultrasound guided group	Reduction with ultrasound
Failure	7/117 (6.0%)	1/169 (0.6%)	5.4% (95% CI 0.1-9%)
Complication rate	10/117 (8.5%)	3/169 (1.8%)	6.7% (95% CI 1.3-12.2%)
Trainee complication rate	8/67 (11.9%)	1/93 (1.1%)	10.8% (95% CI 2.8-18.9%)
Consultant complication rate	2/50 (4%)	2/76 (2.6%)	1.6% (95% CI 5.2-7.8%)

CONCLUSION. Ultrasound use has been shown to decrease complication rates in ICU[1] and the ED[2]. This is the first study we are aware of considering patients presenting for major oncological surgery prior to ICU admission, and we found a substantial reduction in complications for trainee lead insertions. It is interesting to note that contrasting to prominent published data[3], we found no advantage in using ultrasound for experienced users of the landmark technique. Adoption of ultrasound by trainees resulted in a large decrease in complications associated with CVC insertion in patients for major surgery and should be mandatory in this setting.

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RESULTS OF THE INTERNATIONAL SURVEY ON CLINICAL AWARENESS OF INTRA-ABDOMINAL HYPERTENSION AND ABDOMINAL COMPARTMENT SYNDROME IN CRITICALLY ILL PATIENTS (WSACS STUDY 003)

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INTRODUCTION. Despite an escalation of literature on intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS), there is still an under-recognition of the syndrome(1).

METHODS. To fill this void a survey has been launched. The survey can be accessed via www.wsacs.org/survey.htm. So far there are about 2000 respondents (goal = 2500).

RESULTS. Still 13.6% of the respondents are not familiar with IAH or it's effects on organ function while 1.3% never heard about ACS. In total 69.2% of the respondents felt the combination of clinical examination with IAP the best method for diagnosing IAH while 24.1% use IAP alone. Other methods used are CT (13.1%); abdominal perimeter (10.1%) and ultrasound (7.8%). The transvesical method is most widely used (92.3%) followed by intraperitoneal (4.2%) and stomach (2.8%). When the bladder is used, 52.8% instil 50ml, while 21.9% instil 100ml and 4.3% up to 200ml! It is reassuring that already 16.2% of respondents go for the low instillation volumes < 25ml. On the other hand 6.8% do not wait for equilibration whilst measuring IAP and 51.9% are aware of continuous methods. The concept of abdominal perfusion pressure and the filtration gradient is known by 81.5% and 19.7% respectively. Most of the respondents measure IAP 4 to 6 times a day and 43% stated to measure "when clinically indicated". The indication for IAP monitoring in medical patients is most often related to massive fluid resuscitation (19%), pancreatitis (16.3%) and sepsis (14.2%) compared to abdominal surgery (24.3%), trauma (22.4%) and massive fluid resuscitation (20.7%) in surgical patients. However only 2.1% of the respondents felt that IAP monitoring is advocated in neurosurgical patients. Regarding the normal values, 14.8% believe that normal IAP is above 10 mmHg, while 77.1% defines IAH as an IAP above 15 mmHg and 58% defines ACS as an IAP above 25mmHg. Only 8.4% believes that organ dysfunction may occur at pressures below 12 mmHg. About 29.9% of respondents will always perform abdominal decompression in ACS while 64% only in selected patients and 2.1% never. In most of the cases (73.6%) decompression is based on a combination of increasing IAP and new onset organ failure (oliguria, acidosis, increasing ventilator pressures). Temporary abdominal closure after initial decompression is performed with Bogota bag (23.9%), mesh (21.2%), KCI VAC dressing (21%) and home made VAC (19.5%) compared to 14.8%, 20.1, 33.3% and 13.3% respectively for the subsequent decompression. About 34.9% of the respondents were aware of the WSACS and 26.3% were aware of the existing consensus definitions.

CONCLUSION. The results of this survey show that there is still a lack of clinical awareness and knowledge on IAH/ACS. The IAP measurement technique needs to be standardised and there is a lot of educational work to do regarding IAH/ACS diagnosis and treatment.

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RETROSPECTIVE EVALUATION OF VACUUM-ASSISTED FASCIAL CLOSURE FOR OPEN ABDOMEN DUE TO SECONDARY PERITONITIS

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INTRODUCTION. We conducted a retrospective study to evaluate the influence of VAC Therapy on the clinical outcome of patients with open abdomen due to secondary peritonitis.

METHODS. We identified 172 consecutive patients(56,1%male) in two major Viennese hospitals with open abdomen(laparostoma) due to secondary peritonitis. We compared two treatment groups: VAC group: Patients who were treated with VAC therapy, NOVAC group: Patients who were treated without VAC therapy.
Vacuum assisted closure-V. A. C. therapy is a standard tool for complex superficial wounds. The major mechanisms are reduction of the local oedema, stimulation of localized blood flow, promotion of granulation tissue formation, reduction of bacterial colonization and wound contraction due to the negative pressure.
Additionally intensive care procedures are not hindered (prone position, early weaning and mobilization). As the changing of the dressing is done in the ICU it is safer for the patient (no transport required) and efficient. The abdominal dressing prevents clogging of the gut with the peritoneum and provides efficient drainage up to the retroperitoneum. Both effects are preventive for abscess formation. Finally the closure of the abdominal wall is eased.
Patients in the NOVAC group where managed without VAC Therapy(towels, mesh grafts).

RESULTS. In our retrospective study we found a lower in hospital mortality for the whole group and for every single hospital in the VAC Group. In total, 86 patients died (49,7% of 173 patients), of whom 37 were in NOVAC group (72,6% of 51 patients) and 49 in the VAC group (40,2% of 122 patients, p<0,05).
APACHE II score(VAC: 19,6+/-8,2; NOVAC: 19,9+/-8,2; p=0,81), age(VAC: 61,9+/-15; NOVAC: 58+/-14,6; p=0,14) and comorbidity did not differ between the treatment groups.

CONCLUSION. Patient in the VAC group faced a lower in hospital mortality in the whole group and in every single hospital. There was no significant difference in Age, Sex, origin of disease, Apache II Score, MPI and comorbidity between the treatment groups.
With all the restrictions of a retrospective study we believe that our data supports the need for a prospective study to clearly define the benefits of VAC therapy in the treatment of patients with open abdomen.

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EFFECT OF BILE ACIDS ON GUINEA PIG SMALL BOWEL MOTILITY IN VITRO

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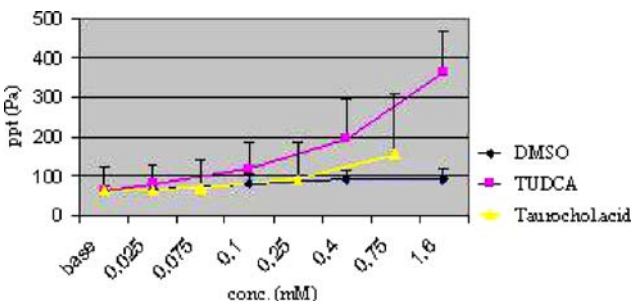
INTRODUCTION. Gastrointestinal motility disturbances are frequently seen in critically ill patients with cholestasis. The pathogenesis is unclear; a possible, but up to now unevaluated mechanism is an inhibitory effect of bile acids on intestinal motility (1). The aim of our study was to investigate this hypothesis.

