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CRITICAL CARE

MEETING ABSTRACTS

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Basic Science

P1

Adaptation analysis of different noninvasive ventilation interfaces in critically ill patients

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Introduction Noninvasive ventilation is a safe and effective method to treat acute respiratory failure, minimizing the respiratory workload and oxygenation. Few studies compare the efficacy of different types of noninvasive ventilation interfaces and their adaptation.
Objective To identify the most frequently noninvasive ventilation interfaces used and eventual problems related to their adaptation in critically ill patients.
Methods We conducted an observational study, with patients older than 18 years old admitted to the intensive care and step-down units of the Albert Einstein Jewish Hospital that used noninvasive ventilation. We collected data such as reason to use noninvasive ventilation, interface used, scheme of noninvasive ventilation used (continuously, periods or nocturnal use), adaptation, and reasons for nonadaptation.
Results We evaluated 245 patients with a median age of 82 years (range of 20 to 107 years). Acute respiratory failure was the most frequent cause of noninvasive ventilation used (71.3%), followed by pulmonary expansion (10.24%), after mechanical ventilation weaning (6.14%) and sleep obstructive apnea (8.6%). The most frequently used interface was total face masks (74.7%), followed by facial masks in 24.5% of the patients, and 0.8% used performax masks. The use of noninvasive ventilation for periods (82.4%) was the most common scheme of use, with 10.6% using it continuously and 6.9% during the nocturnal period only. Interface adaptation occurred in 76% of the patients; the 24% that did not adapt had their interface changed to improve adaptation afterwards. The total face mask had 75.5% of interface adaptation, the facial mask had 80% and no adaptation occurred in patients that used the performax mask. The face format was the most frequent cause of nonadaptation in 30.5% of the patients, followed by patient's related discomfort (28.8%), air leaking (27.7%), claustrophobia (18.6%), noncollaborative patient (10.1%), patient agitation (6.7%), facial trauma or lesion (1.7%), type of mask fixation (1.7%), and 1.7% patients with other causes.
Conclusion Acute respiratory failure was the most frequent reason for noninvasive ventilation use, with the total face mask being the most frequent interface used. The most common causes of interface nonadaptation were face format, patient-related discomfort and air leaking, showing improvement of adaptation after changing the interface used.

P2

Exercise training reduces oxidative damage in skeletal muscle of septic rats

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Introduction Septic patients frequently develop critical illness myopathies (CIMs) that may represent a crucial factor for prolonged intensive care unit treatment and for ventilator weaning delay. Experimental findings have identified that oxidative stress plays a role in causing muscle depletion in chronic pathological states like sepsis. It is well documented that regular moderate physical exercise can decreased oxidative stress and enhance antioxidant functions.
Objective To investigate whether exercise training reduces oxidative damage in septic rats induced by cecal ligation and perforation (CLP).
Methods Wistar rats were randomly assigned to three groups: Sham (submitted to a fake surgery), CLP, and CLP that was previously trained (CLPT). The exercise training protocol consisted of 8 weeks of running on a treadmill, 5 days/week, for 60 minutes at 60% of the maximal running speed obtained on the graded treadmill test. Rats were subjected to CLP surgery; after 120 hours of surgical procedure they were killed by decapitation. Oxidative damage of lipids (thiobarbituric acid reactive species (TBARS)) and proteins (carbonyl groups) were analyzed in Soleus (type I fiber) and plantaris (type II fiber) muscles.
Results See Table 1.

Table 1 (abstract P2). Levels of TBARS and carbonyl of soleus and plantaris muscles

Analysis	Muscle	Sham	CLP	CLPT
TBARS (nmol/mg protein x 10^4)	Soleus	43.0 ± 5.4 (11)	60.2 ± 5.9 (13)*	39.7 ± 5.5 (6)**
	Plantaris	31.3 ± 2.6 (10)	55.3 ± 7.3 (11)*	27.8 ± 5.6 (5)**
Carbonyl (nmol/mg protein x 10^{12})	Soleus	38.8 ± 4.3 (11)	50.9 ± 4.6 (12)†	31.3 ± 4.6 (6)**
	Plantaris	28.8 ± 3.9 (10)	49.7 ± 5.1 (13)*	45.5 ± 6.9 (6)†

Values presented as mean ± SEM. *P <0.05 vs. sham. **P <0.05 vs. CLP. †P = 0.06 vs. sham.

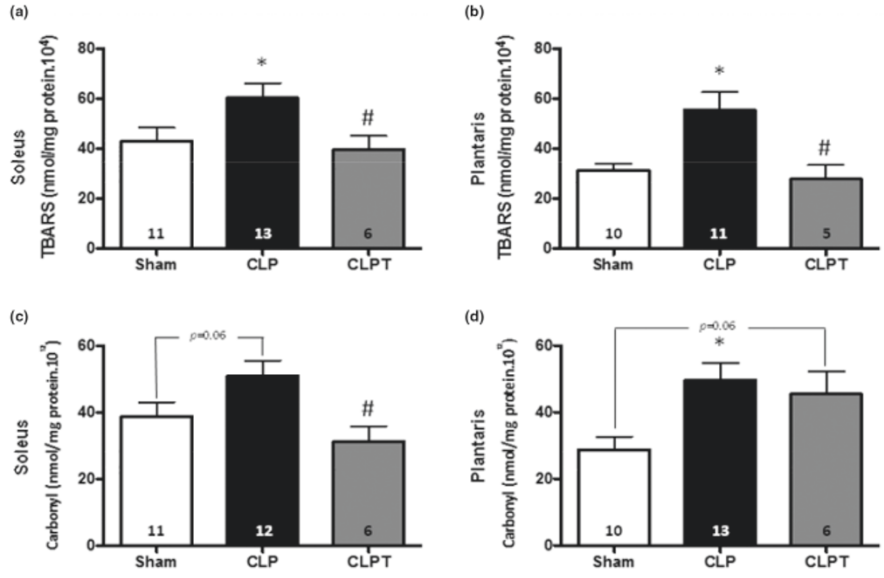

Figure 1 (abstract P2). Levels of TBARS of soleus **(a)** and plantaris **(b)**; and levels of protein carbonyl of soleus **(c)** and plantaris **(d)**. Values presented as mean ± SEM. *Significant difference in relation to Sham group (P <0.05); #Significant difference in relation to CLP group (P <0.05).

Conclusion TBARS and carbonyl analysis for CLPT are lower than for CLP with statistical significance, except for carbonyl plantaris with $P = 0.06$ (Table 1 and Figure 1). Our data supported that exercise training before sepsis could decrease oxidative damage in both muscle fiber types.

Hemodynamics/Shock

P3

Direct hepatic tissue PO_2 measurements in sepsis and tamponade models

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Introduction Tissue hypoxia diagnosis at the bedside remains a huge challenge for intensivists, and surrogate markers of tissue oxygen utilization are used instead. The precise correlation between them is not well defined.
Objective To verify the correlation between portal blood flow, O_2 and CO_2 gradients, hepatic lactate gradient with hepatic tissue PO_2.
Methods This is an observational experimental study, in which 16 large, male, white pigs, about 35 kg, were allocated into two groups: sepsis (n = 8), and tamponade (n = 8). All protocols were approved by the institutional review board for animal experiments. Anesthesia: premedication with intramuscular ketamine (10 mg/kg) plus midazolam (0.25 mg/kg); induction with intravenous propofol 5 mg/kg (at maximum) followed by continuous isoflurane (1.5%), fentanil 2.5 µg/kg/hour and pancuronium 0.24 mg/kg/hour. Mechanical ventilation settings: Vt 10 ml/kg, PEEP 5 cmH_2O, respiratory rate set to normocapnia and FiO_2 adjusted to arterial oxygen partial pressure 60 to 100 mmHg. Continuous gas analysis was also performed. Electrocardiography, invasive pressure in dissected femoral artery, right atria and ventricular pressures after left internal jugular dissection; $etCO_2$ (by gas analyzer), pulmonary artery catheter, portal vein flow Doppler ultrasound, and small bowel tonometry, after median laparotomy. Liver tissue pO_2 monitoring: pO_2 – fluorescence quenching optode – and LDF – laser Doppler fluxometry – probes were directly inserted inside liver parenchyma (Oxford-Optronix, UK). Other procedures: cistostomy (to monitor diuresis), inferior vena cava (by femoral) and superior vena cava (by right jugular) vein catheterizations. Portal vein catheter, after liver hilus dissection (Seldinger) and fluoroscopy-guided right suprahepatic vein catheterization. After experiments, pigs were sacrificed with sedative overdose and 20 ml KCl 19.1% injection. Sepsis was induced by spread of 150 ml warm saline diluted 1g/kg feces in the peritoneal cavity. Tamponade: mini-thoracotomy and a mono-lumen intrapericardium catheter positioning to arouse cardiac tamponade, targeting 20% of baseline decrease in cardiac output at each time phase. Data were analyzed in Excel 2007.
Results In both groups, there was a progressive decrease in portal blood flow, an increase in jejune–portal CO_2 gap, and a decrease in hepatic tissue PO_2. Interestingly, there was a progressive hepatic lactate consumption as hepatic tissue PO_2 decreases. Figure 1 (overleaf) depicts the behavior of the above variables.
Conclusion Hepatic tissue PO_2 paralleled portal blood flow and was inversely related to the jejune tissue PCO_2 gap. Liver has increased lactate consumption as hepatic tissue PO_2 decreased.

P4

Myocardial energy metabolism in sepsis and in anemic, stagnant and hypoxic hypoxia

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Critical Care 2011, **15(Suppl 2):**P4 (doi: 10.1186/cc10152)

Introduction Tissue hypoxia and inflammation are the pillars of multiple organ dysfunction. Current therapeutic interventions aimed to improve systemic oxygen delivery are mediated by increases in cardiac output, but myocardium energetic demand increases in conditions of limited supply. Only scarce data are available on heart oxygen utilization during hypoxic injuries.
Objective To understand the heart metabolism, challenged by different tissue hypoxia models, by examining oxygen, lactate, and glucose in vascular compartments, including coronary sinus.
Methods Thirty-seven pigs, fully monitored, were challenged with different injuries, including normovolemic anemia (n = 8), cardiac tamponade (n = 8), hypoxic hypoxia (n = 8), peritonitis-induced sepsis (n = 8) while five served as controls. In addition to global hemodynamics and oxygen transport, we measured oxygen saturation, lactate and glucose concentrations in arterial, pulmonary artery and coronary sinus vascular compartments. Cardiac power output was calculated as a surrogate marker of cardiac demand.

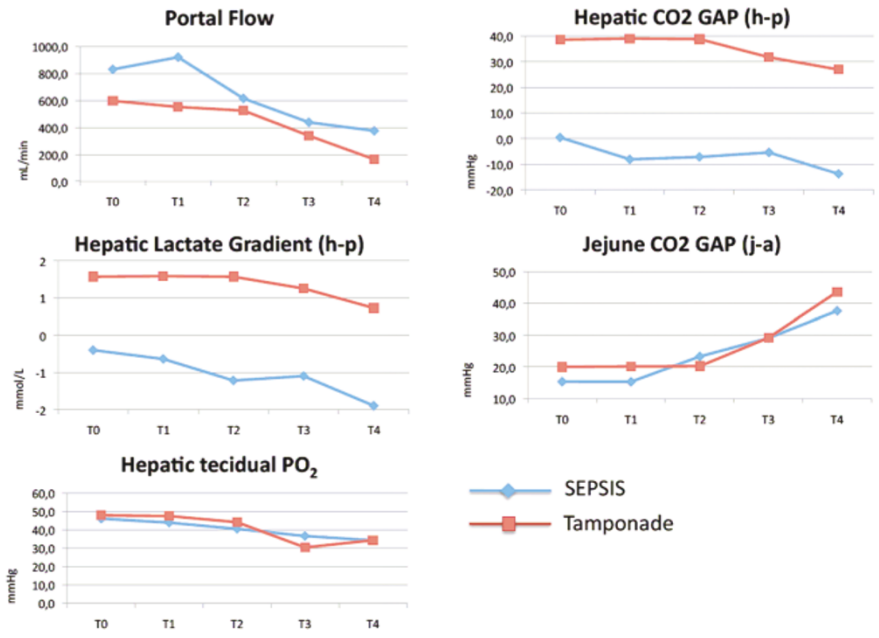

Figure 1 (abstract P3). Portal blood flow, hepatic CO_2 gap, hepatic lactate gradient, jejune CO_2 gap and hepatic tissue PO_2 over time in both groups, sepsis and tamponade.

Results No significant alterations were found in the energetic profile in the stagnant group. There was both a decrease in lactate consumption and an increase in glucose consumption in anemia (ΔLAC changed from –0.7 to +0.5 mmol/l, P = 0.018; ΔGLU changed from –0.1 to –0.4 mmol/l, P = 0.118) and in hypoxic hypoxia (ΔLAC from –0.4 to –0.2 mmol/l, P = 0.361; ΔGLU from –0.25 to –0.5 mmol/l, P = 0.096) groups. In sepsis, we observed a progressive increase in glucose (ΔGLU from –0.1 to –0.25 mmol/l, P = 0.618) and lactate (ΔLAC from –0.26 to –0.53 mmol/l, P = 0.105) consumption by the heart. The highest lactate production was observed in late phases of anemia (+0.5 mmol/l) and the highest glucose consumption (–0.5 mmol/l) in late phases of hypoxic hypoxia. A similar and low CPO (between 3.31 and 4.4 W) was achieved in different time points according to the hypoxia model, such as a FiO_2 about 10%, a Htc about 7%, a 30% reduction of cardiac output in tamponade, or 4 hours after fecal peritonitis induction, suggesting that the heart better tolerates hypoxia and anemia than sepsis and tamponade. See Figures 1 and 2 overleaf.
Conclusion Energetic substrate selection seems to be an important adaptive mechanism in response to different types of tissue oxygen delivery impairment, which may have implications on inotropic agent choice.

P5

Outcomes of 3,400 patients with cancer admitted to intensive care unit: a Brazilian prospective study

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Critical Care 2011, **15(Suppl 2):**P5 (doi: 10.1186/cc10153)

Background Intensive care unit (ICU) admission of critically ill cancer patients was controversial until recently. In the last years, advances in the management of malignancies and organ failures have improved outcomes of patients, resulting in higher rates of survival in the ICU. The aim of this study is to prospectively evaluate the characteristics, short and midterm outcomes of cancer patients requiring intensive care.
Methods During 2 years, we evaluated prospectively patients with cancer admitted to the Instituto do Cancer do Estado de São Paulo. A total of 3,400 patients were included in the study; and collected data were baseline data, risk scores, clinical status, co-morbidities, admission diagnosis, ICU interventions, ICU and hospital outcomes and 90-day outcomes.
Results From 3,400 patients, 52.8% had solid tumors and 47.2% had hematologic malignancies. The most frequent reasons for ICU admission were: sepsis (32%), postoperative care (27%) and respiratory failure (21%). The mean APACHE II score value 24 hours after admission was 23.1 ± 7.8 (8 to 45). ICU mortality was 22%, hospital mortality was 31% and 3-month mortality was 44%. Logistic regression analysis showed that need for mechanical ventilation (odds ratio = 7.76; 95% CI = 4.56 to 12.85), presence of metastasis (odds ratio = 2.87; 95% CI = 2.06 to 5.28), occurrence of acute renal failure (odds ratio = 2.92; 95% CI = 1.67 to 9.46) and higher SOFA scores 72 hours after admission (odds ratio = 6.76; 95% CI = 5.56 to 13.85) were independently associated with increased hospital mortality. The 3-month quality of life of patients who survived was considered unchanged in 51% patients, worse in 25% and better in 24%.
Conclusion This prospective analysis of 3,400 patients with cancer needing intensive care shows high survival rates and good quality of life after ICU admission. These data encourage intensive care treatment in oncologic patients to prevent, detect and cure organ dysfunction.

P6

Red blood cell transfusion after cardiac surgery does not result in improvement of tissue perfusion in adult patients

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Critical Care 2011, **15(Suppl 2):**P6 (doi: 10.1186/cc10154)

Background Most patients undergoing cardiac surgeries are exposed to red blood cell (RBC) transfusions, in the operating room or in the postoperative period. One of the main beliefs of this therapy is the ability of the RBCs to improve tissue perfusion through oxygen supply. However, recently, this concept is being questioned by some evidence as RBC storage lesion and adverse outcomes in transfused patients.

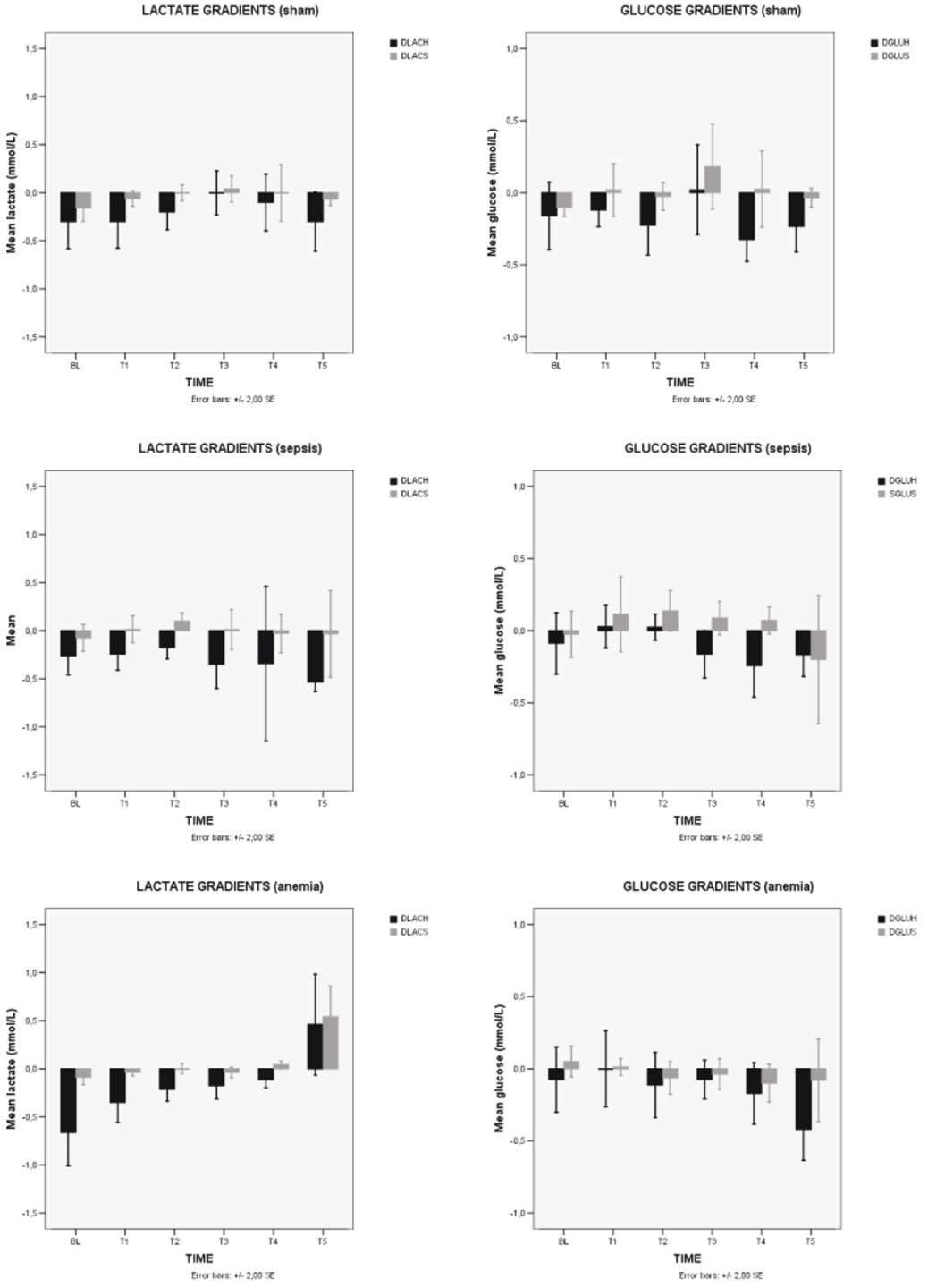

Figure 1 (abstract P4). Systemic and coronary gradients of lactate and glucose – sham, cytopathic hypoxia (sepsis) and anemic hypoxia. DLACH = heart lactate difference = CS LAC – ART LAC; DLACS = systemic lactate difference = PA LAC – ART LAC; DGLUH = heart glucose difference = CS GLU – ART GLU; DGLUS = systemic glucose difference = PA GLU – ART GLU.