METHODS. Guinea-pig small bowel segments were excised and mounted in a tissue bath. Luminal perfusion of the segments with Tyrode's solution resulted in an increase of the intraluminal pressure until the pressure threshold (PT) – the trigger of a peristaltic contraction - was reached. A drug-induced increase of the PT is defined as inhibition of peristalsis, while a decrease of the PT is interpreted as a stimulation of peristalsis (2). After basal peristaltic activity was stable, increasing concentrations of tauroursodesoxycholic acid (TUDCA) and taurocholic acid were added intraluminally. The neutral effect of Tyrode's solution on peristalsis has been described previously (2), the effect of dimethyl sulfoxide (DMSO), used as a solvent for the bile acids, was evaluated in a second step.

RESULTS. The inhibitory effect of taurocholic acid was moderate and not statistically significant. TUDCA on the other hand showed a significant inhibitory effect on small bowel motility. DMSO was devoid of any effect (Figure).



CONCLUSION. Our study demonstrated a profound, concentration dependent inhibitory effect of TUDCA on guinea pig small bowel motility in vitro. Further studies are necessary to evaluate the mode of action of bile acids on motility – a possible mechanism is an inhibitory effect due to opioid receptor stimulation comparable to the bile acid induced pruritus (3).

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PROGNOSTICATION OF DEATH AMONGST ICU SURGICAL PATIENTS: DO ALL THE PREDICTION SCORES LOOK THE SAME?

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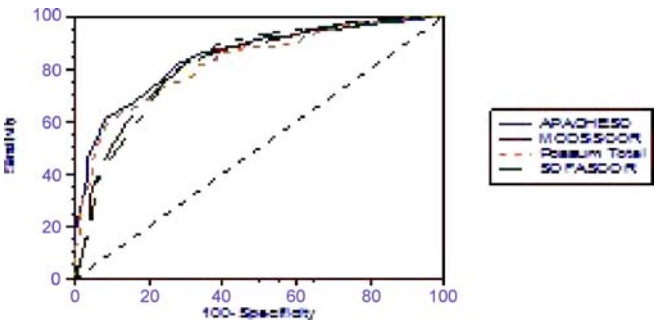
INTRODUCTION. Prediction of death and morbidity amongst ICU surgical patients can be misleading. Direct comparisons of raw morbidity and mortality data involving different surgeons and across various institutions is very difficult, due to a diverse mix of patients, presentations and procedures. So, the search for a single score that reliably could be used for this purpose is enticing.

METHODS. All surgical patients undergoing a surgical procedure admitted to 21 intensive care units of hospitals in different regions of Brazil were enrolled prospectively and their POSSUM, APACHE II, MODS and SOFA scores were collected, with the aim of determining which these would be the best to predict death amongst them. Mortality predictions of the variables used were compared to the actual outcomes using receiver-operator characteristic curve analysis.

RESULTS. A total of 586 patients were enrolled with a mean age of 62,43±16,87 years and 54,85% of them were male. 14,99% of them died in the ICU and 79,21% were discharged alive from the hospital. The area under the curve (AUC) for hospital mortality for APACHE II, MODS, POSSUM and SOFA scores were 0,808, 0,802, 0,809 and 0,805, respectively.



CONCLUSION. All variables analyzed (POSSUM, APACHE II, MODS and SOFA scores) had the same capacity of predicting hospital mortality in ICU surgical patients in this series.

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INTRA- AND INTEROBSERVER VARIABILITY DURING IN VITRO VALIDATION OF THE CIMON INTRA-ABDOMINAL PRESSURE MEASUREMENT DEVICE

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INTRODUCTION. Intra-abdominal pressure (IAP) measurement techniques vary in automaticity and reproducibility. This study will evaluate the intra- and interobserver variability of a new IAP measurement technique, namely via a balloon-tipped catheter connected to the CiMON device (Pulsion Medical Systems, Munich, Germany).

METHODS. A half open, 3L container was used with a FoleyManometer (Holtech Medical, Copenhagen, Denmark) connected to a Foley catheter contained in a 50ml infusion bag (to simulate a bladder) and two balloon-tipped IAP catheters: one from Spiegelberg (Hamburg, Germany) connected to the IAP monitor and one from Pulsion Medical Systems (Munich, Germany) connected to the CiMON. To simulate intraabdominal hypertension and abdominal compartment syndrome, the container was filled with water using 5 cm increments (from 0 to 30 cmH2O). Pressure was estimated by observers using the FoleyManometer (FM) and simultaneously recorded using the IAP monitor (IAP-spie) and the CiMON monitor (IAP-CiM). Observers were blinded to the reference levels.

RESULTS. In total 15 observers (3 intensivists, 4 fellows, 2 medical students and 6 nurses) conducted 3 pressure readings at each of the 7 pressure levels with the FM-technique, giving 315 readings. These were paired with the automated IAP-spie and IAP-CiM readings and the height of the H2O column. The intra- and interobserver coefficients of variation (COVA) were low for both methods. There was no difference in the results between specialists, doctors in training or nurses. The Spearman correlation coefficients (R2) for all paired measurements were > 0.9 (p<0.0001) and Bland-Altman analysis comparing the reference H2O column to the 3 other measurement techniques, showed a very good agreement at all pressure intervals (bias -0.1 ± 0.7 cmH2O; 95%CI -0.2 to 0 cmH2O). There was a consistent, low underestimation of the reference H2O pressure by the Spiegelberg technique and a low overestimation at pressures below 20 cmH2O by both other techniques. The FM significantly overestimated the reference pressure at 0 and 5 cmH2O probable related to the residual filling of the artificial (non-compliant) bladder.

CONCLUSION. All 3 measurement techniques, FM, IAP-spie and IAP-CiM are reliable and reproducible methods to measure IAP in this in vitro model. The COVA for each technique is low and decreases with increasing IAP; with IAP-spie and IAP-CiM giving more reproducible results than FM. There is minimal under- or overestimation by all techniques which also becomes proportionally less significant at the clinically more important high IAP levels.

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FENOLDOPAM THERAPY IN ACUTE RENAL FAILURE ASSOCIATED TO HEPATIC DYSFUNCTION AFTER LIVER TRANSPLANTATION

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INTRODUCTION. Patients (pts) undergoing liver transplantation (LT), especially those with severe graft dysfunction, are prone to a considerable risk of acute renal failure (ARF) in the postoperative period. RIFLE criteria to define ARF (1) permit to compare results among centers. A recent study (2) reports renal injury (RIFLE II: serum creatinine twice the basal value) in 11,1% and failure (RIFLE III: serum creatinine three times the basal value) in 25,7 % of pts submitted to LT; in 75,5% of pts with renal failure dialysis was required. ARF and dialysis after LT are independent risks of death. Low dose fenoldopam mesylate (0,1mcg/kg/min) produces a selective renal vasodilatation and may provide a potential benefit in preserving kidney function. In LT pts prophylactic use of fenoldopam is reported (3), but its efficacy as treatment of renal dysfunction after LT has not been investigated yet. We evaluate the efficacy of fenoldopam to treat ARF associated to hepatic dysfunction after LT.