The aim of this study was to determine if RBC transfusion after cardiac surgery results in improvement of tissue perfusion.

Methods From February 2009 to February 2010, a total of 502 patients underwent cardiac surgery with cardiopulmonary bypass at InCor – University of São Paulo. Arterial lactate, standard base deficit (SBD), arterial bicarbonate and oxygen central venous saturation ($ScVO_2$) were collected immediately at the beginning and end of the procedure, immediately postoperative (POI), after 24 hours (1PO), 48 hours (2PO),

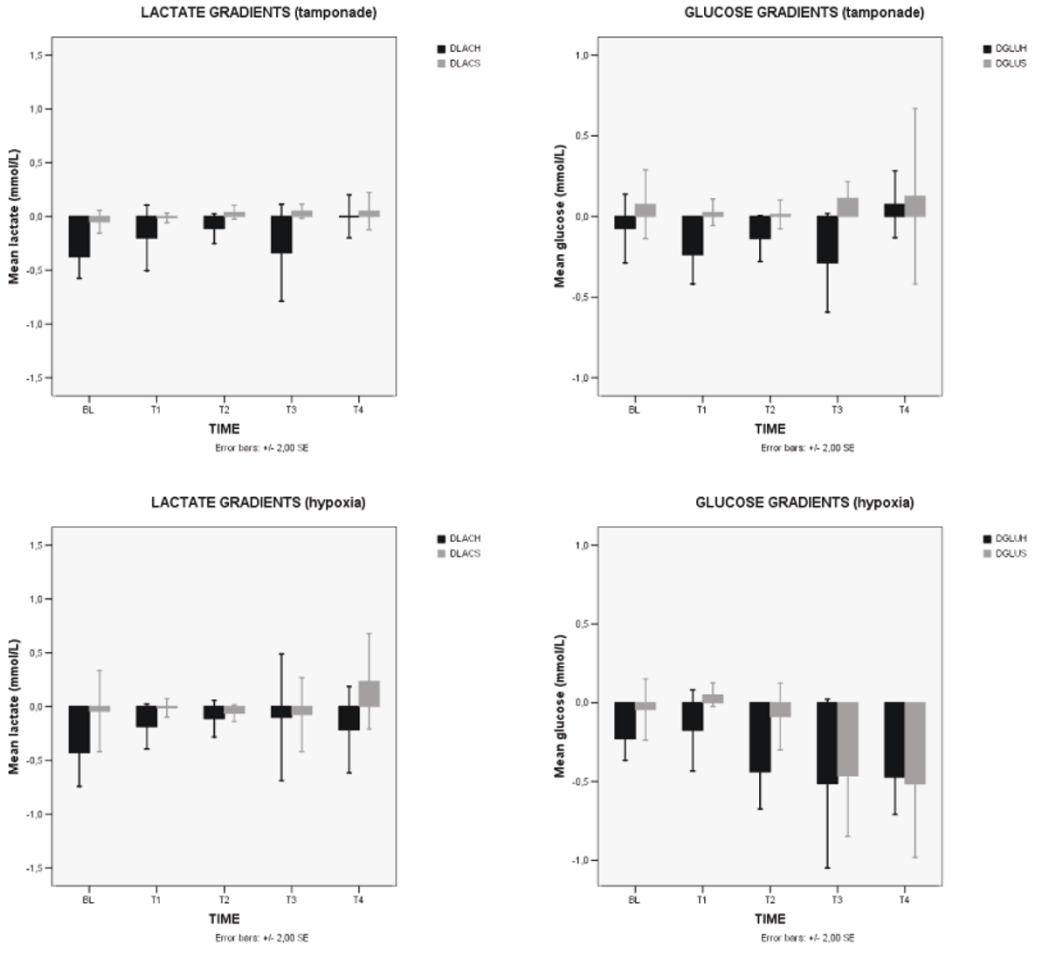

Figure 2 (abstract P4). Systemic and coronary gradients of lactate and glucose – stagnant hypoxia and hypoxic hypoxia. DLACH = heart lactate difference = CS LAC – ART LAC; DLACS = systemic lactate difference = PA LAC – ART LAC; DGLUH = heart glucose difference = CS GLU – ART GLU; DGLUS = systemic glucose difference = PA GLU – ART GLU.

72 hours (3PO) and at ICU discharge. Mean values of these above-mentioned parameters were compared in patients exposed to RBC transfusions and patients not exposed through repeated-measures variance analysis.

Results Hemoglobin values were different between groups since before surgery until just before ICU discharge and in all periods, the group not exposed to RBC transfusions presented higher values compared with the exposed group (see Figure 1 overleaf).

Conclusion In this prospective study, red blood transfusion did not result in improvement of tissue perfusion parameters. This finding brings to discussion the real role of blood transfusion in cardiac patients.

P7

Replacing fentanyl infusion by enteral methadone decreases weaning time from mechanical ventilation

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Background Patients exposed to long-term infusion or high-dose of opioids may develop physiological dependence and withdrawal symptoms during discontinuation. In mechanically ventilated adult patients, the occurrence of fentanyl withdrawal syndrome has been associated with difficulties in discontinuing ventilatory support and with increased length of stay (LOS).

Objective We tested the hypothesis that replacement of fentanyl infusion by enteral methadone decreases weaning time from mechanical ventilation.

Methods A prospective, randomized and double-blind study involving patients fulfilling criteria to weaning from mechanical ventilation but under high risk for fentanyl abstinence syndrome (defined as continuous fentanyl for more than 5 days or more than 5 μg/kg/hour during 12 hours). Patients were randomized into two groups, methadone (MET) group and control (CT) group, as follows: at first 24 hours both groups were given 80% of the original dose of fentanyl and received, additionally, in the MET group enteral methadone (10 mg each 6 hours) or enteral placebo in the CT group. After the first 24 hours, the MET group received enteral methadone and intravenous placebo while the CT group received enteral placebo and intravenous fentanyl. In both groups, the blinded intravenous solutions were reduced by 20% of the original dose, every 24 hours. Any abstinence symptoms were treated with a bolus of fentanyl. A Kaplan–Meyer curve was constructed and the Student *t* test was used to compare groups in following criteria: (1) weaning time from MV, (2) days under MV and (3) ICU LOS.

Results Of 75 randomized patients, seven were excluded and 68 were analyzed: 37 at MET and 31 in CT. Between the beginning of weaning and extubation, there was a greater probability of anticipation of

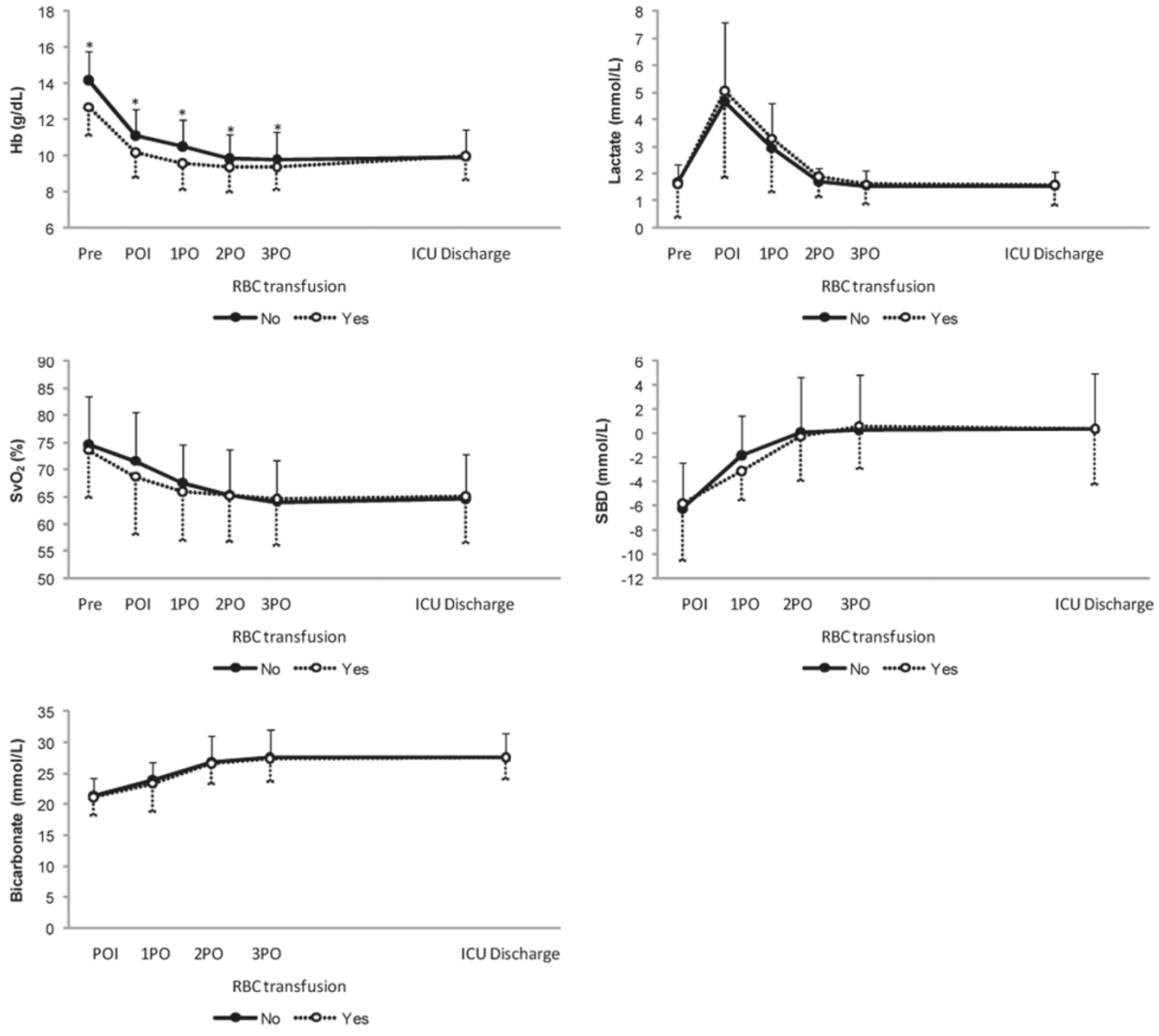

Figure 1 (abstract P6). Comparison between groups exposed or not to red blood cell transfusions considering hemoglobin (Hb) values and perfusion tissue parameters (lactate, oxygen venous central saturation, standard base excess and bicarbonate). *P <0.005.

extubation in the methadone group, but the difference was not significant (hazard ratio = 1.44; 95% CI = 0.81 to 2.56; P = 0.21). The effects of treatment on weaning time were time dependent, and we observed that on the fifth day the probability of successful weaning was 2.27 times greater in the MET (P vs. 13.28 ± 12.85 days, P < 0.004). There was no difference between the two groups with respect to the duration of mechanical ventilation and ICU LOS.

Conclusion These data show that replacement of fentanyl infusion by enteral methadone reduces the weaning time from mechanical ventilation.

P8

Ultrasound-guided venous cannulation: a model of training between medical students and emergency physicians

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Critical Care 2011, **15(Suppl 2):**P8 (doi: 10.1186/cc10156)

Introduction Use of ultrasound introduced as part of intensive care therapy makes viable bedside invasive procedures and diagnosis. Due to portability, combined with team training, its use guarantees less complications related to insertion, as well as patients' safety. It also reduces severe conditions related to the catheter, such as pneumothorax among others. The aim of this study was to evaluate the accuracy related to ultrasound-guided venous catheter insertion in a low-cost famtoma among medical students of third-year graduation compared with experienced doctors and medical residents. We evaluated the success rate of insertion, the number of puncture attempts and the time related to the insertion of the needle from

contact with the surface of the phantom and its correct placement in the vein.

Methods Study participants were 25 undergraduate students of medicine (third year) participating in the curriculum of emergency medicine and intensive care, nine medical residents (internal medicine) and nine critical care physicians. All participants had no previous experience with ultrasound-guided procedures, and medical students had no previous experience with central venous access puncture. There was a lecture prior to the study of 2 hours in ultrasound-guided venous cannulation. Evaluation of the average time between groups was performed by ANOVA using data processing in rank due to lack of homogeneity and the Tukey test for multiple comparisons. A possible relationship between the time needed until the puncture is performed and length of experience was assessed by Spearman correlation, due to lack of normality in the data.

Results We found a success rate of 100% in the insertion of a catheter in phantom among all participants, a longer time in the group of graduate students (Table 1), as well as the number of punctures (mean of 2).

Table 1 (abstract P8). Time (seconds) to cannulation in each group

Group	*n*	Mean	Standard deviation	*P* value
Inexperienced	25	19.60	13.778	
Residents	9	12.44	5.525	0.003
Experts	8	9.88	1.553	
Total	42	16.21	11.638	

Conclusion The use of ultrasound-guided cannulation is a reliable method of training associated with a high of success among graduate students and experienced professionals.

Sepsis

P9

Adverse events associated with long-term ketamine use in pediatric septic shock

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Objective Ketamine hydrochloride is a noncompetitive antagonist of the NMDA receptors and produces a dissociative state described as a 'functional and neuro-physiological dissociation between the neocortical and limbic systems' [1,2].

Methods We describe long-term use of ketamine in the pediatric intensive care unit (PICU) inducing pyramidal liberation in a septic shock patient.

Case A 15-month-old boy with congenital cardiopathy and developmental delay without previous chronic encephalopathy history. He was admitted with septic shock and during the PICU stay received association of multiple analgesic-sedative agents and high doses of ketamine intravenous infusion (Figure 1). The patient presented after 10 days of PICU stay symptoms associated with pyramidal liberation: deep hyperreflexia with sinreflexia, Babinski sign on both sides, opisthotonus, trismus. The clinical signs were not associated with new metabolic or structural intracranial lesion. The patient was discharged from hospital after 36 days receiving pericyazine that was interrupted 1 week after hospital discharge.

Conclusion The ketamine side effects after short-term use include [1,2]: hypertension, apnoea, laryngospasm, emergence phenomena, vomiting, nystagmus, ataxia, myoclonus, random limb movements, opisthotonus, transient facial rash or flushing, intracranial hypertension. The long-term-use side effects are unknown. This is the first report of pyramidal liberation-associated intravenous ketamine for a prolonged period.

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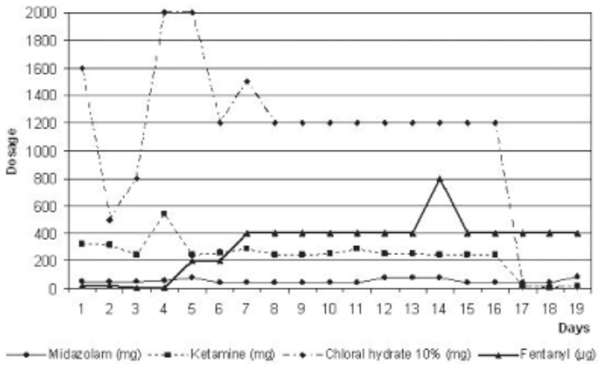

Figure 1 (abstract P9). Daily total doses of analgesic-sedative agents.

P10

Critically ill patients with cancer and sepsis: clinical course and prognostic factors

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Critical Care 2011, **15(Suppl 2):**P10 (doi: 10.1186/cc10158)

Introduction Sepsis is a frequent complication in patients with cancer associated with adverse outcomes. The aim of this study was to evaluate the clinical course and to identify independent predictors of mortality in these patients.

Methods We performed a secondary analysis of a prospective cohort study conducted at an oncological medical–surgical ICU. Logistic regression was used to identify predictors of hospital mortality.

Results A total of 563 patients (77% solid tumor; 23% hematological malignancies) were included over a 55-month period. The most frequent sites of infection were the lung, abdomen and urinary tract; 91% patients had severe sepsis/septic shock. Gram-negative bacteria were responsible for more than half of the episodes of infection; 207 (38%) patients had polymicrobial (>1 infectious agent) infections. ICU, hospital and 6-month mortality rates were 51%, 65% and 72%. In multivariate analyses, sepsis in the context of medical complications, active disease, compromised performance status, presence of three or four SIRS criteria, and the presence of respiratory, renal and cardiovascular failures were associated with increased mortality. Adjusting for other covariates, patients with urinary tract infection had better outcomes. Patients could be stratified into categories of risk for death according to the number of clinical predictors.

Conclusion Our results can be of help to assist intensivists in clinical decisions and counseling of patients and families, and to contribute with future research to improve characterization and risk-stratification in these patients.