METHODS. We reviewed data from 253 pts submitted to LT in our center in the years 2005/06 with preoperative normal renal function. ARF was defined by the RIFLE criteria and treated whit high dose of furosemide; graft dysfunction was defined as initial poor function (IPF: peak of AST>1500 U/L and INR>2,3) and early graft dysfunction (EAD: bilirubin >10mg/dl) during the first week after LT. Fenoldopam was administered at 0,1 mcg/Kg/min for three days in pts with renal injury and hepatic dysfunction after LT.

RESULTS. After Lt, 88 of 253 pts (35%) developed ARF: 64 pts (72,7%) during the first postoperative week, 24 pts (27,3%) after the first week. Forty pts with renal injury (RIFLE II category) and liver dysfunction (11 pts with IPF; 29 pts with EAD) were treated with fenoldopam. Twenty pts (50%) needed low dose of norephinephrine to maintain adequate hemodynamic parameters. Under fenoldopam treatment, renal injury advanced to failure (RIFLE III) in 19 of 40 pts (48%) and 3 of these 19 pts (15,8%) needed kidney replacement treatment. Survival in fenoldopam treated pts was 100% at one and three months after LT.

CONCLUSION. ARF is an early and dreadful complication after LT. Dialysis requirements and mortality reported in the literature in RIFLE III category pts is high (2). Fenoldopam treatment in high-risk pts, with renal injury and graft dysfunction, seems to decrease the progression of renal damage and ameliorate survival in the early period after LT.

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TRAUMATIC LIVER INJURY: MORTALITY AND COMPLICATIONS ASSOCIATED TO THE TREATMENT

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INTRODUCTION. Nonoperative management of liver injuries is highly successful and rarely leads to adverse events. Actually, it is preferred to initial surgical treatment.

METHODS. Retrospective analysis of 83 patients with traumatic liver injuries (TLI) admitted to the ICU of an hospital of reference for hepatic and biliar tract surgery (years 1997-2006). Analysis of demographic variables, type of traumatism, associated injuries, diagnosis, type of treatment, complications and mortality was done. We used the t-test and Chi-square test and a multivariant study to detect risk factors.

RESULTS. Median age 32 years, 72,6% men and average stay of 11.1 days ±1,3 in ICU, 70,2% due to traffic accidents, 19% precipitations. Other traumatisms (Tx) associates were presented in 82.1%: serious thoracic Tx (48,4%), traumatic brain injury (TBI) 32.1% and spleen traumatism 25%. Initial treatment was surgery (50%), conservative (47,6%) or delayed laparotomy (4,8%). Types of surgery: suture of hepatic injury 33,3%, hepatectomy 16,7% and direct hemostasia 9,5%. Packing 14,3% of the cases, splenectomy 12%; second surgery by bleeding 11,6%. Complications: 61%; first 24 hours, 53,6%: 35,7% hipovolemic/hemorragic shock, 90% politransfusion; delayed, 35,7%: respiratory insufficiency 25%, liver failure (LF) 14,3%, hemodinamic shock 10,7%, renal failure (RF) 9,5%, biliary complications 8.3% and liver necrosis 7.1%. Total mortality was 20%, by initial shock 9,5%, hepatic complications 7.1%. No significant difference between surgical or preservative treatment and mortality was found. Packing was associated, p< 0.002, with the need for second surgery for active bleeding, with hemodinamic shock (p< 0.051) and HF (p<0.056). The hepatectomy accomplishment was associated (p<0.005) to liver necrosis. The multivariant analysis detected as risk factors of mortality the TBI and RF, p<0.002, OR 23.5 and p<0.05, OR 9,08, respectively. The variables associated to prolonged stay were trauma associate (p<0.02), precocious complications (p<0.023), RF (p<0.023), sepsis (p<0.023) and change from preservative treatment to surgery (p<0.021). Mortality increases due to associate traumatism (p<0.031, OR 1,28), TBI (p<0.001, OR 6,7), RF (p<0.006, OR 7,6) and abdominal sepsis (p<0.015, OR 5,6).

CONCLUSION. 1) Traumatic liver injury affects young politraumatized people implied in traffic accidents or precipitations. 2) There are no differences between the type of treatment (surgical or preservative) and mortality but packing was associated with needing new surgery by bleeding, shock and hepatic failure. Hepatectomy was associated with liver necrosis. 3) TBI and renal failure were predicting factors of mortality. 4) Mortality was associated with initial shock in 50% of the cases.

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REMIFENTANYL VERSUS MIDAZOLAM PLUS FENTANYL FOR THE ICU SEDATION AND PAIN CONTROL IN PATIENTS UNDERGOING MAJOR ABDOMINAL VASCULAR PROCEDURES

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INTRODUCTION. Analgesia and sedation in mechanically ventilated patients is an indisputable endpoint in intensive care unit (ICU). Over the past years the remifentanyl has been used more often in critically ill patients admitted at ICU after major surgical procedures. Its success derives from either the onset or the offset times. The aim of this study was to compare the usefulness of remifentanyl versus midazolam plus fentanyl for the ICU sedation and pain control in patients undergoing major abdominal vascular procedures.

METHODS. After ICU admission, 40 patients (mean age 66 ± 4) undergoing elective abdominal aortic aneurysm repair were randomly assigned to receive either 30 micrograms/kg/min remifentanyl (R group) or 4 micrograms/kg/min midazolam plus 0.20 micrograms/kg/min fentanyl (MF group). Non-opioids were used as analgesic agents for the postoperative period. Duration of mechanical ventilation and length of ICU stay were compared. Sedation and postoperative pain control were evaluated by using the Ramsay, sedation-agitation scale (SAS), and behavioral pain scale (BPS). Each patient was assessed three times a day (morning, afternoon, and night), by two observers (a physician and a nurse). Kolmogorov-Smirnov test was used to assess the Gaussian distribution of data. Mann-Whitney and chi-square test were applied. A p less than 0.05 was considered statistically significant.

RESULTS. R and MF groups were similar with regard to preoperative (demographics), intraoperative (surgical times, type of anesthesia, bleeding and transfusions, hemodynamics) and postoperative (ventilation setting, drugs administration) variables. The length of stay in ICU was similar for the two groups (36.2 ± 14. vs 38.3 ± 13 hours, R vs MF, respectively). Conversely, mechanical ventilation time showed a significant difference between the two groups (18.4 ± 4.3 vs 25.2 ± 6.2 hours, R vs MF, respectively. P<0.05). No major complications occurred in the two groups, except for a patient in the MF group who developed renal dysfunction. BPS scores were significantly higher for MF group, with averages of 3.8 ± 1.2 vs 6.6 ± 1.7, R vs MF, respectively. P<0.01). The Ramsay and SAS did not differ significantly between groups.

CONCLUSION. The remifentanyl seemed to provide advantages in terms of reduction of mechanical ventilation times and pain control. With respect to Ramsey and SAS, the BPS had better psychometric properties when used in patients admitted at ICU after elective abdominal aortic aneurysm repair.