P11

Evaluation of knowledge of nurses in intensive care, semi-intensive care and ready for a private hospital of St Paul on sepsis

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Critical Care 2011, **15(Suppl 2):**P11 (doi: 10.1186/cc10159)

Background Sepsis is an inflammatory response secondary to an infectious process with presumed or known [1] focus that can lead to involvement of multiple organs and death. The incidence of severe sepsis and septic shock among patients admitted to intensive care units (ICUs) in Brazil was 36 and 30 per 1,000 patient-days, respectively [2]. ICUs in other countries reported an incidence of severe sepsis of 21

cases per 100 admissions in Paris [3] and 16 cases per 100 admissions in the United States [4].

Method Field research, descriptive and exploratory, transversal, prospective, level I, with a quantitative approach. We approached nurses working in intensive care, emergency care and semi-intensive work during the day or night. The study was conducted in a large private hospital in São Paulo. A semi-structured questionnaire was developed with multiple-choice questions containing personal data and information on knowledge about sepsis.

Results We found 82 respondents with 33 nurses from the ICU, 30 from semi-intensive units (USI) and 19 of the health care unit (APU); there is a predominance of females and training time, being an average of 80%. Over 60% of respondents were postgraduates. The APU was found to have the greatest number of correct classifications of sepsis, more than 50% of respondents; the ICU was in second place, with an average of 40% hits; and the USI averaged 30% correct.

Conclusion Of the nurses responding to the questionnaire, 66 (80%) are female and 74 (90%) have worked for more than 1 year and are trained well, and 22 (26%) hold a postgraduate program graduation. According to the results, we can observe that the better performance was seen in the emergency care units and intensive care. This does not exclude such units from a proposal for continuing education, since the primary concern relates to the retention of clinical symptoms.

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P12

First results of a sepsis protocol at Diadema State Hospital

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Critical Care 2011, **15(Suppl 2):**P12 (doi: 10.1186/cc10160)

Introduction Sepsis is an important cause of death at Diadema State Hospital, therefore a sepsis protocol was designed.

Objective To reduce sepsis prevalence, morbidity, the mortality rate and its high cost.

Methods An audit was conducted in the period of April to September 2010 with data collected through hospital records.

Results Sixty-three patients were enrolled. Analyzed was each item of the package of 6 hours according to the designed protocol, including total adherence to the package of 6 hours, mortality of eligible patients and mortality of patients who adhered to the package of 6 hours. Of 63 patients, 28 patients were discharged and 35 evolved to death, only one case not correlated with death from septic shock. Mortality due to sepsis at our service was 56%, which is consistent with the mortality rate in Brazil (57.3%, according to ILAS) and in public hospitals (63.9%). Adherence to the package of 6 hours recommended by the SSC was only 21 of the 63 cases. Of these 21 cases, 11 patients survived and 10 died. Thirty cases of all had some compliance with the protocol of 6 hours, and of these 17 were discharged and 13 died. Disrupting the total mortality (35 cases, 56%), it was found that mortality among patients who adhered to the package of 6 hours was lower (48%) when compared with those who did not join (60%).

Conclusion The results show a lower mortality rate in cases where there was total adherence to the package of interventions in the first 6 hours, but we still have low level of adherence to this package (33%). The average length of stay decreased dramatically from 2008 to 2010 (73% vs. 62%) when we compared the patients who died with those who survived, which is still high but has fallen over time, surpassing the survival rates measured in other public hospitals in Brazil (data from ILAS). After these first results, improvements were made to be implemented in 2011 such as review and redrafting of the protocol flow; training different categories of professionals (technicians, nurses, physiotherapists, doctors, pharmacists); realignment with ILAS, including manager selection protocol with capacity-building and training for use of the international database for comparative analysis; review the recommendation of antimicrobials for the second focus of infection with sepsis; and regular monitoring of results, including average length of stay and mortality. The challenge now is to decrease deaths, aiming to achieve levels comparable with the best institutions in the world. In partnership with ILAS, the project SPDM against Sepsis, our team has strived to achieve this goal.

P13

Georeferencing sepsis in São Paulo city

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Critical Care 2011, **15(Suppl 2):**P13 (doi: 10.1186/cc10161)

Introduction Sepsis is a worldwide disease with heterogeneous outcome. The main factors related to prognosis are age, associated comorbidities, invader virulence, and time to therapeutic initiation. Data related to social–economical attributes have been scarcely investigated.

Objective To evaluate the distribution of sepsis-associated deaths in São Paulo city using a geographic information system (GIS); to verify whether there is any correlation between socioeconomic status and number of deaths.

Methods GIS is a system for input, storage, manipulation, and output of geographic information. GIS allows one to know the socioeconomic conditions of the region studied, including provision of health services, spatial data (rivers, parks, and so on), population data (age and sex), and estimated demand for health services. Thus, GIS could support health managers for planning, monitoring, priority setting and decision-making. Sepsis was identified through death certificates using several International Disease Codes including, but not restricted to, sepsis, septicemia, pneumonia, urinary tract infection, wound surgical infection, bloodstream infection, meningitis, and multiple organ failure among others.

Results Figure 1 (overleaf) depicts every death according to the location of residence.

Conclusion Death secondary to sepsis is widely distributed throughout the regions of São Paulo, and further analysis needs to be done in different subgroups for better characterization and contrast of this syndrome in distinct regions and socioeconomic strata of the city.

P14

Impact of the Surviving Sepsis Campaign implementation on severe sepsis outcome

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Critical Care 2011, **15(Suppl 2):**P14 (doi: 10.1186/cc10162)

Introduction Sepsis is associated with high morbi-mortality rates and evidence-based strategy implementation could improve outcome.

Objective To evaluate the impact of the 6-hour Surviving Sepsis Campaign (SSC) bundle on mortality in a tertiary hospital.

Methods A multifaceted intervention to facilitate compliance with selected guideline recommendations in the intensive care unit, emergency department, and wards in our hospital was implemented. Data were collected in two periods, before and after implementation of the protocol, from July 2005 to December 2008. The first period was called the Control Group from July 2005 to March 2006 and the Protocol Group from April 2006 to December 2008. SSC was implemented in April 2006. Compliance to the 6-hour SSC bundle was measured in both periods, as well as outcome.

Results A total of 414 patients were enrolled, 92 in the Control Group and 322 in the Protocol Group. Mean age was 66 ± 19 years, mean APACHE II score was 24.1 ± 7.5, and 42% were female. Hospital LOS

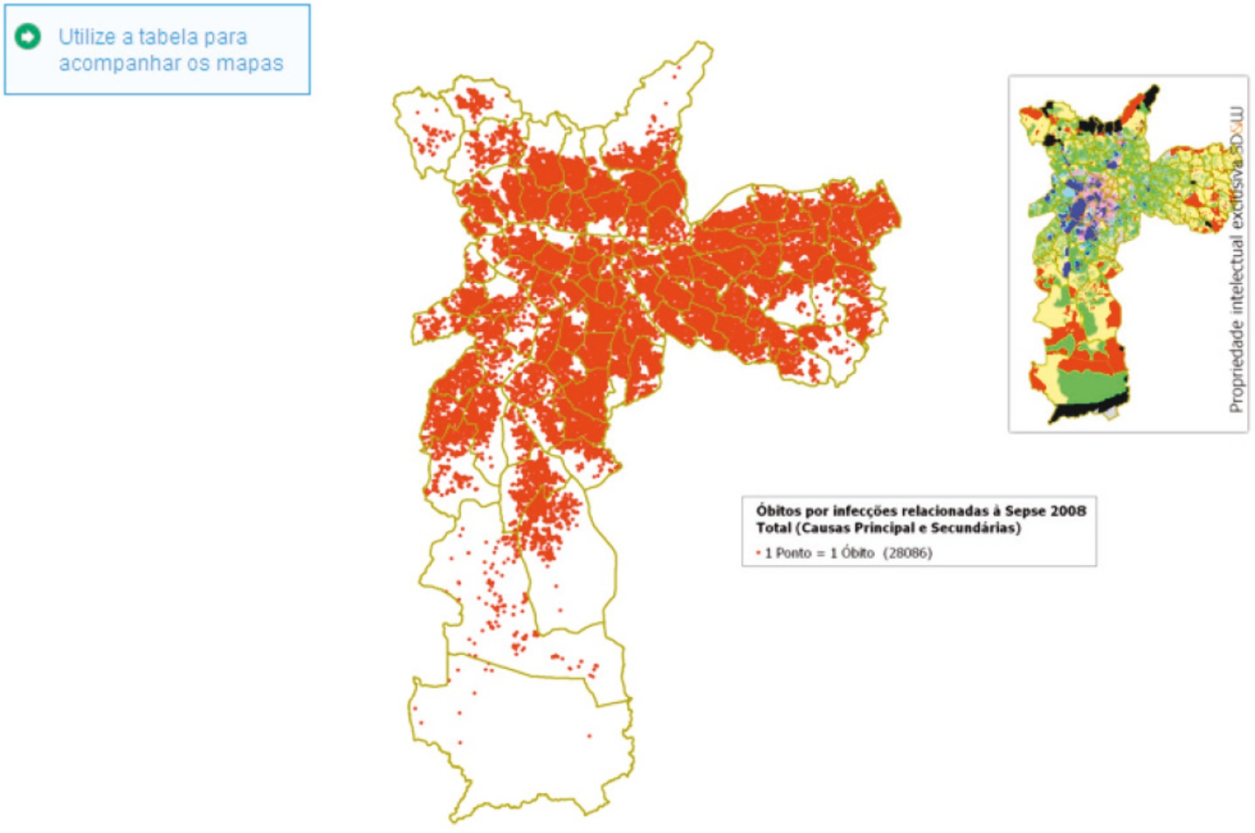

Figure 1 (abstract P13).

in the Control Group was 37 ± 44 days and in the Protocol Group was 47 ± 90 ($P = 0.36$). ICU LOS were similar, 14 ± 17 days and 14 ± 35 days, respectively. The 6-hour bundle adherence has significantly increased from 10% in the Control Group to 28% in the Protocol Group ($P = 0.001$). Differences between 6-hour bundle variables are shown in Table 1. The mortality rate decreased after protocol implementation from 57% to 38% ($P = 0.001$).

Conclusion Implementation of the SSC 6-hour bundle was associated with lower mortality.

P15

Importance of glycated hemoglobin in hyperglycemia diagnosis of patients with sepsis

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Critical Care 2011, **15(Suppl 2):**P15 (doi: 10.1186/cc10163)

Introduction Hyperglycemia is a frequent event in patients hospitalized in intensive care units (ICUs) and was attributed to endocrine metabolic stress related to acute disease. However, the interference of diabetes mellitus (DM) or undiagnosed glucose intolerance in hyperglycemia pathogenesis in critically ill patients is not well established.

Objective To correlate the presence of DM with hyperglycemia or glucose intolerance, not previously diagnosed in patients with severe sepsis/septic shock in the ICU, using the new standards of the American Diabetes Association (ADA) for classification of glycated hemoglobin (HbA1c) [1].

Table 1 (abstract P14). Compliance to each SSC 6-hour bundle variable

Variable (%)	Overall ($n = 414$)	Control ($n = 92$)	Protocol ($n = 322$)	*P* value
Blood culture	69	55	73	0.001
Lactate measurement	83	70	87	<0.0005
Central venous oxygen saturation	62	55	65	0.068
Central venous pressure	65	48	70	<0.0005
Early large spectrum antibiotics	89	86	89	0.46
All variables	24	10	28	0.001

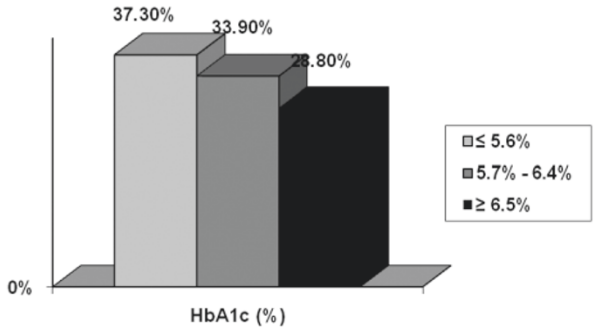

Figure 1 (abstract P15). Presence of diabetes or glucose intolerance undiagnosed.

Methods A study prospectively evaluating patients admitted to the ICU between the January 2007 and August 2009. We included patients with severe sepsis or septic shock, with less than 48 hours from organ dysfunction onset. Severe sepsis and septic shock were defined based on International Sepsis Definitions Conference criteria [2]. Exclusion criteria were: previous diagnosis of DM, insulin infusion at the time of evaluation, sepsis within <30 days and refusal to participate. According to new ADA classification, patients were considered normal with HbA1c ≤5.6%, glucose intolerant with HbA1c between 5.7% and 6.4% and diabetic those with HbA1c≥ 6.5% [1]. Statistical analysis used the *t* test, chi-square and correlation coefficient and was made using SPSS 15.0 software.
Results Our sample included 59 patients, mean age 60 ± 18 years, 62.7% were male. By classifying patients according to HbA1c, although denying a history of DM, only 37.3% had normal HbA1c. About 28.8% had undiagnosed diabetes and 33.9% had glucose intolerance. Analyzing the HbA1c as a continuous variable, we found only a statistically significant correlation with blood glucose levels at inclusion ($P = 0.04$), serum insulin at inclusion ($P = 0.02$) and insulin resistance at inclusion ($P = 0.02$). Studying the population characteristics, an association between HbA1c change and presence of comorbidities was observed ($P = 0.004$). Furthermore, patients with HbA1c changes were older ($P = 0.02$), had higher blood glucose at inclusion ($P = 0.03$) and higher lactate after 24 hours of inclusion ($P = 0.03$). See Figure 1.
Conclusion In this sample of patients with sepsis without previous history of DM a high incidence of patients with diabetes and glucose intolerance undiagnosed was found. Therefore, HbA1c measurement in the ICU may be useful in the investigation of patients with hyperglycemia.
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P16

Influence of vasopressor agent in pediatric septic shock mortality

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Critical Care 2011, **15(Suppl 2):**P16 (doi: 10.1186/cc10164)

Objective To clarify the impact of the choice of vasopressor support on mortality in pediatric septic shock (SS).
Methods A retrospective study based on the institutional database analyzing 1,050 patients admitted from October 1999 to January 2005. We studied children with SS after the neonatal period admitted to the pediatric intensive care (PICU) and we assessed the vasopressor support in the first 24 hours, PICU and hospital (HSP) length of stay (LOS), number of vasoactive drugs used, association between drugs and HSP mortality.
Results There were 101 consecutive patients with SS, mean age 41 months (95% CI = 30 to 52 months); mean of PICU LOS 16.73 days (95% CI = 11.18 to 22.28) and hospital LOS 55.46 days (95% CI = 43.16 to 67.75). PICU mortality was 32% and HSP mortality after PICU discharge was 10.8%. Of these, 33% patients received dobutamine and 26% patients dopamine as the only vasoactive drug. Dopamine plus dobutamine was used in 17.8%; dobutamine plus norepinephrine in 18% and dopamine plus norephinephrine in 3.9%. The HSP mortality associated with dobutamine was 29.4%; dopamine 53.8%; dopamine plus dobutamine 50%; dopamine plus norepinephrine 25%. The dopamine and dopamine plus dobutamine groups had higher hospital mortality (66% vs. 34%). Dopamine was associated with hypertensive state (odds ratio, 0.433; 95% CI = 0.192 to 0.976; $P = 0.047$), hypoxemia (odds ratio, 0.190; 95% CI = 0.040 to 0.909) and mechanical ventilation utilization (odds ratio, 2.625; 95% CI = 1.085 to 6.327; $P = 0.035$).
Conclusion Adrenergic support for pediatric patients with SS remains controversial. A prospective randomized controlled trial will be important to determine which subgroups of SS patients will benefit most with each drug.

P17

Incidence and risk factors for sepsis in surgical patients: a cohort study

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Introduction Surgical patients are vulnerable to infectious complications during hospitalization due to several factors. Sepsis seems to be a common complication in the postoperative period, and prompt recognition combined with early interventions is an effective way of reducing mortality in this condition.
Objective To evaluate risk factors for sepsis in surgical patients admitted to the intensive care unit (ICU).
Methods Prospective data collected from a cohort of surgical patients from January 2005 to December 2007. We analyzed the incidence of sepsis and certain variables from the preoperative, intraoperative and postoperative period as risk factors for sepsis.
Results We studied 648 surgical patients. The mortality rate was 19.3% and mean age was 53.2 ± 18.8 years. The incidences of severe sepsis and septic shock were 6.6% and 12.7%, respectively. Multivariate analysis showed that the following variables were associated with sepsis: urgent surgery (OR = 6.92, 95% CI = 4.34 to 11.03), emergency surgery (OR = 5.36, 95% CI = 2.86 to 10.05), POSSUM physiologic variables (OR = 1.03, 95% CI = 1.01 to 1.06), POSSUM surgical variables (OR = 1.09, 95% CI = 1.05 to 1.13), mechanical ventilation (OR = 7.20, 95% CI = 3.78 to 13.71) and Sequential Organ Failure Assessment at ICU admission (OR = 1.13, 95% CI = 1.05 to 1.22).
Conclusion The present study detected a high incidence of infectious complications in surgical patients that resulted in high mortality rates. Risk factors associated with sepsis during the perioperative period were easily detectable and knowledge of these can be useful for prevention strategies and early identification of complications.

P18

Lactate and base deficit are predictors of mortality in critically ill patients with cancer

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Critical Care 2011, **15(Suppl 2):**P18 (doi: 10.1186/cc10166)

Objective Cancer patients frequently require admission to the intensive care unit (ICU); however, there are few data regarding predictive factors for mortality. The aim of this study was to evaluate whether arterial lactate or standard base deficit (SBD) on admission and after 24 hours can predict ICU and hospital mortality for patients with cancer.

Methods We evaluated 1,129 patients with severe sepsis, septic shock, or postoperative after high-risk surgery. Lactate and SBD collected at admission and after 24 hours were compared between survivors and nonsurvivors. We evaluated whether arterial lactate and SBD are independent predictors of ICU and hospital mortality.
Results There were 854 hospital survivors (76.5%). Twenty-four-hour lactate >1.9 mmol/l (OR = 4.02, CI = 2.7 to 5.97) and SBD <–2.3 (OR = 2.4, CI = 1.64 to 3.52) were independent predictors of ICU mortality. Twenty-four-hour lactate >1.9 mmol/l (HR = 2.63, CI = 1.99 to 3.47) and 24-hour SBD <–2.3 mmol/l (HR = 1.74, CI = 1.33 to 2.27) were independent predictors of hospital death.
Conclusion Our findings suggest that lactate and SBD measurement should be included in the routine assessment of patients with cancer admitted to the ICU. These markers may be useful in the adequate allocation of resources in this population.

P19

Plasma levels of IL-6 and IL-10 in septic patients at admission and during follow-up and association with clinical outcomes

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Critical Care 2011, **15(Suppl 2):**P19 (doi: 10.1186/cc10167)

Introduction Sepsis is a systemic inflammatory syndrome triggered by infection. It has been recognized that a dynamic interaction between proinflammatory and anti-inflammatory response is present in this syndrome, which is balanced by as yet unknown mechanisms. We and others showed that inflammatory cytokines are upregulated in the early phase and downregulated in the late phases of sepsis, while anti-inflammatory cytokines are preserved. However, there are few data about the dynamics of these cytokines during follow-up of patients and their relation with clinical outcome. The aim of this study was to evaluate the plasma levels of a proinflammatory, IL-6, and an anti-inflammatory, IL-10, cytokine in septic patients.
Methods This prospective study included 53 septic patients (SP) and 29 healthy volunteers (HV) as a control group. Patients were admitted to the intensive care units of São Paulo, Sirio-Libanes and Israelita Albert Einstein hospitals. Samples were collected during the first 48 hours of organ dysfunction or sepsis (D0). A second sample was collected after 7 days from 35 SP (D7). The plasma levels of cytokines were measured using the cytometric bead array method (limit detection 2.0 pg/ml) by flow cytometry.
Results IL-6 and IL-10 plasma levels were higher in SP (median 170.8 pg/ml, range 3.53 to 16,028.52 pg/ml; and median 6.6 pg/ml, range 0.0 to 1,698.92 pg/ml, respectively) than HV (median 2.3 pg/ml, range 0.0 to 19.92 pg/ml for IL-6; and median 2.4 pg/ml, range 0.0 to 12.7 pg/ml for IL-10) ($P = 0.0001$ and $P = 0.007$, respectively). Plasma levels of IL-6 and IL-10 at D7 were not significant different from those at D0 ($P = 0.85$ and $P = 0.59$, respectively). IL-6 and IL-10 admission plasma levels were higher in nonsurvivors (median 284.76 pg/ml, range 9.16 to 16,028.52 pg/ml; and median 17.6 pg/ml, range 0.0 to 1,698.92 pg/ml, respectively) than in survivors (median 103.57, range 3.53 to 9,745.43 pg/ml; and median 9.91 pg/ml, range 0.0 to 313 pg/ml; $P = 0.02$ and $P = 0.003$, respectively).
Conclusion Our results show that both proinflammatory and anti-inflammatory cytokines are detected during sepsis and a higher level of both cytokines at admission is associated with worst outcomes.

P20

Relevance of eosinopenia as an early sepsis marker

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Critical Care 2011, **15(Suppl 2):**P20 (doi: 10.1186/cc10168)

Introduction Early diagnosis of sepsis based on biomarker values has been evaluated. However, there is no ideal marker for this purpose yet.
Objective To evaluate eosinopenia as an early sepsis marker.

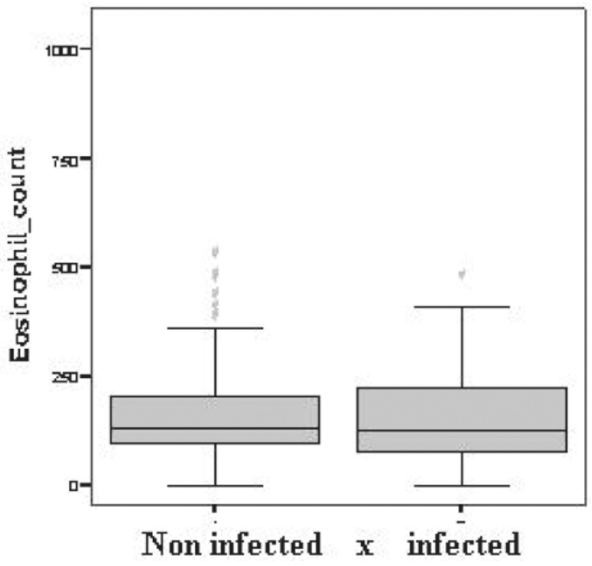

Figure 1 (abstract P20). Eosinophil count comparison between non-infected and infected patients.

Methods A retrospective study, on a 40-bed surgical–medical intensive care unit (ICU). Data from 300 charts of patients consecutively admitted (between January and March 2009) were collected. The patients were classified as negative (no systemic inflammatory response syndrome (SIRS)), SIRS, sepsis, severe sepsis or septic shock, according to the criteria of the American College of Chest Physicians/Society of Critical Care Medicine. Patients who died or were discharged within 24 hours after admission, with previous hematological disease and those whose data were incomplete were excluded from the study. We compared the eosinophil cell count (hematology analyzer ABX Pentra DF 120; Horiba Medical, Montpellier, France) on the day of admission to the ICU between the non-infected group (negative and SIRS) and the infected group (sepsis, severe sepsis and septic shock). The normality of the distribution was tested by the Kolmogorov–Smirnov test and the comparisons were made utilizing the Mann–Whitney test. Statistical analyses were done utilizing SPSS 19 version.
Results Three hundred patients were admitted to the ICU in the period, mean age 58.6 ± 20 years. The mean length of stay was 9.2 ± 15.7 days, the mean APACHE II score was 9.4 ± 6.5. Eighteen patients were excluded (one because of discharge within 24 hours; 11 patients because of previous hematological disease; six because of incomplete data). The remaining 282 patients were enrolled into the study, classified as follows: negative (158 patients – 56%), SIRS (25 – 8.8%), sepsis (44 – 15.6%), severe sepsis (23 – 8.2%) and septic shock (32 – 11.4%). At the time of admission, 99 (35.1%) patients had an infection. The mean ± SD eosinophil count was 167.6 ± 131.5, 153.6 ± 129 and 153.7 ± 135.6 cells/mm^3 in the total, non-infected and infected groups, respectively ($P = 0.46$; Figure 1). At a cut-off value of 100 cells/mm^3, the eosinophil count yielded a sensitivity of 35%, a specificity of 71%, a PPV of 40% and a NPV of 66%.
Conclusion Eosinopenia was not a good early diagnostic marker for sepsis in this population.

P21

Th17 lymphocytes and alternatively activated monocytes are upregulated in clinical sepsis

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Critical Care 2011, **15(Suppl 2):**P21 (doi: 10.1186/cc10169)

Introduction Sepsis is a systemic inflammatory response triggered by infection. Inflammatory response is modulated during sepsis and

upregulation and downregulation of cellular activity is observed, depending on the cells and functions evaluated. Nevertheless, the interaction of innate and adaptative immune responses has been little studied in clinical sepsis.
Objective The aims of this study were to evaluate the presence of TCD4 lymphocytes Th1, Th17, regulatory (Treg) and alternatively activated monocytes in septic patients and their association with prognosis.
Methods Septic patients were enrolled at admission (D0, n = 67) and after 7 days of therapy (D7, n = 33). Thirty-two healthy volunteers matched for age and gender were included as controls. PBMC were obtained by the Ficoll gradient method. Th1 and Th17 lymphocytes were identified by the intracellular detection of IFNγ and IL-17, respectively, and Treg cells were identified by $Foxp3^{+}CD127^{-}$ or $CD25^{+}CD127^{-}$ expression. Monocytes were evaluated for CD206 and CD163 expression.
Results Spontaneous production of IFNγ and IL-17A was increased in TCD4 cells of septic patients when compared with healthy volunteers. After PMA/Io stimulation, the percentage of TCD4 lymphocytes producing IFNγ was lower and IL-17 was higher in septic patients than in healthy volunteers. The results based on absolute $TCD4^{+}$ lymphocyte counting showed a lower proportion of Th1 cells and double the proportion of Th17 cells in septic patients compared with healthy volunteers while the proportion of Treg remained unchanged. In follow-up samples, a higher percentage of IFNγ and a lower percentage of IL-17 producing cells were observed compared with D0 samples. A higher percentage of spontaneously producing IFNγ was found in D7 compared with D0 samples from patients who died and a decreased percentage of PMA/Io-induced IL-17 producing cells between patients' samples of follow-up (D7) compared with admission samples was found in survivors. Septic patients showed a markedly increased proportion of alternatively activated monocytes, which was sustained in both patients' samples.
Conclusion We found a decreased proportion of Th1 and increased proportion of Th17 in septic patients, and an impressive increase in the percentage of monocytes expressing CD206 and CD163, indicating differentiation towards wound healing and regulatory or inhibitory monocytes, which may underscore the previous studies showing a reprogramming of monocytes' function in sepsis.
Acknowledgments This work was supported by Fundação de Amparo a Pesquisa de Estado de São Paulo (FAPESP – grants 2006/58744-1 and 2008/07511-2).

P22
Epidemiology of hospitalized pediatric bacterial sepsis in Brazil: a trend analysis from 1992 to 2006
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Critical Care 2011, **15(Suppl 2):**P22 (doi: 10.1186/cc10170)

Objective To determine the epidemiology, costs and outcome of hospitalized pediatric sepsis in Brazil (1992 to 2006) and to compare mortality caused by sepsis with that caused by other major childhood diseases.
Methods We performed a population-based cohort study using a government database of all hospitals affiliated with the Brazilian health system. We studied all hospitalizations in children from 28 days through 19 years with diagnosis of bacterial sepsis defined by the criteria of the International Classification of Diseases.
Results From 1992 through 2006, the pediatric hospital mortality rate was 1.23%. There were 556,073 pediatric admissions with bacterial sepsis, with a mean mortality rate of 19.9%. The incidence of sepsis decreased 64% from 1992 to 2006 (P <0.001); however, the mortality rate remained unchanged (from 1992 to 1996, 20.5%; and from 2002 to 2006, 19.7%). The sepsis hospital mortality rate was substantially higher than pneumonia (0.5%), HIV (3.3%), diarrhea (0.3%), undernutrition (2.3%), malaria (0.2%) and measles (0.7%). The Human Development Index and mortality rates by region were: North region 0.76 and 21.7%; Northeast region 0.72 and 27.1%; Central–West region 0.81 and 23.5%; South region 0.83 and 12.2%; and Southeast region 0.82 and 14.8%, respectively.
Conclusion Sepsis remains an important health problem in children in Brazil. The institution of universal primary care programs has been associated with substantially reduced sepsis incidence and therefore deaths**;** however, hospital mortality rates in children with sepsis remain unchanged. Implementation of additional health initiatives to reduce sepsis mortality in hospitalized patients could have great impact on childhood mortality rates in Brazil.

P23
Role of nurses in the early recognition of sepsis
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Critical Care 2011, **15(Suppl 2):**P23 (doi: 10.1186/cc10171)

Introduction Sepsis is considered one of the most challenging diseases of all time [1]. During many years the concept of sepsis was not the same inside the medical court, which resulted in a heterogeneous population [2]. Its incidence has been growing dramatically over the past decades, having advanced age of patients, increase of invasive procedures, frequent use of immunosuppressive drugs and the increase of infections caused by multiresistant bacteria as the main contributors [3]. Nurses have an important role in early recognition of sepsis.
Objective We investigated whether nurses are able to early recognize signals and symptoms of sepsis.
Methods The methodological strategy was quantitative, exploratory and multicentric, with four small private hospitals involved. Thirty nurses working for medical–surgical clinic, semi-intensive, intensive and emergency units participated in the survey.
Results Only 23.3% of nurses considered variation in leukocytes, cardiac and respiratory frequency and axillary temperature as classifying sepsis clinical signals. In one case with sepsis signals, only 10% of answers were correct. When trying to establish a differentiation pattern among sepsis stages, a new case was developed highlighting severe sepsis, showing 36.6% of right answers, making it clear that there is a confusion facing this syndrome, where 10% chose sepsis, 26.6% septic shock and 26.6% infection caused by a surgical wound. Only 30% of the nurses pointed out that treatment is effective within hours of its recognition. In a final question 70% affirmed that it is important to recognize sepsis early.
Conclusion The study showed that there are difficulties on the part of nurses in recognition of sepsis. With the present results, it can be concluded that the development of nursing care protocols with the early recognition of sepsis signals by the nurse can help the patient's recovery. Training of nurses working in an ICU, and their team as a whole, can help to reduce deaths in hospitals, improving the assistance and making patients' permanence in ICUs shorter, which can not only benefit patients but can also lead to a reduction in costs for the institution.
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Cardiology

P24
Respiratory muscle weakness in acute heart failure patients
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Critical Care 2011, **15(Suppl 2):**P24 (doi: 10.1186/cc10172)

Background Respiratory muscle weakness has been arbitrarily defined as a maximum inspiratory pressure lower than 70% of the predictive value. Patients with chronic heart failure have 30 to 50% prevalence of respiratory muscle weakness, and so far there is no evidence of this prevalence in patients hospitalized with acute heart failure.

Objective To evaluate maximum inspiratory pressure and the prevalence of respiratory muscle weakness in hospitalized patients with acute heart failure.
Methods A cohort study, performed at Hospital Israelita Albert Einstein in acute heart failure patients admitted to our hospital. We excluded patients with chronic pulmonary disease, neurological and neuromuscular disorders, postoperative period and those that needed an orotracheal tube. Patients after respiratory and hemodynamic stability were submitted to a maximum inspiratory pressure (MIP) measurement by a manuvacuometer. Measurement was performed using a facial mask and unidirectional valve with the patient positioned at 45°. We also collected demographic data, brain natriuretic peptide hormone (BNP), ejection fraction estimated by echocardiogram and use of non-invasive ventilation. MIP was measured at two moments, the first measurement as soon as patients were clinically stable and the second measurement before hospital discharge.
Results We evaluated 50 patients, with a mean age of 75 years (95% CI = 72 to 78.8), mostly male patients (78%, 39 patients), mean ejection fraction of 0.33 (95% CI = 0.31 to 0.35), and 93.5% had ejection fraction lower than 0.45. At hospital admission, 24 patients used NIV (55.8%), and the BNP median value was 726.5 pg/ml (range of 217 to 2,283 pg/ml). The first MIP measurement showed a median of –52 cmH_2O (range of –20 to –120 cmH_2O), with 35 patients (70%) presenting MIP lower than 70% of the predictive value. Time to the first measurement had a median of 3.5 days (range of 1 to 22 days). At hospital discharge, the median MIP was –53 cmH_2O (range of –20 to –150 cmH_2O), and maintained 70% of patients with MIP lower than 70% of the predictive value. There was no significant difference between initial and hospital discharge MIP ($P = 0.806$). Median hospital length of stay was 11 days (range of 4 to 36 days).
Conclusion Hospitalized patients with acute heart failure have a high prevalence of respiratory muscle weakness, and maintain weakness even after clinical stabilization.

P25

Three-dimensional and two-dimensional echocardiography and biochemical analysis in patients with ST-segment elevation myocardial infarction percutaneously treated: relationship between LV function, remodeling and serum cardiac markers

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Critical Care 2011, **15(Suppl 2):**P25 (doi: 10.1186/cc10173)

Introduction The prognosis of patients with acute myocardial infarction (MI) concerns multiple aspects that demonstrate myocardial aggression (such as serum markers of cardiac damage), and also adaptative mechanisms relative to the acute event (ventricular remodeling).
Objective The aim of the study was to assess the relationship of serum markers of cardiac damage and tridimensional echocardiographic (3D Echo) parameters as well as echocardiographic bidimensional (2D Echo) left ventricular ejection fraction (LVEF) in patients with acute ST-elevation MI.
Methods A prospective study of 23 patients (17 males, mean age of 57 ± 13 years), with acute ST-elevation MI, primarily percutaneously treated (stent). Serum cardiac markers (CK-MB, troponin I, myoglobin) and serum BNP were compared with echocardiographic parameters (volumes, LVEF, 3D dissynchrony index, 3D sphericity index (3D SPI)). The 3D SPI is defined as: $LVEDV / (4/3\pi(D/2))^3$, where D is left ventricular diastolic diameter on 4CH apical view. 3D SPI was compared with a group of 20 normal volunteers (normal values: 0.29 ± 0.08). The statistical analysis was performed using Pearson's correlation coefficient (r), 95% CI, $P < 0.05$, linear regression equation and Bland–Altman test.
Results 3D SPI ranged from 0.29 to 0.45 (0.35 ± 0.0 8); 3D LVEF ranged from 0.36 to 0.70 (0.50 ± 0.06); 3D EDV ranged from 72 to 159 (100 ± 27) ml; 2D LVEF ranged from 0.40 to 0.71 (0.54 ± 0.08); 2D EDV ranged from 57 to 165 (104 ± 32) ml. Troponin I ranged from 2.3 to 33 (12.9 ± 9) ng/ml; CKMB ranged from 5.7 to 258 (94.4 ± 78) ng/ml; BNP ranged from 25 to 1,058 (264 ± 128) pg/ml. Pearson's correlation coefficient (r), relative to 3D LVEF: 1 – BNP: $r = –0.7427$, $P = 0.4800$.
Conclusion In this series, stronger correlation was observed relative to serum CK-MB, BNP and 3D Echo LVEF, when compared with 2D Echo LVEF. We did not observe association concerning LV remodeling and cardiac damage assessed by serum cardiac markers.