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POSTOPERATIVE LIVER FAILURE DEFINED BY THE "50-50" CRITERIA IS AN INDEPENDENT PREDICTIVE FACTOR OF MORTALITY IN ICU AFTER HEPATECTOMY

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INTRODUCTION. Postoperative liver failure defined by the association of prothrombin time (PT) < 50% and serum bilirubin (SB)> 50 µmol/l (the 50-50 criteria) has been shown to be an accurate predictor of death after hepatectomy in a retrospective work (1). The aim of the study is to validate prospectively the prognostic value of the 50-50 criteria in patients admitted after hepatectomy in ICU.

METHODS. From January 2005 to February 2007, patients admitted postoperatively in ICU after hepatectomy were consecutively studied. Demographic and descriptive preoperative data, indications and type of hepatectomy, pathologic exam of the non tumorous liver parenchyma, SAPSII score and postoperative descriptive and biological data during the 10 first postoperative days (POD) were recorded. Statistical analysis was performed using SPSS software. ANOVA or chi2 test were performed for univariate analysis followed by logistic regression for multivariate analysis.

RESULTS. Ninety-four patients admitted in ICU, accounting for 22 % of the hepatic resections performed during the same period have been analyzed. Their age was 58±17 years and their SAPSII was 25±10 (mean± SD). Indications for hepatectomy were malignant diseases in 84 cases including primary tumors (n=34), metastases 3 segments). The≥(n=29). There were 79 (84%) major hepatic resections (underlying liver parenchyma was abnormal in 78 cases (steatosis >30% (n=42), noncirrhotic fibrosis (n=20) and cirrhosis (n=16). Ten patients (10,6%) died in ICU. Factors associated with death in univariate analysis were hepatocellular carcinoma, severe fibrosis or cirrhosis, SAPS II score, " 50-50 " criteria on]: 9%POD3 and POD5 and shock. Presence of severe fibrosis (Odd Ratio (OR) [CI95]%]: 30 [4,5-200]) or on POD5 (OR[CI95%[1,5-52]) and " 50-50 " on POD3 (OR[CI95: 38 [2,7-500]) are independent predictors of death on multivariate analysis.

CONCLUSION. Our results validate prospectively the prognostic value of postoperative liver failure. The " 50-50 " criteria when observed on postoperative day 3 or 5 is indeed an independent predictive factor of mortality in ICU after hepatic resection.

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ABDOMINAL COMPARTMENT SYNDROME FOLLOWING RECTUS SHEATH OR RETROPERITONEAL HEMATOMA: A MULTICENTER RETROSPECTIVE ANALYSIS (WSACS STUDY002)

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INTRODUCTION. Rectus sheath (RSH) or retroperitoneal hematoma (RPH) is a well recognised complication of treatment with low molecular weight heparin (LMWH) or oral anticoagulation, but can also be caused by trauma, after surgery, with pregnancy or just spontaneously. In the past, surgeons were reluctant to operate on RSH/RPH especially in the context of a poor hemostasis. Increased intra-abdominal pressure (IAP) and abdominal compartment syndrome (ACS) have recently been reported as a complication of LMWH associated RSH/RPH and in some cases surgical evacuation resulted in improvement of organ function (1,2).

METHODS. Retrospective data analysis. The study protocol with the methods can be accessed via the WSACS website (www.wsacs.org). Data were recorded in an excel sheath. The IAP was measured either via the gastric or bladder route.

RESULTS. So far data are collected on 7 patients from 3 centres. Mean age was 69.3±13.5, with BMI 24±3.2. Severity scores on admission were: SAPS II 47±12.4, APACHE II 25.6±1.5, and SOFA 7.7±4.2. All but one (emergency surgery) admissions were medical. There were 4 rectus sheath hematomas and 3 retroperitoneal (psoas) bleedings. All but one (spontaneous) RSH or RPH were related to the use of LMWH and underlying renal failure. The average size was 17.3±3.7 cm and diagnosis was made by abdominal CT in all cases. Treatment consisted of decompressive laparotomy in 4, radioangiographic embolisation in 1, percutaneous drainage in 1 and conservative medical treatment in 1 (sedation, intubation and continuous infusion of neuromuscular blockers). The average hematoma evacuation in those patients treated surgically or percutaneously was 2730±1702 ml. The IAP dropped significantly from 32.9±11.2 at baseline to 17.6±3.6 postintervention, while the hourly urine output rate increased from 7.9±14.1 ml to 130.7±169.1 ml. Mean ICU stay was 13.7±5.9 days and all patients survived.

CONCLUSION. The presence of a RSH or retroperitoneal bleeding can dramatically increase the IAP even to levels consistent with ACS. This retrospective analysis shows that aggressive surgical, percutaneous or radioangiographic interventions resulted in resolution of the ACS associated organ dysfunction and a good outcome. Surgeons should no longer be reluctant to operate on RSH or RPH!

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PLASMA DISAPPEARANCE RATE OF INDOCYANINE GREEN (PDR ICG) AFTER LIVER TRANSPLANTATION (OLT): ALWAYS A RELIABLE TOOL TO ASSESS EARLY GRAFT FUNCTION AND OUTCOME?

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INTRODUCTION. Early graft dysfunction(EAD)after OLT is associated with increased morbidity/mortality. Deschenes(DES)defined EAD as the presence of one of the following between postop day(POD)2 and 7: bilirubin>10 mg/dl,prothrombin time(PT)>17 sec and hepatic encephalopathy. Pulse densitometric PDRICG (normal values 18–25%/min)is quoted as a reliable indicator of the quality of graft function after OLT: values<16%/min are associated with moderate-severe graft dysfunction,values <10% /min with poor outcome. We prospectively evaluated PDRICG in predicting the quality of graft function. We correlated the results with EAD,conventional liver function tests (bilirubin, PTINR, ALT,lactate),grafts and patients outcome(death). Follow-up ranged from 2 to 6 mo after OLT.

METHODS. 73 patients admitted to OLT from Nov 05 to Jan 07 composed the study group. PDRICG (LiMon,PULSION) was measured in all the pts on POD1:cut-off value for dysfunction was considered 16%/min. Hepatic hypoperfusion was ruled out with cardiac output monitoring and hepatic Doppler US. To measure Bilirubin, ALT, PTINR and lactate, blood samples were taken before OLT and 6,18,24 POD1),48,72 hours (POD3) after OLT. PTINR and Bilirubin were measured on POD7. Statistical analysis included Fisher's exact test,Wald's test,M-H odds ratio as appropriate.

RESULTS. After 3 mo follow-up,69 pts were alive(mortality 5.4%),and 68 grafts were functioning:4 pts died for extrahepatic reasons,1 was successfully retransplanted for primary non function (PNF). According to DES,pts with EAD were 12(16%):among them no deaths,2 MOF,1 PNF. ICU LOS was similar in EAD and non-EAD pts. PDR on POD 1 was 10±5%/min (19±10 in non EAD p<0.02). On POD7, EAD and non-EAD pts had normal PTINR(1.19 ± 0.19 vs 1.16 ± 0.13, ns) and near normal lactate (1.98±0.4 mM vs 1.7±0.3,ns) but different Bilirubin (15±10 mg dl-1 vs 6±4.5, p<0.0001). According to PDR <16%/min on POD1,35 pts (47%) had graft dysfunction (among them only 8 pts included in DES EAD):in spite of the lower PDR in pts with dysfunction (p<0.0001),mortality,MOF,ICU LOS were similar. On POD7,normal PTINR (1.18±0.15 vs 1.13±0.15,ns) and lactate (1.97±0.8mM vs 1.7 ±0.5,ns)were found in pts with or without dysfunction;instead, Bilirubin was significantly higher in pts with dysfunction (10±8 mg dl-1 vs 5± 4, p< 0.002). While PDR > 18 was always correlated with good graft function, low PDR were not necessarily associated with poor outcome: PDRICG < 10%/min as cut off value to define dysfunction did not increase the discriminating power.