Infection

P26

PK–PD correlation of anti-infective agents for dose adjustment in one severe burn child with sepsis

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Introduction Altered pharmacokinetics in patients with major burns may result in anti-infective plasma concentrations below those required to be effective against the common pathogens encountered in burn patients. Altered fluid volumes and increased renal blood flow in these patients are the main factors responsible for pharmacokinetic

Table 1 (abstract P26). Pharmacokinetics and PK–PD correlation for six anti-infective agents for a burn child [AQ2]

		Drug efficacy (%)[a]/*MIC* (mg/l)[b]			$t_{1/2}$ (hours)		CL (ml/minute/kg)		Vd (l/kg)	
Drug	**Follow-up periods**				**Obtained**	**Reference[c]**	**Obtained**	**Reference[c]**	**Obtained**	**Reference[c]**
Fluconazole	1	100%	100%	100%	22.10	27 to 37	0.27	0.20 to 0.34	0.53	0.50 to 0.70
		8 mg/ml	*16 mg/ml*	*32 mg/ml*						
Imipenem	3	100%	100%	100%	1.90	0.8 to 1.0	4.62	2.6 to 3.1	0.76	0.18 to 0.28
		0.5 mg/ml	*1 mg/ml*	*4 mg/ml*						
Linezolid	2	100%	50%	0%	3.45	4.5 to 5.4	3.22	1.14 to 2.08	0.95	0.57 to 0.86
		1 mg/ml	*2 mg/ml*	*4 mg/ml*						
Meropenem	8	100%	100%	62%	2.00	1.0	3.81	2.7 to 4.3	0.60	0.17 to 0.28
		0.5 mg/ml	*2 mg/ml*	*8 mg/ml*						
Sulphamethoxazole	2	50%	50%	ND	19.65	7.5 to 12.7	0.74	0.24 to 0.38	1.34	0.22 to 0.30
		32 mg/ml	*64 mg/ml*	*ND*						
Vancomycin	5	80%	60%	60%	2.10	5.0 to 11.0	1.46	1.3 to 1.5	0.30	0.33 to 0.45
		1 mg/ml	*2 mg/ml*	*4 mg/ml*						

[a]Parameters PK–PD for *in vivo–in vitro* correlation: $AUC^{ss}_{0\ to\ 24}$ / MIC or %T >MIC. [b]Eucast, 2011. [c]Goodman and Gilman, 2006; Micromedex, 2010.

changes that require higher doses, reduction on time dose intervals or both of them.
Objective Anti-infective plasma measurements in one burn patient with sepsis to determine whether drug efficacy was achieved, thereby improving the likelihood of infection control.
Methods A male burn child, 8 years old, 40 kg with severe thermal plus inhalation injuries (petrol), 45% total burn surface area, was investigated. He has received six anti-infective agents during the 88-day period in the ICU. Drug plasma monitoring, pharmacokinetics and the PK–PD correlation were done by blood sample collection, and drug plasma measurements were performed by high-performance liquid chromatography.
Results Since in burns pharmacokinetics is unpredictable for all agents investigated, drug efficacy was based on PK–PD correlation (Table 1). Dose adjustment was performed for vancomycin (from 0.5 g 6-hourly to 1 g 8-hourly), meropenem (from 0.75 to 1 g 8-hourly) and linezolid (from 0.3 to 0.6 g 12-hourly).
Conclusion PK–PD correlation was applied to investigate changes on dose regimen to reach the efficacy for all anti-infective agents. Dose adjustments were required only for vancomycin, linezolid, and meropenem to guarantee drug efficacy.
Acknowledgements The authors are grateful to the Brazilian Foundation CAPES, CNPq and FAPESP for financial support.

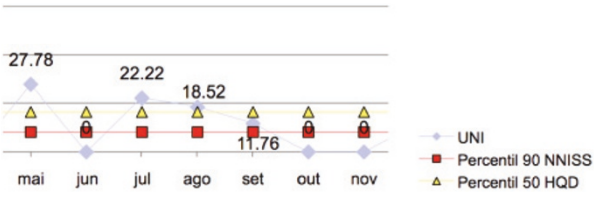

Figure 1 (abstract P27). Ventilator-associated respiratory infection rate per 1,000 days of mechanical ventilation.

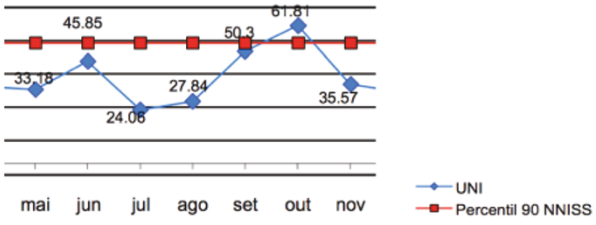

Figure 2 (abstract P27). Device utilization for mechanical ventilation.

P27

Preventing ventilator-associated pneumonia: a new methodology for bed head control 24 x 7

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Background Among the measures for preventing ventilator-associated pneumonia (VAP) in patients at risk, strict control of the bed head above 30° stands as the single one with better cost benefit [1]. While the semi-recumbent position is intended to be an inexpensive and easily performed action by the intensive care unit team, the smart beds currently available are not the reality for the vast majority of hospitals around the world because of the high cost. Therefore, the simple theoretical principles for its execution are contradicted by its difficult practical application.
Objective We propose a new methodology for continuous control of the bed head, thus making possible the appropriate compliance to the semi-recumbent position, seeking a reduction in the VAP rates.
Methods A retrospective observational study with 41 mechanically ventilated patients over a 7-month period starting in May 2010, in a neurointensive critical care unit of a private tertiary hospital. There was a historical control as reference during 3 months before the intervention made in August, and measurements for the same time after it as a means to confirm its appropriate implementation, based on the National Nosocomial Infections Surveillance System (NNISS) as a parameter. Applied was a technique for an hourly basis positioning of the head of bed angle in such a manner that it never remained below 30º for over 1 hour in the 24 hours daily. It was turned into a mandatory item in the prescription and its execution was performed by the nursing staff, through reading of a specific angulation marking adhesive in the side head rail, and annotation in the usual sheet for recording the vital signs, followed by the prompt adjustment to the right position. Other items of the institutional bundle of VAP were not modified.
Results There was a trend towards reduction in the ventilator-associated respiratory infection rate (Figure 1) after the implementation of the methodology, bringing it to zero despite the elevation in device utilization (Figure 2).
Conclusion This unsophisticated and low-cost method for controlling heads of beds in an intensive care unit allowed its adequate employment, thus seeming to cause an impact in the incidence of VAP when comparing respiratory infection rate and device utilization, despite limitations about the small case series and the short following period.
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P28

Ventilator-associated pneumonia: microbiological profile and mortality

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Background Ventilator-associated pneumonia (VAP) is the second most frequent infection in American intensive care units (ICUs) and the most frequent in European ICUs, and its incidence and mortality rates are still high, despite the continuous advances in diagnosis and treatment techniques. Although its multiple etiologies and complex diagnosis breed divergence about its management approach.
Objective To evaluate the microbiological profile of patients with VAP admitted to the ICUs of two hospitals in São Luís – MA.
Methods A descriptive, analytic, retrospective study, with 1,072 patients admitted to ICUs of the hospitals Dr Carlos Macieira and Centro Médico Maranhense between January 2008 and December 2009. The patients were stratified by age, sex, infection type, identified pathogens and ICU stay outcome. Data were analyzed by the software Epi Info® (version 3.5.1; 2008) and so was calculated the chi-square (χ^2) nonparametric test, with 5% significance level adopted.
Results It was verified that 31.6% of the patients had a polymicrobial infection and 68.4% acquired infection by monobacteria. Gram-negative bacilli showed up as the most common pathogens overall. The multidrug-resistant bacteria incidence was 51.3% and its correlation with VAP mortality and the means of days under mechanical ventilation of infected patients did not present statistical significance respectively.
Conclusion VAP has been pointed out as a manifold etiology disease, with high morbi-mortality indexes that do not change according to the etiologic agents.
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Nephrology

P29

Analysis of the outcome of mechanical ventilation in patients with acute renal failure

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Background Mechanical ventilation (MV) is a factor that may induce or worsen lung injury and also contribute to the failure of other organs. An early manifestation of multiple organ failure in the ICU is acute renal failure (ARF), with a prevalence ranging from 4 to 16%, which is associated with increased rates of mortality.
Objective The aim of this study was to analyze the outcome of mechanical ventilation in patients with ARF in the ICU.
Methods This is a retrospective and analytical study that included patients aged >18 years, hospitalized in the ICU of HSL under MV for more than 24 hours, from June 2009 to June 2010. Patients with chronic renal failure were excluded. The AKIN criteria were used to stratify patients into three groups: non-ARF, ARF and dialysis ARF. The variables analyzed were age, gender, APACHE II, length in ICU, length of MV, MV outcome and mortality. Statistical analysis used chi-square and ANOVA, with a significance level of 5%.
Results The sample consisted of 131 patients, 51.1% women, mean age 65.6 ± 20.0 years. According to the criterion AKIN, 69.5% of patients had ARF, dialysis was 31.9%. APACHE II was higher in ARF (17.6 ± 7.7) and IRA dialysis (18.6 ± 11.0), compared with the group non-ARF (13.2 ± 7.7), $P = 0.01$. The ICU stay was similar between groups (non-ARF 21.8 ± 32.5 days; ARF 20.8 ± 19.9 days; dialysis ARF 27.1 ± 23.4 days, $P = 0.53$). The duration of MV was higher in the dialysis ARF (non-ARF 5.5 ± 4.7 days; ARF 6.9 ± 7.6 days; dialysis ARF 14.2 ± 15.1, $P < 0.01$). See Table 1 and Figures 1 and 2.
Conclusions In the sample studied, we observed a high prevalence of MV and ARF, and the presence of renal failure is associated with a lower success rate of weaning and higher mortality.

Table 1 (abstract P29). Characteristics of subjects with AKIN criteria

	No ARF ($n = 40$)	ARF ($n = 62$)	Dialysis ARF ($n = 29$)	*P* value
Age (years)	57.7 ± 20.1	70.3 ± 18.9	66.3 ± 19.1	<0.01
APACHE II	13.2 ± 7.7	17.6 ± 7.7	18.6 ± 11.0	0.01
SAPS II	40.0 ± 14.6	45.6 ± 12.6	44.3 ± 16.4	0.14
Length in ICU (days)	21.8 ± 32.5	20.8 ± 19.9	27.1 ± 23.4	0.53
Length of stay (days)	28.3 ± 36.2	25.2 ± 22.8	29.6 ± 24.0	0.74
Duration of MV (hours)	131.8 ± 112.1	166.7 ± 182.0	341.6 ± 363.4	<0.001

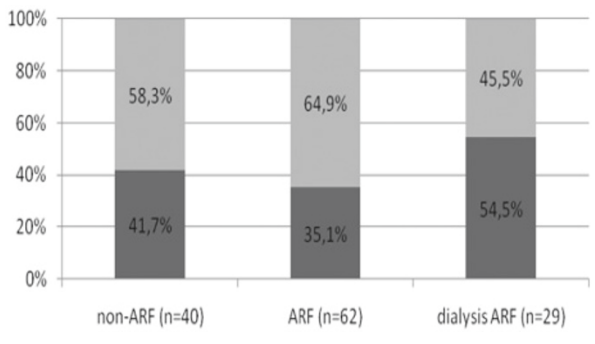

Figure 1 (abstract P29). Distribution of patients who progressed or not to wean from MV. *P <0.01.

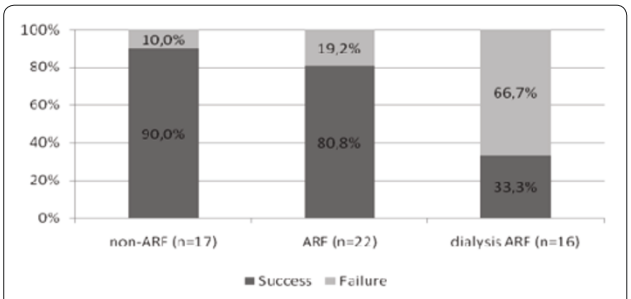

Figure 2 (abstract P29). Outcomes of weaning. *P <0.01.

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P30

Fluid removal in critically ill patients during hemodialysis: is there a role for functional hemodynamic monitoring?

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Critical Care 2011, **15(Suppl 2):**P30 (doi: 10.1186/cc10178)

Introduction Renal replacement therapy is frequently required in critically ill patients with acute kidney injury. With intermittent hemodialysis, large volumes of fluid need to be removed over a relatively short period of time, jeopardizing hemodynamic stability in already hemodynamically compromised patients. Established methods of dry weight estimation are not practical in critical care and the estimation of excess body fluid removable by hemodialysis constitutes a particular change in these patients. Dynamic parameters of fluid responsiveness are increasingly being used to guide fluid therapy in critical care, but their suitability to monitor fluid removal with hemodialysis is not known.
Objective The aim of our study was to analyze changes in a dynamic parameter of fluid responsiveness (pulse pressure variation) in critically ill patients submitted to intermittent hemodialysis.
Methods Changes in pulse pressure variation, central venous pressure, median arterial pressure, and cardiac index were analyzed every hour over intermittent hemodynamics using a minimally hemodynamic monitoring device (LIDCO plus) in 28 mechanically ventilated patients. Additional measurements of lactate and central venous saturation were measured at the same time.
Results Median dialysis duration was 4.5 hours, and a median of 2,900 ml fluid was removed. There were 102 hypotensive episodes. The median arterial blood pressure was 72 mmHg. Median CVP was 16 ± 6 and pulse pressure variation was 9 ± 6 just before hemodialysis. There was a significant increase in the pulse pressure variation over the dialysis treatment (15 ± 4) and a decrease in the CVP value (13 ± 6). Comparing the group of patients already fluid responsive (ΔPp >13%) just before the start of hemodialysis with the group nonfluid reponsive (ΔPp <13%), the median values of lactate (2.1 x 1.9, $P = 0.78$) and central venous saturation (0.74 x 0.72, $P = 0.94$) were not significantly different, but at the end of the procedure a significant difference in lactate was observed (4.2 x 2.5, $P < 0.2$).
Conclusion In our study the rate of ultrafiltration during hemodialysis was reflected by the changes in the pulse pressure variation. In patients already fluid responsive (ΔPp >13%) just before hemodialysis, the impact of fluid removal at the end of the procedure in perfusion parameters was significantly higher. Dynamic parameters of volemia could be useful to guide fluid removal and avoid hypoperfusion in acute renal failure patients mechanically ventilated during hemodialysis treatment.

P31

Impact of positive fluid balance on survival in critically ill cancer patients

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Introduction Fluid overload has recently been linked to adverse outcomes in critically ill patients, but its impact on the outcomes of cancer patients admitted to intensive care units (ICUs) has not been previously described.
Methods A total of 234 cancer patients admitted to the medical ICU in a 6-month period were prospectively evaluated for survival. Univariate and multivariate analyses were used to study ICU admission parameters associated with ICU mortality. Exclusion criteria were ICU stay <24 hours and chronic renal failure on dialysis.
Results Overall mortality was 21%. The mean age of all patients was 62.7 ± 11.6 years and 55% were male. Postoperative care (45%) and sepsis (35%) were the major reasons for admission to the ICU. The mean APACHE II score value at 24-hour ICU was 21.2 ± 6.4 and the mean Karnofsky score before ICU admission was 75.2 ± 17.2. At multivariate analysis, the following variables at ICU admission were significantly associated with ICU mortality in cancer patients: Lung Injury Score >2 (OR = 3.3; 95% CI = 1.32 to 8.23) and positive fluid balance (for each 100 ml/24 hours) (OR = 1.03; 95% CI = 1.01 to 1.06).
Conclusions Fluid overload is independently associated with increased mortality in critically ill cancer patients. Further studies are necessary to determine the impact of positive fluid balance on acute organ dysfunction and overall prognosis of cancer patients.

P32

Previous renal support is a predictor for chronic renal replacement therapy after orthotopic liver transplantation

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Critical Care 2011, **15(Suppl 2):**P32 (doi: 10.1186/cc10180)

Background In the Model for End-Stage Liver Disease (MELD) era of organ allocation, renal replacement therapy (RRT) has been done in many liver transplant patients. In this setting the time and probability of kidney function recovery is essential for patient and transplant program management.
Methods In this study we evaluated a sample of stable post-intensive care dialysis patients from a group of 297 adults who were submitted to orthotopic liver transplantation (OLT) in an urban tertiary medical center from 1 June 2005 to 31 December 2009. We evaluated the average time of renal function recovery (out of need for RRT) in OLT patients on post-intensive care hemodialysis (HD) and determined risk factors for chronic dialysis support during a 1-year follow-up period. Patients were censored at recovery of kidney function, death on HD or end of the follow-up period. The Cox proportional hazards model was used to compare the relative risk (RR) of remaining or not in HD after 1 year and predictor variables.
Results We evaluated the clinical records of 83 patients (50 ± 14 years, 64% male, 22% pre-OLT diabetes mellitus (DM), 31% HCV-related disease, MELD 27.5 ± 11.8, 17% acute re-OLT, 37% pre-OLT RRT, pre-OLT serum creatinine 1.5 ± 1.4 mg/dl, 28% pre-OLT proteinuria). During the study period, 70 (84%) patients were removed from dialysis; of these, six (7%) remained on HD for more than 90 days until renal function recovery, 184 days being the longest period required. Nine (11%) patients died on HD and only four (5%) patients were on HD after 1 year. The median of recovery time was 28 days (from 6 to 184 days). Classic risk factors for renal disease, like age and DM, acute re-OLT requirement and pre-OLT RRT, were significant predictors of chronic RRT. In the multivariate analysis, the most important prognostic factor for chronic RRT was the presence of pre-OLT RRT (HR = 1.89, 95% CI = 1.145 to 3.129, $P = 0.013$).
Conclusion Given the shortage of available organs, kidney transplantation after or concomitant to OLT must be considered cautiously, especially in OLT patients who were not submitted to pre-OLT RRT.

P33

Prognostic factors for acute kidney injury development in critically ill cancer patients

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Introduction Acute kidney injury (AKI) in cancer patients is a complication that causes substantial morbidity and mortality.
Methods A total of 1,500 cancer patients admitted to the medical intensive care unit (ICU) between November 2008 and February–March 2011 were evaluated for AKI, defined as an increase in serum creatinine (SCr) >0.3 mg/dl over the baseline value, according to the AKIN stage I definition. Univariate analysis was used to study ICU admission parameters associated with AKI occurrence during the ICU stay.
Results AKI incidence was 31%, with a mortality rate of 42%, compared with 20% for non-AKI patients. The mean age of all patients was 63.1 ± 11.3 years and 55% were male. Sepsis (44.8%) and respiratory failure (24.8%) were the major reasons for admission to the ICU. At univariate analysis, the following variables at ICU admission were significantly associated with AKI in cancer patients during the ICU stay: need for vasopressors (74.3% vs. 25.7%; $P = 0.004$), serum potassium (4.2, 3.6 to 4.6 mEq/l vs. 3.8, 3.5 to 4.2 mEq/l; $P = 0.006$), serum pH (7.35, 7.3 to 7.39 vs. 7.39, 7.34 to 7.42; $P = 0.006$), base excess (–5.5, –9.2 to –1.8 vs. –2, –5 to 0.1; $P = 0.003$), serum phosphorus (3.9, 3.4 to 4.6 mg/dl vs. 2.9, 2.4 to 3.9 mg/dl; $P = 0.0001$), baseline serum creatinine (1.2, 0.7 to 1.8 mg/dl vs. 0.6, 0.4 to 0.8 mg/dl; $P = 0.01$). At multivariate analysis, the following variables at ICU admission were associated with AKI: serum creatinine >1.0 mg/dl (OR = 9.2; 95% CI = 2.3 to 35.8), pH <7.38 (OR = 5.1; 95% CI = 1.6 to 15.6) and need for vasopressors in the first 24 hours (OR = 3.4; 95% CI = 1.2 to 9.6). Variables previously thought to be indicative of a poor prognosis (advanced age, metastatic or progressive disease, recent chemotherapy and performance status) were not predictive of AKI.
Conclusions AKI is frequent in critically ill cancer patients and has a great impact on mortality. AKI incidence can be better estimated by an evaluation of the acute organ dysfunction at ICU admission than by the characteristics of the underlying malignancy.

P34

Serum soluble-Fas, inflammation and anemia in acute renal failure and critical illness

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Introduction Soluble Fas (sFas) levels are associated with anemia and erythropoietin (Epo) hyporesponsiveness in chronic kidney disease. Anemia is also a common feature in patients with acute renal failure (ARF) and in critically ill patients. Therefore, it is possible that sFas levels are also associated with anemia and increased need for serum Epo levels in ARF and critical illness in order to maintain hemoglobin (Hgb) levels.
Objective To investigate the relationship between serum levels of sFas, Epo, inflammatory cytokines and Hgb levels in patients with ARF and critically ill patients.
Methods We studied 72 critically ill patients with ARF on continuous hemodiafiltration (CVVHDF group; $n = 53$) or without ARF (non-ARF group; $n = 19$), 29 chronic hemodialysis patients (ESRD group) and 29 healthy volunteers (Healthy group). The CVVHDF dose was 30 ml/kg per hour or higher. We investigated among the four groups the

relationships between Hgb and serum levels of sFas, Epo, TNFα, IL-6, IL-10 and iron status.
Results The CVVHDF and non-ARF groups had higher serum levels of Epo, IL-6, IL-10 and ferritin than the other groups. Hgb levels were lower in the CVVHDF group than in the other groups. Serum sFas levels were higher in uremic patients (CVVHDF and ESRD groups; P <0.001). When all critically ill patients were pooled together, Hgb levels correlated negatively with serum levels of IL-6 (r = –0.55, P = 0.001), sFas (r = –0.40, P = 0.001), TNFα (r = –0.37, P <0.001), iron (r = –0.28, P = 0.02), ferritin (r = –0.35, P = 0.004) and transferrin saturation (r = –0.30, P = 0.01). In multivariate analysis, after adjusting for markers of iron store and inflammation, levels of IL-6 (P <0.001), sFas (P <0.001) and TNFα (P = 0.01) correlated negatively with Hgb in critically ill patients.
Conclusion Our findings demonstrate that sFas is associated with anemia in ARF and critically ill patients. Serum sFas and Epo levels were higher and Hgb levels were lower in critically ill patients with ARF, suggesting that sFas may be associated with Epo hyporesponsiveness in ARF and critical illness.

Table 1 (abstract P35). Etiology and population

Etiology	Population (%)
COPD, *n* (%)	98 (29.6)
Pneumonia, *n* (%)	68 (20.54)
Postoperative, *n* (%)	63 (19.03)
Sepsis, *n* (%)	39 (11.78)
ARDS/ALI, *n* (%)	25 (7.55)
Trauma without brain injury, *n* (%)	11 (3.32)
Acute pulmonary edema, *n* (%)	10 (3.02)
Miscellaneous, *n* (%)	17 (5.13)
Total	331

ALI, acute lung injury; ARDS, acute respiratory distress syndrome; COPD, chronic obstructive pulmonary disease.

Pneumology

P35

Applying a new weaning index in ICU older patients

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Introduction With the increase in life expectation, more admissions to hospital, use of mechanical ventilation (MV) and weaning trials in older patients have been observed.
Objective To evaluate the variables associated with successful weaning from mechanical ventilation in older patients.
Methods We evaluated a cohort from September 2004 to January 2008 with 479 patients. We excluded one patient aged under 18 years, 35 tracheostomized and 112 with neurologic diseases, resulting in 331 patients. Besides the conventional weaning indexes, we evaluated the performance of a new integrative weaning index (IWI). The study was approved by the Ethics Committee of Pedro Ernesto University Hospital (2206-CEP). The chances of successful weaning were investigated using relative risk and logistic regression. The Hosmer–Lemeshow goodness-of-fit test was used to calibrate and the C statistic was calculated to evaluate the association between predicted probabilities and observed proportions in the logistic regression model.
Results Prevalence of successful weaning in the sample was 83.7%. There was no difference in mortality of older and nonolder patients (P = 0.16), in the days of mechanical ventilation (P = 0.22) and days of weaning (P = 0.55). In older patients, the IWI was the only variable associated with respiratory weaning in this population (P <0.0001). See Tables 1 to 5.

Table 2 (abstract P35). Analysis of the outcome variables by sample and by age

Variable	Category	Total (%)	Age ≥70 (%)	Age <70 (%)	*P* value
Result	Success	277 (83.7)	125 (80.7)	152 (86.4)	0.16
	Failure	54 (16.3)	30 (19.4)	24 (13.6)	
	Death	17 (5.1)	15 (9.7)	2 (1.1)	0.002
Evolution	Discharge	277 (83.7)	125 (80.7)	152 (86.4)	
	Return	37 (11.2)	15 (9.7)	22 (12.5)	
Days of MV	Mean ± DP/median	9.1 ± 7.6/ 7	9.2 ± 8.6/6	9.1 ± 6.7/7	0.22
Days of weaning	Mean ± DP/median	2.7 ± 2.3/2	2.8 ± 2.6/2	2.6 ± 2.0/2	0.55
APACHE II	Mean ± DP/median	16.0 ± 5.6/15	16.9 ± 5.8/16	15.3 ± 5.2/14	0.009

Significant P <0.05.

Table 3 (abstract P35). Analysis of the respiratory variables according to the results by age

	Age ≥70				Age <70			
Variable	Success (%)	Failure (%)	RR	95% CI	Success (%)	Failure (%)	RR	95% CI
P/F ≥255	59.2	46.7	1.11	0.94 to 1.30	63.2	16.7	1.30	1.13 to 1.50
Cqst.rs ≥30	80.8	23.3	1.83	1.38 to 2.43	84.2	29.2	1.62	1.25 to 2.10
IWI ≥25.5	97.6	3.3	10.6	3.60 to 31.1	96.1	8.3	4.60	2.26 to 9.36
P 0.1 ≤3.1	78.4	36.7	1.53	1.19 to 1.97	77.0	20.8	1.48	1.21 to 1.81
f ≤29	72.8	33.3	1.43	1.16 to 1.77	68.4	20.8	1.33	1.14 to 1.56
Vt ≥320	76.8	23.3	1.67	1.31 to 2.14	73.7	29.2	1.34	1.13 to 1.60
f/Vt*P 0.1 ≤270	80.0	33.3	1.64	1.25 to 2.14	77.0	16.7	1.52	1.24 to 1.86
f/Vt ≤100	81.6	23.3	1.87	1.40 to 2.51	78.3	25.0	1.47	1.20 to 1.81

RR, relative risk. Significant P <0.0001, except for P/F on age ≥70.

Table 4 (abstract P35). Logistic regression to the success of weaning by age

Age	Significant variable	Coefficient	SE	*P* value	RR	95% CI
≥70	Intercept	–2.2687	0.606	0.0002		
	IWI ≥25.5	7.0727	1.173	<0.0001	1,179.3	118 to 11,752
<70	Intercept	–3.1147	1.035	0.003		
	IWI ≥25.5	6.0547	1.187	<0.0001	426.1	41.6 to 4,364
	APACHE ≤17	3.4249	1.159	0.003	30.7	3.2 to 298

CI, confidence interval; RR, relative risk; SE, standard error of coefficient.

Table 5 (abstract P35). Estimated probability of success according to the logistic model by age group

Age	IWI ≥25.5	APACHE ≤17	Estimated probability (%)	95% CI
≥70	No		9.4	3.06 to 25.4
	Yes		99.2	94.5 to 99.9
<70	No	No	4.3	0.58 to 25.2
	No	Yes	57.7	27.5 to 83.1
	Yes	Yes	95.0	81.8 to 98.8
	Yes	No	99.8	98.0 to 100.0

CI, confidence interval: lower limit (%) to upper limit (%).

Conclusion The IWI was the main independent variable in weaning of the older patient population, and it can contribute to this critical moment.

P36

CPAP with variable flow is comparable with Bubble CPAP in preterm infants

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Background nCPAP has many benefits to treat respiratory distress in the newborn. It has been shown that in devices with variable flow, nCPAP reduces work of breathing and increases lung recruitment, compared with continuous flow; nevertheless, there are few randomized controlled trials comparing these different CPAP apparatuses regarding respiratory outcomes.
Objective To evaluate the efficacy of nasal CPAP using a device with variable flow or Bubble CPAP, regarding CPAP failure, occurrence of air leaks, total CPAP time and main complications of prematurity.
Methods A randomized clinical trial. Newborns admitted to the Hospital Israelita Albert Einstein's NICU (São Paulo, Brazil) with birth weight ≥1,000 g, without previous mechanical ventilation and with respiratory distress requiring nCPAP were randomized into two study groups: Variable Flow (Servo-*I*; Siemens Elema Inc., Sweden) or Bubble CPAP (Fisher and Paykel Healthcare, Auckland, New Zealand). Both groups used the same interface (BC 161; Fisher and Paykel Healthcare), with a target $SatO_2$ of 88 to 94%. Gestational age, birth weight, Apgar 5 minutes, diagnosis of respiratory distress, CPAP failure, the main complications of prematurity and total CPAP and oxygen time were recorded. Continuous variables were analyzed by Student *t* test, categorical variables were analyzed by Fisher's exact test. The significance level was set at $P = 0.05$.
Results A total of 40 infants were randomized. One baby was excluded from the Variable Flow Group because we were obligated to change the nasal prong interface due to the development of nasal injury and damage to the septal mucosa. There were no differences between groups regarding birth weight (Variable Flow: $n = 19$, 2,602 ± 585 g; Bubble CPAP: $n = 20$, 2,518 ± 598 g; $P = 0.663$); gestational age (35.8 ± 0.5 weeks and 35.7 ± 0.4 weeks; $P = 0.863$); gender (male: 68.4% and 70.0%; $P = 0.915$); Apgar5 (9.4 ± 0.6 and 9.6 ± 1.0; $P = 0.246$); prenatal steroids (31.6% and 10.0%; $P = 0.127$); time for CPAP installation (120/90/203 minutes and 135/50/225 minutes; $P = 0.978$); CPAP failure (21.1% and 20.0%; $P = 1.000$); air leak syndrome (10.5% and 5.0%; $P = 0.605$); total CPAP time (22.0/8.00/31.00 hours and 22.0/6.00/32.00 hours; $P = 0.822$); and total oxygen time (24.00/7.00/85.00 hours and 21.00/9.50/66.75 hours; $P = 0.779$). Values are mean ± SD or percentage or median/interquartile ranges (for time for CPAP installation, total CPAP and total oxygen time).
Conclusion In this small randomized clinical trial the use of a device with variable flow was comparable with Bubble CPAP regarding the occurrence of the main variables analyzed.

P37

Estimated work of breathing in PAV-plus ventilation in ICU patients

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Background The purpose of the new PAV-plus ventilation is to guarantee a better patient ventilator synchrony allowing the measurement of respiratory system mechanics and the estimation of the patient work of breathing.
Objective To verify whether ICU patients recovering from acute respiratory failure can be maintained well in PAV-plus ventilation and if the PAV-plus ventilatory mode can estimate respiratory mechanics and work of breathing in ICU clinical practice.
Methods We studied 20 stable ICU patients that were recovering from acute respiratory failure and could be ventilated comfortably in pressure support of 15 cmH_2O. After 20 minutes in PSV of 15 cmH_2O we measured the tidal volume, respiratory rate, minute ventilation, $PaCO_2$ and asked the patients to give a note from 0 to 10 on a visual comfort scale. Then, we changed the patients to PAV-plus ventilation with 65% support and after 20 minutes we measured the same mentioned parameters plus the respiratory system compliance, resistance and the patients work of breathing. The same procedure was made after changing the patients to PAV-plus ventilation of 50% support. We established the association between the estimated work of breathing by the ventilator and the measured respiratory parameters ($P < 0.05$).
Results Twenty ICU patients recovering from acute respiratory failure were studied, mean age 71.7 ± 9 years, 12 females. Mean minute ventilation at 15 cmH_2O of pressure support ventilation was 8.4 ± 2.0 l/minute and mean $PaCO_2$ was 36.8 ± 5.96 mmHg. Mean minute ventilation was maintained at 8.5 ± 2.0 and 9.48 ± 3.0 l/minute in PAV-plus of 65% and 50%, respectively (P = NS). Mean $PaCO_2$ was 39 ± 6.6 mmHg in PAV-plus of 65% and 40.65 ± 6.8 mmHg in PAV-plus of 50% (P = NS). During PAV-plus 65% the mean estimated patient work of breathing was 0.3 ± 0.1 J/l, and in PAV-plus 50% was 0.4 ± 0.1 J/l (P =

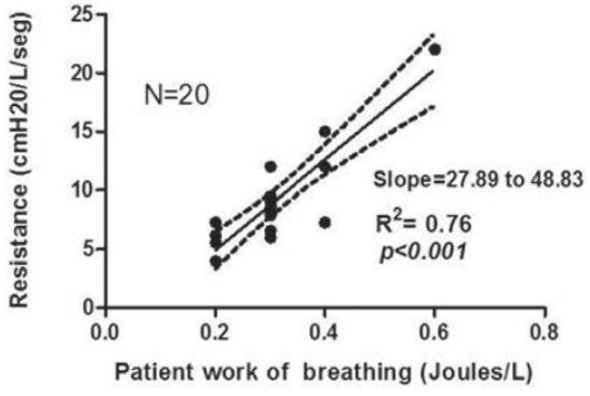

Figure 1 (abstract P37). Correlation between resistance and WOB in PAV-plus.

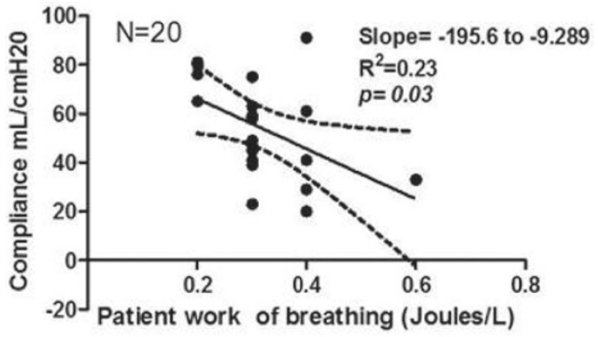

Figure 2 (abstract P37). Correlation between compliance and WOB in PAV-plus.

NS). Mean compliance during PAV-plus 65% was 53.8 ± 20.4 and PAV-plus 50% was 55.3 ± 18.8 (P = NS). Mean respiratory resistance was 9.6 ± 4.2 in PAV-plus 65% and 8.7 ± 3.3 in PAV-plus 50% (P = NS). Mean comfort scale was 8.45 ± 1.8 in PSV of 15 cmH_2O and 8.1 ± 1.4 in PAV-plus 65% and 8.1 ± 1.2 in PAV-plus 50% (P = NS). Patient's estimated work of breathing significantly associated with respiratory resistance (P <0.0001; Figure 1) and inversely with respiratory compliance (P = 0.03; Figure 2) and was not associated with the comfort scale (P = 0.8), minute ventilation (P = 0.5), $PaCO_2$ levels (P = 0.5), tidal volume (P = 0.3) or respiratory rate (P = 0.8).

Conclusion ICU patients recovering from acute respiratory failure could be maintained comfortably in PAV-plus ventilation of 65% and 50% compared with PSV of 15 cmH_2O and their estimated work of breathing correlated negatively with patient's compliance and positively with patient's resistance.

P38

Influence of the equipment used for manual ventilation over the variability of respiratory mechanics in rabbits

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Introduction A self-inflating bag is used for newborns' manual ventilation, using an oxygen concentration close to 100%, unknown peak inspiratory pressure (PIP), no end positive expiratory pressure (PEEP) and high tidal-volume (Vt). Manual ventilation using a T-piece device allows better control of PIP, use of PEEP and probably less variation in pulmonary ventilation.

Objective To compare using an experimental model with the adult rabbit, the variability of PIP, PEEP, Vt, minute ventilation (VMin), respiratory rate (RR), inspiratory time (Tins), expiratory time (Tex) and ratio Tins/Total time during manual ventilation using a self-inflating bag or T-piece device.

Methods Adult New Zealand White rabbits were manually ventilated by 21 individuals using a self-inflating bag (LIFESAVER® Neonate Manual Resuscitator; Teleflex Medical, Research Triangle Park, NC, USA) or a T-piece device (Babypuff®; Fanem Ltd, São Paulo, Brazil). Before ventilation each animal was sedated with intramuscular ketamine–acepromazine solution (10 mg/kg and 0.1 mg/kg, respectively) and anesthetized (1% lidocaine, s.c.) at the site of incision for tracheostomy and carotid cannulation. After curarization (pancuronium 1 mg/kg, i.v.) the ventilation was started and ventilatory data (PIP, PEEP, Vt, minute volume, inspiratory and expiratory time) were continuously recorded until sacrifice with sodium pentobarbital (100 mg/kg, i.v.), after 10-minute ventilation. For each variable analyzed a variability index was calculated, defined as the standard deviation of the mean values of each variable during the 10-minute ventilation. Statistical analysis was by t test or Mann–Whitney test, significance was set at P = 0.05.

Table 1 (abstract P38)

	T-piece (n = 21)	Self-inflating-bag (n = 21)	P value
Vt (ml/kg)	0.7 ± 0.7	2.5 ± 1.6	<0.001
VMin (ml/kg)	28.7 ± 14.6	122.3 ± 86.2	<0.001
PIP (cmH_2O)	0.34 ± 0.21	3.3 ± 2.1	<0.001
PEEP (cmH_2O)	0.2 ± 0.2	0.0 ± 0.0	<0.001
RR (bpm)	2.6 ± 1.3	9.9 ± 25.6	0.087
Tins (seg)	0.12 ± 0.05	0.13 ± 0.23	<0.001
Tex (seg)	0.13 ± 0.06	0.20 ± 0.22	0.902
Tins/Tt	0.04 ± 0.01	0.06 ± 0.07	0.034

Data are mean ± SD.

Results The variability indices for all variables analyzed during the 10-minute ventilation are shown in Table 1.

Conclusion The authors conclude that the use of a T-piece device allows lower variability during manual ventilation, with the exception of respiratory rate and expiratory time. We speculate that this lower variability could result in lower lung injury during manual ventilation.

P39

Maximum recruitment strategy revealed efficiency and a larger recruitable lung in a prospective series of early ARDS patients

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Introduction A recent meta-analysis demonstrated that higher levels of PEEP were associated with improved survival among the subgroup of patients with ARDS. The maximum recruitment strategy (MRS) guided by thoracic CT scan is capable of reversing alveolar collapse almost completely, allowing PEEP titration to sustain lungs almost fully open, homogenizing tidal ventilation and possibly reducing ventilator-induced lung injury.