CONCLUSION. In our study PDRICG does not seem to be reliable indicator of functional recovery of the graft and subsequent graft outcome when correlated with conventional syntetic (PTINR) and clearing liver tests(lactate clearance) or graft and pts outcome. Instead, low PDR values might reflect an escretory damage or a competition of ICG with bilirubin for the same carrier.

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INTRAABDOMINAL PRESSURE AND ICU SURVIVAL

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INTRODUCTION. Impact of IAP on ICU survival is not well established.

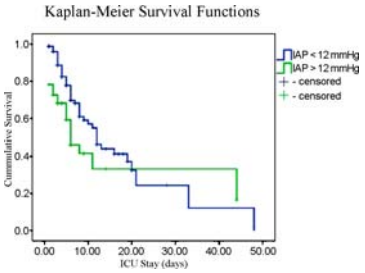
METHODS. 211 surgical ICU patients were prospectively studied. Patients were allocated in 2groups according to mean IAP values during ICU stay:group1-IAP<12mmHg,n=56 and group2-IAP>12mmHg,n=155. IAP was measured transvesically with 50ml saline q12h. Groups were uniform in demographics and co-morbidities. The Kaplan-Meier method was used to estimate survival in groups. Cox regression further determined explanatory variables.

RESULTS. Median survival time in group1.was 12(1.484)vs.6(1.375)in group2 expresed as median(SE). Log-rank test for survival curves showed p=0.009. Final stepwise optimized Cox regression model revealed that IAP>12mmHg is independently associated with mortality, they have 2.208times higher possibility of ICU death then patients with IAP<12mmHg.

TABLE 1.

Cox regression Summary

	B	SE	Wald	p value	EXP(B)
UO	-.001	.000	4.473	.034	.999
MAP	.167	.080	4.342	.037	1.18
IAP	.792	.259	9.374	.002	2.20
APP	-.983	.286	11.813	.001	.374
FG	.827	.244	11.451	.001	2.28
PaCO2	-.100	.051	3.921	.048	.905
PalvO2	.258	.104	6.114	.013	1.29
DA-aO2	-.266	.105	6.431	.011	.766
PaO2	-.240	.103	5.391	.020	.787
Glasgow	-.358	.182	3.885	.049	.699



CONCLUSION. IAP>12mmHg is an independent predictor of mortality in surgical ICU.

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MULTIPLE ORGAN DYSFUNCTION SYNDROME (MODS) IN ICU COMPLICATED SURGERY PATIENTS

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INTRODUCTION. The purpose of this clinical trial is to study the risk factors for the development of MODS in ICU patients (pts) after complicated surgery, as well as other parameters affecting prognosis.

METHODS. We enrolled retrospectively 154 pts, 119 men (77.3%) and 35 women (22.7%), who entered ICU because of acute post-operative respiratory failure. They stayed >4 days and were mechanically ventilated. Mean age: 62.6±19.4 years, mean stay: 23.4±9.1 days. Surgical sites: Abdomen 89 (57.8%), central nervous system 36 (23.4%), chest 8 (5.2%), orthopaedics 7 (4.5%), spinal cord 5 (3.2%), urological 5 (3.2%), gynecological 2 (1.3%), face 2 (1.3%). Emergency operations 83 (53.9%), eclectic 71 (46.1%). The pts were divided in 2 groups: Group A 39 pts (25.3%) who developed MODS and group B 115 (74.7%) who did not. We examined: age, stay in the ICU, duration of mechanical ventilation (DMV), number of surgical procedures (nSP), number of preexisting significant disease (n PD), number of units of red cells transfused (n TU), sepsis and mortality rates (MR).

RESULTS. The results of the above parameters in the 3 groups: All pts, group A and group B were respectively: Age (years): 62.6±19.4, 66.1±11.3, 61.4±23.6. Stay (days): 23.4±9.1, 38.3±12.9, 18.3±7.4. DMV(days): 19.7±6.3, 35.1±10.2, 14.5±5.6. nSP (including the initial one): 212 (1.38±0.29), 62 (1.59±0.35), 150 (1.30±0.24). nPD: 1.81±0.22, 2.01±0.23, 1.74±0.22. nTU: 6.6±2.56, 10.3±2.7, 5.3±2.3. Sepsis: 45 (29.2%), 38 (97.4%), 7 (6.1%). MR: 42/154 (27.3%), 27/39 (69.2%), 15/115 (13%).

CONCLUSION. 1) The nTU, (p<0.05), the emergency of operations (p<0.05) and the presence of sepsis (p<0.001) predispose significantly to the development of MODS. 2) Age, nSP and nPD are related to the development of MODS, but not significantly (p<0.1). 3) MODS prolonged stay (p<0.01) and DMV (p<0.01) and increased MR (p<0.001). 4) In 34 pts of group A (87.2%), MODS appeared between 10th and 17th day of admission in ICU (14.4±2.9 days). 5) No specific surgical site was related more frequently to MODS.

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PERCUTANEOUS TRACHEOSTOMY IN THE PATIENTS WITH MECHANICAL VENTRICULAR ASSIST DEVICE

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INTRODUCTION. Mechanical ventricular assist devices (VAD) are an important adjunct to the management of end-stage heart failure patients, and are the standard of care for most potential heart transplant candidates with life-threatening congestive heart failure refractory to conventional therapy. Some of these patients require prolonged ventilatory support after VAD implantation, and tracheostomy offers many advantages over endotracheal intubation. The aim of this study was to assess the safety of percutaneous dilatational tracheostomy (PDT) performed in ICU in this patient population.

METHODS. We retrospectively studied 37 consecutive adult heart transplant candidates (April 2003 to February 2007) with mean age of 47.1±14.1 (range 18–65) years who underwent implantation of biventricular or left ventricular assist device as a bridge to heart transplantation. All the patients after VAD implantation were initially treated by unfractioned heparin with target activated partial thromboplastin time (aPTT) of 60–75 sec (ratio patient/normal 1.8–2.3). Before PDT was performed, heparin was partially reversed with protamine. The coagulation status of patients and complications of PDT were documented.

RESULTS. 7 (18.9%) patients with mean age of 54.3±11.3 (range 30–63) years underwent PDT insertion in the immediate postoperative period. The PDT procedure was performed an average of 8.6±2.5 (range 5–13) days after VAD implantation. The mean baseline platelet count was 215.1±45.7 (range 155–288) x10^9/liter. The mean baseline prothrombin time (INR) was 1.2±0.1 (range 0.9–1.3). The mean baseline aPTT was 68.7±5.1 (range 62–75) sec. The mean aPTT before PDT insertion (after partial heparin reversal) was 48.6±3.0 (range 44–52) sec. PDT insertion resulted in oozing in 2 (28.6%) patients, and was treated with suture ligation without any long-term sequelae. There were not any case of conversion to the open tracheostomy technique nor serious bleeding complications requiring emergent reoperation.