Objective To test the efficiency, feasibility and side effects of MRS; to compare the amount of non-aerated tissue during MRS and calculate lung recruitability.

Methods A case series report in a general medical/surgical private and academic ICU with 42 beds at Albert Einstein Hospital, São Paulo, Brazil. Fifty-one severe ARDS patients were included. Early and severe ARDS patients were submitted to MRS guided by thoracic CT. The protocol consisted of two parts: recruitment phase to calculate the opening pressure (PEEP 10 to 45 cmH_2O and constant driving pressure 15 cmH_2O); PEEP titration phase (PEEP 25 to 10 cmH_2O) to maintain the lungs open. Patients were followed until hospital discharge or death.

Results Fifty-one severe ARDS patients were included and followed, of whom 84% had primary ARDS. The median maximum recruitment PEEP level was 45 (IQR: 43 to 45) cmH_2O and the median maximum recruitment plateau pressure was 60 (IQR: 58 to 60) cmH_2O, and the median titrated PEEP after MRS was 25 (IQR: 25 to 25) cmH_2O. Median global nonaerated parenchyma decreased significantly from 53.6% (IQR: 42.5 to 62.4) to 12.7% (IQR: 4.9 to 24.2) (p_2/FiO_2 ratio increased from 125 (IQR: 86 to 164) to 307 (IQR: 236 to 373)) (P <0.01).

Conclusion The MRS was an efficient, feasible and safe ventilatory strategy to reverse nonaerated lung and hypoxemia in early and severe ARDS patients with multiple organ failure, revealing a larger recruitable lung. No major complications except for transitory changes in blood pressure were noted.

P40

Mechanical ventilation profile in an adult ICU in Brazil

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Background Adult critically ill patients need invasive mechanical ventilation support due to distinct causes that vary from an elective high-risk surgery to post cardiorespiratory arrest.
Objective To know the mechanical ventilation profile in an adult medical–surgical ICU in Brazil. To study adults patients that needed more than 24 hours invasive mechanical ventilation support in an adult ICU in Brazil.
Methods We analyzed all patients that needed more than 24 hours invasive mechanical ventilatory support admitted to Albert Einstein Adult medical–surgical 36-bed ICU from December 2008 to April 2010. We studied patient's age, sex, APACHE II score, cause of intubation/mechanical ventilation, duration of ventilatory support, maximum inspiratory pressure (MIP; mmHg), maximum expiratory pressure (MEP; mmHg) and respiratory shallow breathing index (RSBI; l), rate of extubation success and ratio of reintubation.
Results A total of 252 patients were studied, mean age 63 ± 19 years, 35% females, mean APACHE II score 22 ± 6. The main cause of intubation/mechanical ventilation was acute hypoxemic respiratory failure (35%) followed by depressed level of consciousness (34%), post high-risk surgery (19%), airway obstruction (3%), hemodynamic instability (5%) and respiratory fatigue (01%). The mean duration of invasive mechanical ventilation was 114 ± 4 hours (27 to 566 hours). Before a spontaneous breathing trial to check readiness for extubation, mean MIP was 48 ± 12 (20 to 120) mmHg, mean MEP was 45 ± 15 (12 to 120) mmHg and mean RR/TV (l) was 53 ± 20 (5 to 190). The extubation success rate was 87.3%. We used non-invasive ventilation immediately after extubation in 66% of our patients. In total, 12.7% patients needed reintubation. The hospital mortality rate was 8.75% (22 patients). There were no differences in regard to age, gender, mechanical ventilation time, MIP, MEP, RSBI, use of non-invasive mechanical ventilation and reintubation rate between patients that survived and those that died.
Conclusion In our ICU the main causes for invasive mechanical ventilatory support were hypoxemic respiratory failure and post high-risk surgery. The mean duration of invasive support was 4.7 days and the reintubation rate was 12.7%.

P41

Positive end-expiratory pressure can increase brain tissue oxygen pressure in hypoxemic severe traumatic brain injury patients

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Introduction Brain tissue oxygen pressure ($PtiO_2$) reflects brain oxygenation and is a useful tool in traumatic brain injury (TBI) patients. Increases in inspired oxygen fraction (FiO_2) are related to improvement on $PbrO_2$, but other approaches that aim to improve oxygenation, like increasing positive-end expiratory pressure (PEEP), were not deeply evaluated in humans.
Objective The aim of this study was to evaluate the effects of three different PEEP levels on $PbrO_2$ of hypoxemic severe TBI patients.
Methods From February 2007 to February 2011, 36 severe TBI patients admitted to our intensive neurological unit were monitored with $PtiO_2$ through the Licox device (Integra Neuroscience). Seventeen patients remained in the study according to the following inclusion criteria: ratio of arterial oxygen tension to fraction of inspired oxygen (PaO_2/FiO_2 ratio) <300; cerebral perfusion pressure (CPP) >60 mmHg; intracranial pressure (ICP) <20 mmHg; $PtiO_2$ >20 mmHg; absence of any signal of brain deterioration. These patients were submitted to PEEP levels of 5, 10 and 15 cmH_2O, each one for at least 20 minutes. During the three PEEP levels, $PtiO_2$, pulse oxygen saturation (SpO_2), ICP and CPP were monitored and statistically analyzed by ANOVA and Bonferroni methods. P <0.05 was considered statistically significant.

Table 1 (abstract P41). Baseline characteristics of the evaluated patients

Baseline characteristic	Mean	SD
Age	28.6	8.4
APACHE II	19.2	3.2
Glasgow	6.1	0.9
FiO_2	55.9	11.8
PaO_2/FiO_2 ratio	154	46.6
$PbrO_2$	27.7	6.5
ICP	8.3	4.4
CPP	94.8	8.2
SpO_2	95.5	2.1

APACHE II, Acute Physiology and Chronic Health Evaluation.

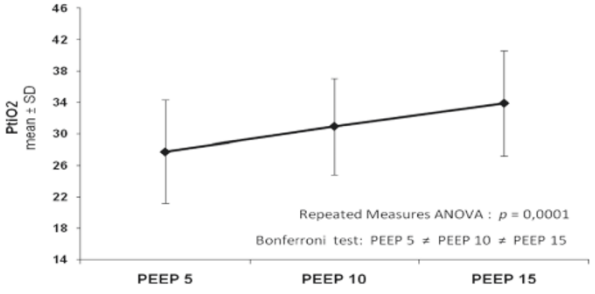

Figure 1 (abstract P41). Changes in $PtiO_2$ according to the PEEP levels.

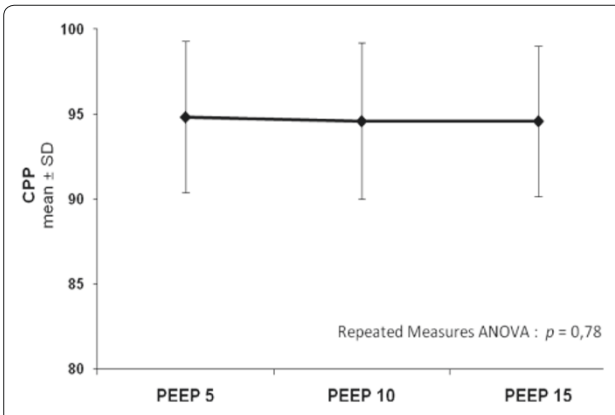

Figure 2 (abstract P41). Changes in CPP according to the PEEP levels.

Results The increase of PEEP level from 5 to 15 cmH_2O increased SpO_2 from 95.5 ± 2.1 to 98.6 ± 1.2 (P = 0.0001) and $PtiO_2$ from 27.8 ± 6.5 mmHg to 33.9 ± 6.7 mmHg, respectively (P = 0.0001). On the other hand, ICP and CPP did not present statistical significance according to the increase of PEEP levels (8.29 ± 4.44 mmHg to 8.65 ± 4.42 mmHg; P = 0.14 and 94.8 ± 8.2 to 94.6 ± 8.0 mmHg; P = 0.78, respectively). The main characteristics of the evaluated patients are described in Table 1. Changes in $PtiO_2$ and CPP according to the PEEP levels are represented in Figures 1 and 2.
Conclusion In hypoxemic severe TBI patients, increasing PEEP levels from 5 to 10 and 15 cmH_2O increased $PtiO_2$, without increasing ICP and/or decreasing CPP. Increasing PEEP levels can be an alternative ventilatory approach to improve brain oxygenation besides FiO_2.

P42

Pressure transmitting device: a simple and safe method of continuous aspiration of subglottic secretions during orotracheal intubation

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Introduction Many interventions are known to decrease the incidence of ventilator-associated pneumonia, which has great impact on mortality, length of stay and costs in intensive care units. One of them is the aspiration of the secretions that pool above the cuff of the endotracheal tube [1]. It is a simple device but its use is not free from complications [2], being, most of them, bleedings and obstructions due to lesions of tracheal mucosa. The maintenance of a constant suction, without wide pressure variation, is an important point to minimize these complications. The common manometers do not have enough precision to set an adequate aspiration pressure, because of its broad scale, and are not able to avoid or to limit pressure variations in case of partial occlusions, by secretion, for example, facilitating lesions occurrence. Pressure transmitting devices (Figure 1), usually used for continuous aspiration of pleural drainage, have those helpful characteristics. It can be set in an adequate aspiration pressure (20 mmHg ~ 27 cmH_2O) by setting the water column height. It avoids suction pressure variations since the air bubbles up on the water, balancing pressure inside the system.
Methods Pressure transmitting devices were tested in 12 patients with subglottic aspiration on their orotracheal tubes. They were watched for complications and the findings are reported. The aspiration pressure used was set at 20 cmH_2O.
Results The proposed system was used for periods that lasted from 3 to 14 days in each patient. It was able to remove the subglottic secretions in all tested cases. There were two episodes of system obstruction due to thick secretions, one of them was a blood clot (the patient had an abundant oral bleeding), easily treated with gentle suction using a 5-ml syringe. There was one case of obstruction resolved with air injection through the subglottic suction lumen. There was no bleeding related to subglottic suction. There was no ventilator-associated pneumonia.
Conclusion In those reported cases, the subglottic suction system using a pressure transmitting device seemed to be effective, without serious complications. This study of cases is not able to affirm these conclusions. It is just an initial test of a new method. For better evidence, this system has to be compared with other devices, like manometers, that are usually used for aspiration pressure control.

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P43

Pumpless extracorporeal lung assist in a pregnant woman with severe ARDS

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Introduction Acute respiratory distress syndrome is characterized by acute-onset, refractory hypoxemia, bilateral infiltrates on chest radiographs and PAOP <18 mmHg or absence of clinical signs of left atrial hypertension. The protective ventilatory strategy limiting plateau pressure to lower than 28 cmH_2O, driving pressure below 15 cmH_2O and tidal volume between 4 and 6 ml/kg using a PEEP level to sustain the open lung approach usually results in hypercapnia. However, it is the mainstream supportive therapy that can modulate survival in this syndrome.
Methods We describe a case report where a 31-year-old woman who was admitted to the intensive care unit with fatigue, shortness of breath and hypoxemia. She was 24 weeks pregnant and acute myeloid leukemia, subtype M3 was diagnosed 5 days before admission. Non-invasive ventilatory support, chemotherapy (doxirubicin and all-trans retinoic acid) and blood components (red blood cells, fresh frozen plasma, cryoprecipitate and platelets) were implemented. After 4 days the clinical scenario was out of control and she was intubated. Renal function deteriorated and hemodialysis was required.
Results Controlled mechanical ventilation using neuromuscular blocking (NMB) agents was set to limit plateau pressure, driving pressure, tidal volume and high level of PEEP (15 cmH_2O). However, oxygenation progressively deteriorated despite the instituted therapy and on the eighth day on mechanical ventilation the intraabdominal pressure (IAP) was 20 mmHg, the driving pressure was 20 cmH_2O and Vt was 5 ml/kg, which resulted in PaO_2/FiO_2 of 90, pH 7.15, $PaCO_2$ of

Figure 1 (abstract P42).

115 mmHg. Interventional lung assist (iLA; Novalung, GmbH, Talheim, Germany), a pumpless arterio-venous extracorporeal membrane for CO_2 removal, was connected without systemic anticoagulation. After 20 minutes using iLA with 9 l/minute O_2, a PEEP level of 20 cmH_2O, Vt of 4 ml/kg, driving pressure of 20 cmH_2O, I:E of 1:1 resulted in a PaO_2/FiO_2 of 175, $PaCO_2$ of 57 mmHg and pH 7.35. Hemodynamics were stable and vasopressor agents were not needed. The blood flow in the circuit was 1.4 l/minute. After 14 hours on iLA the NMB agent was interrupted and assisted ventilatory support with Bivent + PSV (Servo i Maquet, Solna, Sweden) was started, sustaining a driving pressure of 15 cmH_2O. After 48 hours on iLA the baby was born naturally and the IAP decreased to 7 mmHg. Respiratory system mechanics and the PaO_2/FiO_2 ratio improved: 56% and 64%, respectively. CPAP + PSV was started on day 8 after iLA implementation and it was surgically removed on the day after when the $PaCO_2$ was sustained below 40 mmHg.

Conclusion We present the first case so far where iLA was safely used during 9 days in a pregnant woman with severe ARDS and multiple organ dysfunction syndrome under continuous hemodialytic support that allowed us to set a protective ventilatory strategy using an assisted ventilation mode.

P44

Strategies for reducing the time of mechanical ventilation and ventilator-associated pneumonia

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Introduction Ventilator-associated pneumonia (VAP) is one of the most frequent causes of nosocomial infection and complication in the intensive care unit (ICU). VAP is associated with increased mortality and morbidity, as well as increased costs of intensive therapy.

Objective To compare the prevalence of VAP and the duration of mechanical ventilation in a general ICU, before and after implantation of a bundle of four and five measures.

Table 1 (abstract P44)

	Control group	Group 1	Group 2
% VAP	27.3	8.7	1.5
% VAP/1,000 days on MV	25.7	10.6	2.2
% death	63.3	42.9	41.5

Table 2 (abstract P44)

	Control group	Group 1	Group 2
Gender (men/women)	77/76	82/67	64/66
Age (years)	63.4 ± 19.3	70.7 ± 14.5	66 ± 15.1
APACHE II	17.3 ± 7	15.9 ± 13.3	25 ± 8.8
Diagnosis on admission to intensive care, *n* (%)			
Stroke	15 (9.8%)	4 (2.6%)	3 (2.3%)
SDRA	2 (1.3%)	0 (0%)	0 (0%)
Cardiorespiratory arrest	5 (3.2%)	9 (6%)	7 (5.3%)
Sepsis	25 (16.3%)	15 (10%)	12 (9.2%)
Pneumonia	24 (15.6%)	28 (18.7%)	22 (16.9%)
COPD	12 (7.8%)	16 (10.7%)	16 (12.3%)
Postoperative abdominal surgery	31 (20.2%)	30 (20.1%)	30 (23%)
Oncologic	13 (8.4%)	18 (12%)	14 (10.7%)
Miscellaneous	26 (16.9%)	29 (19.4%)	26 (20%)
Total	153	149	130

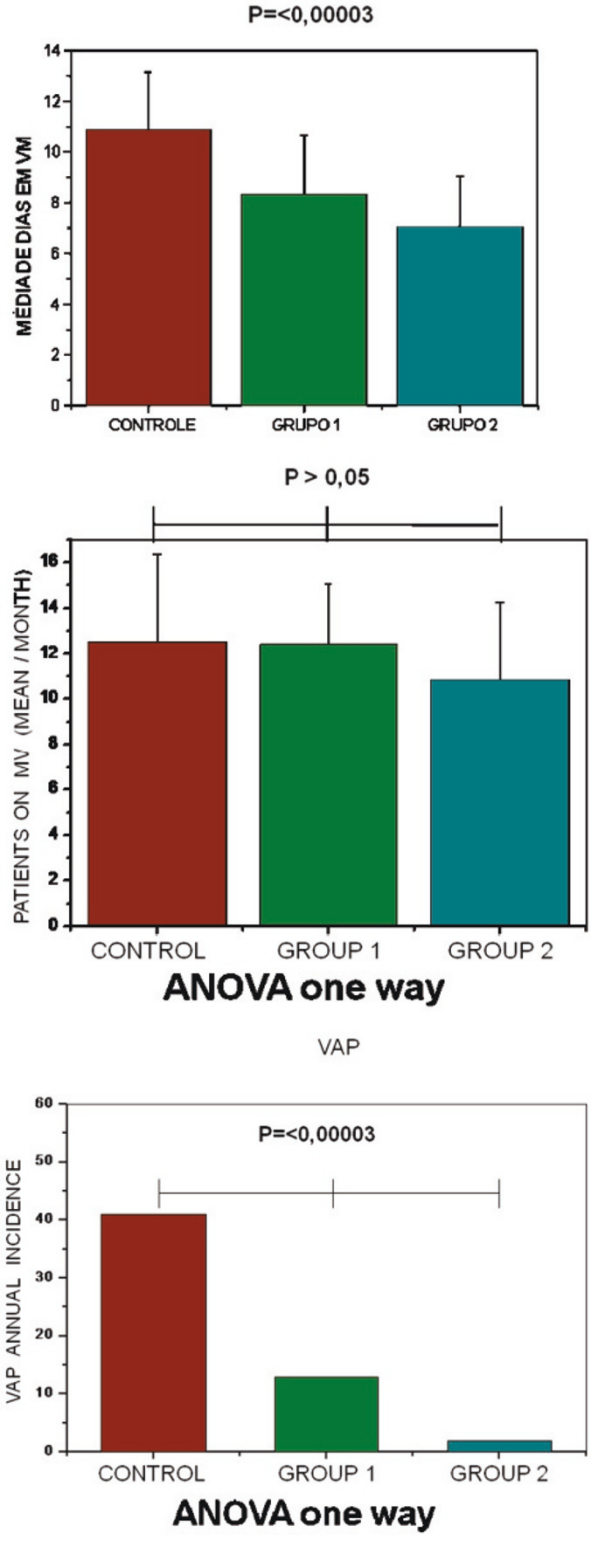

Figure 1 (abstract P44).

Methods A prospective study made in the general ICU, from December 2007 to November 2009, with a total of 432 patients. The measures adopted in the bundle of VAP were: daily sedative interruption,

elevation of the head of the bed to 45°, deep venous thrombosis prophylaxis, peptic ulcer disease prophylaxis. The fifth measure used was the daily interruption of sedatives with spontaneous breathing trials (SBTs). The control group was the group without the VAP bundle. Group 1 was with the VAP bundle. Group 2 was the group of VAP bundle with daily interruption of sedatives and SBTs.