CONCLUSION. PDT can be performed safely in ICU in end-stage heart failure patients with implanted VAD despite slightly prolonged aPTT. Documented complications of PDT insertion were minor – oozing treated by simple suture ligation. No major complications nor long-term sequelae were recorded.

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USE OF MINITRACHEOSTOMY IN WEANING FROM MECHANICAL VENTILATION IN PATIENTS AFTER MAJOR THORACIC SURGERY

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INTRODUCTION. Minitracheostomy is a safe bedside procedure that facilitates clearance of secretions in patients with sputum retention. Thoracic surgery is associated with several risk factors for sputum retention and atelectasis: impaired respiratory mechanics, injury of phrenic and laryngeal nerves, bronchoplastic procedures and postoperative mental disorders.
The aim of the pilot study was the evaluation of the usefulness of minitracheostomy following the tracheostomy or endotracheal intubation during the weaning from mechanical ventilation (MV) in patients after major thoracic procedures.

METHODS. Minitracheostomy was performed in 11 patients, males aged 57±7.5 yrs who had undergone a major lung resection or oesophagectomy requiring subsequent rethoracotomy or complicated by postoperative mental impairment responsible for respiratory insufficiency. A flanged, reclosable cannula 4.0 mm in internal diameter (Minitrach II, Portex, UK) was inserted below the 1st or 2nd tracheal cartilage after removal of the endotracheal tube or conventional tracheostomy tube in patients with symptoms of impaired spontaneous clearance of secretions or atelectasis. The mean period of MV before the minitracheostomy was 11±8 days.

RESULTS. The placement of tracheal cannula was uneventful in all cases and the aspiration of airway secretions with 10CH catheter was satisfactory. Fiberoptic suction bronchoscopy due to atelectasis and sputum retention was performed 2,5 times on average (1-6) before minitracheostomy, while it was not required in any patient after minitracheostomy ($p<0.001$). The significant increase in PaO2 and decrease in PaCO2 after the procedure was observed (60.1±11.8 vs 75±18.2 and 58±6.2 vs 46.2±1 mmHg respectively, $p< 0.05$). Normal glottic function permitting oral feeding was preserved. Mean ICU length of stay after the cannulation was 6±4.1 days. Minitracheostomy tubes remained in place for 7.5±4.6 days. Removal resulted in closure within 24 hrs. No late complications including subglottic stenosis occurred.

CONCLUSION. 1. Minitracheostomy is easy, safe and well tolerated procedure.
2. The use of the minitracheostomy during weaning from mechanical ventilation in the patients after major thoracic surgery helps to avoid repeated aspiration bronchoscopy.

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OUTCOME OF BLUNT TRAUMATIC CRDIO-PULMONARY ARREST

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INTRODUCTION. The aim of this study is to clarify the outcome of patients with CPA on arrival due to blunt trauma (BT-CPA) treated with our strategy including emergency department thoracotomy (EDT). The outcome of patients with BT-CPA is very poor and in some regions they are not resuscitated if they do not show any life sign. Of course in Japan, we have few strategies for them, which are not always effective. And we have few data concerning the outcome of them.

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

RESULTS. For past 10 years, 478 PT-CPA patients were treated. 76% of them were witnessed and 21% were CPA after scene (during transfer). 85% of them underwent EDT and 72% underwent aortic cross clamp. Although 34% achieved ROSC, most of them died within 24 hours. Only 18% went to ICU, TAE room, and OR (admitted), and only 2.7% (13 patients per 10 years) were discharged (survivor). In 363 witnessed patients, 39% achieved ROSC, 21% of whom were admitted, and 2.5% survived (9). Restricted in 8 witnessed patients showing VF as the first cardiac rhythm, 38% were admitted and 13% (1) survived. Restricted in 134 witnessed patients showing PEA (pulsless electorical activities) as the first cardiac rhythm, 28% were admitted and 1% (1) survived. On the other hands, 220 witnessed patients showing no life sign, whose first cardiac rhythm on the scene was asystole, 8% were admitted and 3% (4) survived. the first cardiac rhythm of 2 of the 4 survivors were asystole and the other 2 PEA.

CONCLUSION. Expected outcome of BT-CPA patients is hopeless. However, we can not and should not give up to resuscitate them merely because they are BT-CPA and they do not show any life sign on the scene. We consider the indication of aggressive resuscitation in every individual case by his/her individual condition.

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AN AUDIT OF ROUTINE BRONCHOSCOPIC EXAMINATION OF PERCUTANEOUS TRACHEOSTOMIES AFTER ONE WEEK.

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INTRODUCTION. Our unit recently witnessed 2 cases of tracheostomy tube obstruction secondary to retained dried secretions resulting in life-threatening hypoxia. Both required replacement of the tracheostomy tube under adverse emergency conditions. The removed tubes were seen to be almost totally occluded with secretions but had still allowed passage of a suction catheter. The incidence of blocked tracheostomy tubes on intensive care has been previously reported at 2.15 per 100 days of intubation.

METHODS. On the basis of these two adverse incidents we changed our routine practice to include examination of the internal surface of the tracheostomy tube between 7-10 days post insertion using a fibreoptic bronchoscope. The broncoscope was not advanced beyond the end of the tracheostomy lumen and therefore no extra sedation was necessary. We audited the first 40 consecutive patients who had percutaneous tracheostomy tubes inserted on the ICU. Data collected on amount of tube occlusion ('clean' = no secretions, 'moderate' = secretions present but cleared by suction through the bronchoscope, and 'heavy' = occlusion warranting replacement of tube), number of days post tube insertion, and the type of humidification system (a heat-moisture exchange (HME) filter or a heated water bath circuit).

RESULTS. Overall 21 examinations were possible. Patients were excluded for a variety of reasons: 14 patients were discharged from the unit early; 2 patients died early; 2 patients were receiving terminal care and inspection was inappropriate and 1 awake patient was confused and would have required sedation, and therefore was not examined.
13 (61%) were clean, 8 (38%) had moderate secretions and none had heavy secretions. Average number of days between insertion and inspection was 7.7 (range 5-11 days). A Chi squared test (using Yates' correction) shows no association between type of humidification system and amount of secretions. Routine endoscopic examination of all tracheostomy tubes between 7 and 10 days post-insertion may be indicated. We found that 38% of tracheostomies after 7 days had secretions that warranted suctioning.

CONCLUSION. As tracheostomy tube occlusion can present with life-threatening airway obstruction it should be considered if there is any suspicion of tube occlusion despite easy passage of suction catheter. It is an easy and quick examination which is very well tolerated by the awake patient.

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LIVER TRANSPLANTATION IN ADULTS

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INTRODUCTION. Characterize and analyze the post liver transplantation evolution in the intensive-care unit (ICU) and identify potential risk factors for major complications.

METHODS. Retrospective study of data of 194 postoperative liver transplantations in the ICU, between January 2005 and February 2007. Forty-four perioperative variables were surveyed and a multivariate analysis attempted to identify risk factors independently associated to the major early postoperative complications.

RESULTS. The most frequent primary diagnosis were familial amyloidotic polyneuropathy (FAP) (35,6%), hepatocellular carcinoma (19,1%) and alcoholic liver disease (17,5%). Sequential (domino) liver transplantations were carried out in 40 procedures. The most frequent indication for retransplantation was hepatic artery thrombosis (60%). ICU stay was 5,7 days. The most challenging complications were hemorrhagic events requiring blood transfusion (19,6%), acute renal failure requiring dialysis (9,3%) and thrombotic events (8,3%). Sixty nine percent of the thrombotic events occurred in FAP patients. The overall mortality was 4,6% and the most common cause of death was hemorrhagic shock. After logistic regression, independent factors predicting early hemorrhagic events included primary diagnosis of cirrhosis with severe hepatic failure (Child-Pugh C), intraoperative bleeding with hemodynamic instability and a longer cold ischemic time (non sequential liver transplantation). Independent factors predicting early thrombotic events included primary diagnosis of AFP, transaminases elevation more than 24 hours after transplantation and a 1,5 fold (50%) rise in serum lactate within a 24 hour period.

CONCLUSION. Awareness of potential risk factors for the major post hepatic transplant complications in the ICU should contribute to lowering short-term morbidity and mortality. The sequential (domino) transplantation enlarges the donor pool, decreases cold ischemic time and was in this study independently associated to a lower risk of early hemorrhagic complications. The FAP group was independently associated to an increased risk for thrombotic complications.

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THIRTY-DAY MORTALITY AFTER ESOPHAGEAL RESECTION IS REDUCED FOLLOWING INTRODUCTION OF A CLOSED FORMAT INTENSIVIST LED ICU

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INTRODUCTION. Surgical resection is the only curative treatment in patients with esophageal cancer, but is associated with considerable postoperative morbidity and mortality. The short-term surgical outcome depends on patient characteristics, surgical approach (transhiatal or transthoracic), preoperative treatment as well as hospital characteristics. In this single center study, we analyzed surgical mortality in esophageal cancer patients before and after introduction of a closed format intensivist led ICU.

METHODS. The Reinier de Graaf Gasthuis is a large non-academic hospital. The surgical team performed 100 esophagectomies between 1990 and 2004. The ICU organisation was changed from an open format ICU to a closed format intensivist led ICU starting January 1st, 2001. We compared 30-day mortality in patients operated on before 2001 (n=47, 1990-2000, cohort 1) and since 2001 (n=53, 2001-2004, cohort 2) with correction for case-mix in multivariable logistic regression analysis as described in recent literature[1].

RESULTS. Results are presented in Table 1. Univariate analysis showed a 12.5 times decreased risk for 30-day mortality as compared to the risk of cohort 1 (Odds Ratio 0.08, 95%CI 0.01-0.67). Multivariable analysis with adjustment for age, comorbidity, preoperative treatment and hospital volume (per period) confirmed this reduction (OR 0.075, 95%CI 0.01-0.63).

TABLE 1.

	Cohort 1 1990-2000 n=47	Cohort 2 2001-2004 n=53	P-value/ Odds ratio (95%CI)
Age (mean ± SD)	61.6 ± 11.6	61.1 ± 8.7	0.8 [a]
Comorbidity	28 (60%)	35 (66%)	0.5 [b]
Preoperative chemotherapy	5 (11%)	20 (38%)	0.004 [b]
Transhiatal approach	33 (70%)	47 (89%)	0.06 [b]
ICU length of stay (mean ± SD)	9.9 ± 12.1	8.9 ± 10.9	0.7 [a]
30-day mortality	9 (19%)	1 (2%)	OR 0.08 (0.01-0.67) [c]

a Independent samples T-test. b Chi-square test. c Multivariable log reg analysis

CONCLUSION. Closed format intensivist led ICU organisation significantly improved 30-day mortality after esophagectomy for cancer.

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HYPERAMYLASEMIA AFTER AORTIC ANEURYSM REPAIR

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INTRODUCTION. Acute pancreatitis after surgical treatment of aortic aneurysm is a rare complication with a high mortality rate, while hyperamylasemia without clinical signs of pancreatitis is more frequent but self-limited complication.
We analyzed retrospectively the incidence of hyperamylasemia after aortic aneurysm repair, to confirm its use as a prognostic indicator regarding clinical course and outcome.

METHODS. We reviewed 32 patients (30 males/2 females), who were admitted in ICU, from 9/2004 to 9/2006, after abdominal or thoraco-abdominal aortic aneurysm (TAA) repair. Among these patients, 15 (46%) had elevated levels of serum amylase (Group I) and 17 (54%) had normal values (Group II). Serum amylase, lactic acid, blood tests, liver and renal function tests, were recorded the 1st and 3rd day of ICU hospitalization as well as their correlation with the patient outcome.

RESULTS. In both groups age, APACHE II score and the percentage of ruptured aneurysms were found at the same range (Table 1). Also at the same range were the values of Hemoglobin (Hb) and the lactic acid (Lac). Group I (with hyperamylasemia) was associated with higher mean values of aspartic aminotransferase(AST), alanine tranferase(ALT) and Urea, than group II (Table 2). The following days all these values tent to normalization except serum amylase levels which continued to rise till 3rd day and were normalized after 4th to17th day. None of the patients developed acute pancreatitis and no signs of embolisation were noticed. The overall mortality in Group I was 53% and in Group II. 30%.

TABLE 1.

	Number	Age	Apache II	Ruptured	Survivors
Group I	15 (TAA 2)	74.87	18.93	7 (47%)	7 (47%)
Group II	17 (TAA 2)	72.65	16.35	8 (47%)	12 (70%)

TABLE 2.

	Amylas day 1	Amylas day 2	SGOT day 1	SGPT day 1	Urea day 1	Cr day 1	Hb day 1	Bil day 1	Lac day 1
Group I	325.87	504.29	176.53	102.40	106.40	2.71	10.49	1.73	2.81
Group II	104.53	111.88	59.35	49.35	68.35	2.14	10.45	1.49	2.71

CONCLUSION. Hyperamylasemia after aortic aneurysm repair can be attributed in perioperative trauma during retroperitoneal dissection, shock, thromboembolic episodes or ischemia/reperfusion injury. Hyperamylasemia is a frequent self-limited complication, but when is accompanied with elevated values of serum transaninases and urea nitrogen, then is associated with high mortality rate.

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ABDOMINAL AORTIC ANEURYSM: OPEN OR ENDOVASCULAR REPAIR?

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INTRODUCTION. Abdominal Aortic Aneurysm (AAA) has a markedly progressive increasing incidence, probably due to an aging population and a high incidence of smoking. It seems that 85% of AAA > 6cm of diameter suffer rupture until 2 years. Recent endovascular techniques of AAA repair (EVAR) contribute to a diminishing mortality, mainly among patients with important comorbidities. The aim of this study was to compare mortality and length of stay (LOS) at Intensive Care Unit(ICU), between open aortic repair (OAR) versus EVAR.

METHODS. Observational retrospective study with immediate post-operative patients admitted at ICU of a private hospital in Rio de Janeiro from May of 2004 thru March 2007. Demographics, clinical and laboratorial data were collected. We divided patients into two groups, according to technique (OAR or EVAR). Data were compared using SPSS for windows version 10. For categorical data we used ANOVA, and for numerical data Student T Test.

RESULTS. 28 patients were studied,16 patients in OAR group with mean age of 67,68 ± 9,59 years. 75% were men (n = 12), 25% women (n = 4). EVAR group had 18 patients with mean age of 72,01 ± 7,96 years. 94,44 % were men(n = 17), 5,56% women (n = 2). There were no statistic difference in incidence of Systemic Hypertension (87,5% X 100%), Diabetes Mellitus (43,76% X 33,33%), Chronic Pulmonary Obstructive Disease (25% X 16,67%) and Dislipidemy (25% X 16,67%). LOS at ICU was significantly lower for EVAR group (1,11 ± 0,76 days X 3,69 ± 2,06 days, p < 0,05). EVAR group mortality was 0% X 12,5% (n=2) in OAR group.

CONCLUSION. EVAR was the best technique related to a significant shorter LOS at ICU and although not statistically significant,showed lower mortality rates.

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COMPLEX VASCULAR SURGICAL PROCEDURES IN WOMEN. MORBIDITY AND MORTALITY

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INTRODUCTION. Cardiovascular disease is one of the main mortality causes of the world. Mortality of women submitted to cardiac surgery is higher than men. The aim of this study is to analyze if women patients submitted to vascular surgical procedures in a private hospital in Rio de Janeiro, Brazil show different mortality when compared with men.

METHODS. Observational retrospective study with immediate post-operative patients admitted at ICU of a tertiary private hospital in Rio de Janeiro from May of 2004 to March of 2007. Demographics, clinical and laboratorial data were collected. We divided patients into two groups, according to gender (Male or Female). Data were compared using SPSS for windows version 10. For categorical data we used ANOVA, and for numerical data Student T Test.

RESULTS. 205 patients were studied. Male group had 145 patients with mean age of 70,38 $\pm$ 10 years. Female group had 60 patients with mean age of 69,47 $\pm$ 13,87 years. There were no statistic difference in incidence of Systemic Hypertension (96,67% X 90,34%), Diabetes Mellitus (55% X 42,76%), Chronic Obstructive Pulmonary Disease (10% X 12,41%), Ischemic Heart Disease (20% X 26,21%). Female group showed more Chronic Renal Failure (6,67% X 17,93%, $p < 0,05$). Mortality was higher in male group (8,33% X 2,76%, $p < 0,05$). Length of stay at ICU was significant higher in male group (4,97 $\pm$ 2,33 days X 1,92 $\pm$ 3,32 days, $p < 0,05$). Mean APACHE II in male group was 15,52 and 14,33 in female group.

CONCLUSION. In our population, male group showed greater mortality than female group despite of greater incidence of Chronic Renal Failure in female group. LOS at ICU was higher in male group too.

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SURGICAL INTERVENTIONS IN ICU PATIENTS: ARE THEY SAFE?

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INTRODUCTION. Critically ill patients frequently need surgical procedures due to different problems, including medical complications not directly related to the cause of admission. Such procedures have a high risk of mortality and complications, even due to patient's condition or by surgical risk itself. OBJECTIVE: To study incidence of major surgical procedures in patients already interned at ICU, performed after more than 24 hours of admission; as well as to analyze the impact of such procedures in ICU outcome and mortality.

METHODS. Retrospective cohort study. All patients admitted in ICU since 2004 july to 2006 may which were submitted to major surgical procedures after > 24 hours were studied. It were excluded cases in that the admission intent was to prepare the patient to operation (preoperative optimization); it were included re-operations. It were also excluded surgical elective tracheostomies and gastrostomies, as well as operations directly related to the primary cause and soon after ICU admission (ex, orthopedic trauma surgeries). It was made analysis with descriptive statistics, and comparison with univariated analysis of variance (anova), with t-test.

RESULTS. During the 23 month study period, there were 798 admissions in the general adult ICU (mean age: 51.9; APACHE II: 18.2; 60,8% male). 48 major surgical procedures (SP) were performed in 44 patients: 17 on digestive system, 10 neurosurgery, 06 vascular, 04 orthopedic, 03 cardiac, 03 thoracic, 02 plastic, 02 tocogynecologic and 01 urologic. All of them with general anesthesia, at operation room. Mean age: 44.2; male: 68.9%. There was no death due to transport, during surgical procedures or directly related to them.

	SP	Non-SP	p
APACHE II	19.2	18.2	0.487
ICU Mortality (%)	62.2	39.7	0.005
ICU length (days)	16.2	06.1	<0.0001
MV length (days)	13.0	04.1	<0.0001

CONCLUSION. Major emergency surgical procedures performed in ICU are safe, however ICU mortality, ICU length and MV length are very high, probably due to the complexity and the clinical seriousness of the ICU patients. Admission APACHE II did not predict mortality in this group of patients.

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INTERMITTENT CLAUDICATION: ENDOVASCULAR TREATMENT X OPEN INFERIOR LIMB REVASCULARIZATION

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INTRODUCTION. Peripheral arterial disease is a common manifestation of atherosclerosis, and its prevalence increases with age and the presence of cardiovascular risk factors. Cigarette smoking and diabetes mellitus are the strongest risk factors. Hypertension, dyslipidemia, and hyperhomocysteinemia also significantly increase the risk of peripheral arterial disease. Surgical treatment markedly improved in recent years, mainly because development of endovascular techiniques like subintimal angioplasty. The aim of this study was to compare mortality and length of stay (LOS) at Intensive Care Unit (ICU), between open inferior limb revascularization (OLR) or endovascular inferior limb revascularization (ELR).

METHODS. Observational retrospective study with immediate post-operative patients admitted at ICU of a tertiary private hospital in Rio de Janeiro from May of 2004 to March of 2007. Demographics, clinical and laboratorial data were collected. We divided patients into two groups, according to technique (OLR or ELR). Data were compared using SPSS for windows version10. For categorical data we used ANOVA, and for numerical data Student T Test.

RESULTS. 63 patients were studied. OLR group had 32 patients with mean age of 70,83 $\pm$ 8,04 years. 78,13% of men (n=25), 21,87% of women (n=7). ELR group had 31 patients with mean age of 66 $\pm$ 14,38 years. 70,97% of men (n=22), 29,03% of women (n=9). There were no statistic difference in incidence of Systemic Hypertension (93,75% X 83,87%), Diabetes Mellitus (71,88% X 61,29%), Ischemic Heart Disease (34,38% X 19,35%), Chronic Renal Failure (28,13% X 16,13%) and Dislipidemy (18,75% X 12,9%). Mortality was higher in OLR group, but without significant difference (15,63% X 3,23%). LOS at ICU was higher in OLR 3,09 $\pm$ 4,84 days X 1,84 $\pm$ 4,05.

CONCLUSION. In our population, both techniques did not show statistic differences. Both showed safety and seems to be excellent options to improve wellness of patients suffering of intermittent claudication.

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