Results Control group: 153 patients were ventilated from December 2006 to November 2007, with a mean ventilation time of 10.8 ± 2.2 days, as 41 patients were with VAP, 27.3% of VAP with 53.3% mortality. Group 1: 149 patients were ventilated from December 2007 to November 2008, with a mean ventilation time of 8.3 ± 2.3 days, as 13 patients were with VAP, 8.7% of VAP with 42% mortality. Group 2: 130 patients were ventilated from December 2008 to November 2009, with a mean ventilation time of 7 ± 2 days, as two patients were with VAP, 1.5% of VAP with 41.5% mortality. All VAP cases on 15 patients happened after the fourth day of MV; that is, all of them were cases of late VAP. See Tables 1 and 2 and Figure 1.

Conclusion Implementation of a daily bundle with SBTs is associated with reduction of mechanical ventilation time, and it is the determinant factor to have lower indexes of VAP.

P45

Impact of daily evaluation and spontaneous breathing test on the duration of pediatric mechanical ventilation: a randomized controlled trial

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Objective To assess whether the combination of a daily evaluation and application of a spontaneous breathing test (SBT) could shorten the duration of mechanical ventilation (MV), as compared with weaning based on our standard of care. Secondary outcome measures included extubation failure rate and need for non-invasive ventilation (NIV).

Methods A prospective randomized controlled trial in two pediatric intensive care units at university hospitals in Brazil. The trial involved children between 28 days and 15 years of age who were receiving MV for at least 24 hours. Patients were randomly assigned to one of two weaning protocols. In the test group, children underwent a daily evaluation to check readiness for weaning and a SBT with pressure support of 10 cmH_2O and PEEP of 5 cmH_2O for 2 hours, with the SBT repeated on the next day in children failing it. In the control group, weaning was performed according to the services routine.

Results A total of 294 children were randomized, 155 to the test group and 139 to the control group. The time to extubation was shorter in the test group, in which the median duration of MV was 3.5 (95% CI = 3.0 to 4.0) days, in comparison with 4.7 (95% CI = 4.1 to 5.3) days in the control group ($P = 0.0127$). This significant reduction in the duration of MV in the intervention group was not associated with increased rates of extubation failure or NIV, and represents a reduction of 30% in the risk of remaining under MV (hazard ratio of 0.70).

Conclusion In children under MV for more than 24 hours, a daily evaluation to check readiness for weaning combined with a SBT reduced the duration of MV, without increasing the extubation failure rate or the need for NIV.

P46

Use of lung ultrasonography in the detection of pneumothorax among medical students and emergency physicians

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Critical Care 2011, **15(Suppl 2):**P46 (doi: 10.1186/cc10194)

Introduction The use of lung ultrasound in the detection of pneumothorax is becoming routine in emergency departments and intensive care units in the United States and Europe [1]. The interposition of the visceral and parietal pleura (pleural–lung interface) produces pulmonary artifacts easily visualized by ultrasound and described initially by Lichtenstein and Meziere [2]. In evaluating the lung for pneumothorax, the most important finding is the presence or absence of lung sliding. The presence of pleural sliding essentially rules out a pneumothorax in the analyzed region and the absence of lung sliding indicates a high suspicion of disease. Organizations such as the American College of Emergency Physicians (ACEP) have demonstrated the short learning curve and prompt application to clinical practice of this use of lung ultrasound. There is already evidence, both in Brazil and beyond, that knowledge retention based on an educational model using computer simulation would be particularly useful in training Brazilian physicians in lung ultrasound if it was proven to be effective.

Objective To evaluate the sensitivity and specificity of diagnosis of medical students compared with emergency physicians (experts) in identifying pneumothorax by lung ultrasound.

Methods Students of 3 years of medical graduation participating in the module Radiology Emergency Medicine ($n = 40$) and emergency physicians ($n = 11$) with training in emergency medicine and intensive care, called experts, were invited to participate. The study subjects were assessed for the correct diagnosis of 20 cases of pneumothorax after training through classroom teaching of lung ultrasound lasting 2 hours addressing the recognition of artifacts in the lung and identification of pneumothorax Lung Sliding Lines B. Prior to training, medical students and emergency physicians had no prior knowledge or practice in emergency ultrasonography. We used video-clips of 10 positive and 10 negative real cases of pneumothorax obtained by an experienced examiner in lung ultrasound. The comparison between the two groups was described by the mean and standard deviation of hits in each group and tested by the nonparametric Mann–Whitney test. The agreement between raters overall and in each group was estimated by the kappa correlation coefficient. The difference between the agreement observers in each group was tested by *Z* test for proportions.

Results Students and experts did not have statistically different test scores as shown in Table 1. There was a high degree of agreement between raters both overall and in each isolated group.

Table 1 (abstract P46)

Appraiser	Sensibility (%)	Specificity (%)	PPV (%)	VPN (%)	Accuracy (%)
All	87.8	92.0	91.6	88.3	89.9
Undergraduates	87.3	91.0	90.7	87.7	89.1
Experts	90.0	95.5	95.2	90.5	92.7

Conclusion Medical students and medical experts are able to accurately identify pneumothorax, despite an abbreviated training time with no previous knowledge of ultrasound lung. Therefore the use of a simulation model based on lung ultrasound videos can be implemented in a systematic way to help health professionals and medical students in their training.

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Neurology

P47

Integral patient care: mental health in a critical patient service

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Critical Care 2011, **15(Suppl 2):**P47 (doi: 10.1186/cc10195)

Objective To determine the impact of the introduction of multidisciplinary meetings on mental health in the identification of psychiatric and psychological risks in a unit of critical patients.

Introduction Mental healthcare in hospital wards for critical patients is necessary both for individuals with psychological or psychiatric disorders that require intensive medical care and for those individuals who develop these disorders during hospitalization, often in the same function, illness or treatment. These disorders may cause negative impact on adherence to clinical care, well-being, psychosocial rehabilitation and patient safety during hospitalization. In our department there is a psychologist working in conjunction as part of the healthcare team, aiming to identify psychological risk factors that may impact on treatment and help the team in handling difficult situations psychologically. To identify patients with psychiatric risk, we developed a protocol for Psychiatric Risk Assessment, whereby the presence of 11 items identified by the nurse initiates the discussion of a case with a psychiatrist at the Center for Psychosomatic Medicine of Hospital Israelita Albert Einstein, which directs care and/or suggests mental health interventions. Driving this protocol is the need to ask the nurse to discuss with the mental health professional based on the identification and recovery of behavioral changes that may be missed and/or be identified only when there is already an exacerbation of psychiatric conditions or occurrences related to them. Aiming to assist the nursing staff on early identification of these risks and organize actions during the stay in the ward and at discharge, a multidisciplinary meeting weekly was implemented to discuss cases and situations related to them.
Methods Implementation of a multidisciplinary meeting consisting of nurses, psychologists, psychiatrists, medical and nursing coordinators in November 2010. Conducting a weekly meeting with the purpose of discussing situations related to behavioral changes in patients hospitalized in the unit, planning, multidisciplinary care and management of cases. After the meeting, the nurse forwarded to the treatment team a summary that included a description of what qualifies as a psychological or psychiatric risk factor for each case, the guidelines for the team for management of the situation and suggestions for the doctor when involving medical management.
Results There were 68 psychiatric risks in the semi-intensive unit in the second half of 2010. Of these, 31 cases were reported in December, the month following the beginning of the multidisciplinary meeting. Whereas 12 cases were reported in October and 12 cases in November, there was an increase of 158% in the number of cases reported in December. Regarding reports of psychological risk, we observed that the multidisciplinary meeting to discuss the risks promotes to the nurse the understanding of all aspects involved, allowing the discrimination of the psychological aspects and relevance to specialist interventions as well as instrumentalizing the team to handle the patient and family.
Discussion The discussion of disciplinary cases seems to have enabled an understanding, appreciation and discrimination of which behaviors observed by the nurse should be accompanied by the psychology team as the protocol of psychiatric risk. The discussion of mental health with professionals may have afforded the team a better idea of how these professionals can help provide routine care, promoting the early identification of psychological and psychiatric risks. Other studies should be performed to confirm the effectiveness of this intervention.
Conclusion A multidisciplinary meeting was effective to assist the team in early detection and recovery of his observations of psychiatric disorders in hospitalized patients in a semi-intensive unit.

P48

Tissue plasminogen activator-treated patients with acute ischemic stroke in the pioneer public service of Rio de Janeiro: a comparative profile with the NINDS study

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Introduction Strokes are the leading cause of death in Brazil, with an incidence of 108/100,000 inhabitants [1], 31% lethality, and beyond they are causes of disability and high social costs. The National Institute of Neurological Disorders and Stroke study (NINDS) [2] and the 3rd European Cooperative Acute Stroke Study [3] demonstrated that intravenous tissue plasminogen activator (t-PA) improved clinical outcome at 3 months. This study recognized the patient's profile attending a pioneer public Stroke Team – trained at Albert Einstein and Mãe de Deus Hospitals – comparing and analyzing its results with NINDS.
Objective To evaluate the profile – age, door-to-needle time (Dt), NIHSS and mortality – in patients with acute ischemic stroke (AIS) treated with t-PA in Hospital Municipal Souza Aguiar (HMSA). To compare the results with NINDS' reference data.
Methods An observational series and analysis of cases treated with t-PA on HMSA. A review of recent literature.
Results From May 2006 through November 2010, 71 patients received t-PA therapy and underwent this study (Table 1). Comparing with NINDS (on average) we obtained: age: HMSA = 61.8 years (18 to 88), NINDS = 67 years. Dt HMSA = 2.65 hours (1 to 5.5). Patients obtained treatment within 1.5 hours (Dt <1.5 hours): HMSA = 11 (16%); NINDS = 71 (49%).

Table 1 (abstract P48)

	HMSA (*n* = 71)	NINDS (*n* = 177)
Age (years)	61.8 (18 to 88)	67
Dt <1.5 hours (patients)	11 (15.49%)	71 (49%)
NIHSS at admission	13,4 (5 to 24)	14 (1 to 37)
Mortality	9 (13%)	24 (17%)

Conclusions The study reported an early presentation of AIS, which may be associated with difficult access to primary care in this city. The entry NIHSS was similar in both studies. In the NINDS, 50% of the patients received t-PA within 1.5 hours, and only 16% in the HMSA at this time. Pre-hospital quick reference and rapid diagnosis in the emergency room could diminish the Dt. Symptomatic hemorrhage (13% HMSA) was similar if we take into account only deaths from the use of t-PA therapy. Finally, we demonstrated benefits with t-PA treatment in AIS in Rio de Janeiro and recognized limitations that, when overcome, will allow improving the treatment of such severe disorder.

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P49

Incidence of delirium in three critical care units of a teaching hospital in Brazil

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Introduction Delirium is a disturbance of consciousness in which there is a sharply global deficit of attention associated with change in cognition that cannot be attributed to a pre-existing dementia. Its relevance is not only due to the high incidence, but above all its consequences, such as influence on mortality, morbidity, and prolonging the period of hospitalization.
Objective The aim of this study was to assess the incidence of delirium in patients admitted to three intensive care units (ICUs) of a teaching hospital through the diagnostic tool CAM-ICU.
Methods The patients were evaluated through the daily application of the CAM-ICU by the same physician. We evaluated the correlation of clinical suspicion of attending physicians, medical residents and nurses to perform the diagnosis of delirium compared with the CAM-ICU, the median time to development of delirium, and risk factors for developing delirium, and compared the outcome between patients who progressed to delirium and those who had no delirium during the study period. Standard descriptive statistics were used. Continuous

variables were reported as the mean and standard deviation. Interobserver agreement was assessed using Cohen's kappa statistic (κ). All statistics and their 95% confidence intervals were computed using SPSS software and Medcalc software.
Results In the period of 39 days, 106 patients were screened, and 42 patients fulfilled inclusion criteria and were enrolled in the study. The incidence of delirium was 21.4% (nine patients). The average time to development of delirium was 62.67 hours (± 33.76), and 88.9% of patients developed delirium in the first 5 days in the ICU. The agreement of clinical diagnoses in relation to the CAM-ICU method was moderate, with the best agreement assigned to nurses. A trend for increased length of ICU and hospital stay was found between patients who developed delirium. The average time in the ICU for patients with delirium was 12.11 days (± 15.44) and patients without delirium was 5.75 days (± 7.13), $P = 0.0821$. The average time of hospitalization for patients with delirium was 29 days (± 28.99) and without delirium was 21.69 days (± 22.83), $P = 0.428$. See Table 1.

Table 1 (abstract P49). Correlation of clinical suspicion of attending physicians, medical residents and nurses to perform the diagnosis of delirium compared with the CAM-ICU

κ	Delirium	Hypoactive	Hypoactive or mixed
Attending physicians	0.610	NA	0.009
Medical residents	0.656	0.025	0.035
Nurses	0.690	0.038	0.057

Kappa values for delirium (three subtypes), and only the hypoactive or hypoactive and mixed. NA, not available: no agreement between CAM-ICU and the evaluation by attending physicians.

Conclusion Delirium is a common disorder in ICUs. Specific tests should be used regularly in order to optimize the correct diagnosis and treatment of this disturbance.

P50

Validity and reliability of the Brazilian–Portuguese version of three tools to diagnose delirium: CAM-ICU, CAM-ICU Flowsheet and ICDSC

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Critical Care 2011, **15(Suppl 2):**P50 (doi: 10.1186/cc10198)

Introduction Delirium is a frequent form of acute brain dysfunction in critically ill patients. Several detection methods have been developed for use in these patients. This study has the objective to validate the Brazilian–Portuguese CAM-ICU and to compare the sensitivity and specificity of three diagnostic tools (ICDSC, CAM-ICU and CAM-ICU Flowsheet) for delirium in a mixed population of critically ill patients.
Methods The study was conducted between July and November 2010 in four intensive care units (ICUs) in Brazil. Patients were screened for delirium by a psychiatrist or neurologist as the reference rater using the Diagnostic and Statistical Manual of Mental Diseases, Fourth Edition (DSM-IV), and subsequently by an intensivist rater using a Portuguese translation of the CAM-ICU, CAM-ICU Flowsheet and ICDSC (Intensive Care Delirium Screening Checklist).
Results One hundred and nineteen patients were evaluated: 38.6% were diagnosed with delirium by the reference rater. The CAM-ICU had sensitivities of 72.5% (95% CI = 55.9 to 84.9%) and specificity 96.2% (95% CI = 88.5% to 99.0%), the CAM-ICU Flowsheet had sensitivities of 72.5% (95% CI = 55.9 to 84.9%) and specificity 96.2% (95% CI = 88.5% to 99.0%), and the ICDSC had sensitivities of 96.0% (95% CI = 81.5 to 99.8%) and specificity 72.4% (95% CI = 58.6 to 83.0%). High agreement occurred between CAM-ICU and CAM-ICU Flowsheet (kappa coefficient = 0.96).
Conclusion The CAM-ICU Brazilian–Portuguese version is a valid and reliable instrument for the assessment of delirium among critically ill patients. The three instruments CAM-ICU, CAM-ICU Flowsheet and ICDSC are good diagnostic tools in critically ill ICU patients and the CAM-ICU was the most specific. In addition, the CAM-ICU Flowsheet presented an excellent correlation with the CAM-ICU and may be employed in general ICU patients.

Epidemiology/Quality of Life/Administration

P51

Adverse effects of physiotherapy using the passive bicycle in the ICU

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Critical Care 2011, **15(Suppl 2):**P51 (doi: 10.1186/cc10199)

Introduction The present study aimed to analyze the adverse effects of the therapy using the passive bicycle in the intensive care unit (ICU).
Methods This was a longitudinal, experimental, non-randomized controlled trial study. Performed with patients hospitalized in the ICU from Vita Curitiba and Batel Hospitals, and the Institute of Neurology from Curitiba, between 10 March and 30 June 2010. The total sample was 41 patients, with a total of 215 events, of both genders, being 23 men and 18 women, with an average age of 64 years, Glasgow average 11 ± 3 and APACHE II average score was 19 ± 6. Of the total sample, only two patients were evaluated according to the Ramsay scale, with an average of 4 ± 0.7. The passive bicycle activity was performed while the patient was in a bed or chair. The hemodynamic variables (heart rate, respiratory rate, mean arterial pressure and oxygen saturation) were collected at the beginning (before start of activity), 3 minutes after the start, and at the very end of the activity, and there was no pre-established activity time. The adverse effects accidental extubation; monitoring loss, like electrode, pulse oximetry and non-invasive blood pressure measures; change of balance, as lack of trunk control; fall; probe removal (nasogastric, nasoenteral and/or bladder); peripheral venous/arterial access were observed during the whole therapy time. The passive bicycle activity was performed 113 times in a chair (53%), and 102 times in bed (47%), having an average of 7.8 ± 2.29 minutes.
Results For the 215 events, were observed seven monitoring loss (3.27%) and one for skin lesion (0.467%), and there was no statistic significant from the proportion test. The adverse effects fall, probe removal, change of balance and extubation did not occur during the activity application. For the hemodynamic variables, using the Student *t* test ($P < 0.05$), mean arterial pressure, heart rate and respiratory rate, did not have significant change, without any hemodynamic instability during the activity (see Figure 1).
Conclusion The results show that using the passive bicycle in the ICU as a physiotherapy feature is secure and has a low risk of adverse effects related to ICU conduct.

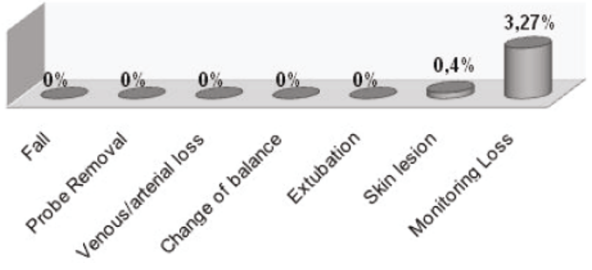

Figure 1 (abstract P51). Adverse effects during the passive bicycle activity.

Post-publication note (added 14 September 2011)
There is a correction to abstract P52 printed at the end of this supplement as abstract P67.

P52

C-reactive protein/albumin ratio at ICU discharge as a predictor of post-ICU death: a new useful tool

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Critical Care 2011, **15(Suppl 2):**P52 (doi: 10.1186/cc10200)

Introduction There are classical predictors of death after ICU discharge, such as age, severity of disease and level of nursing care. CRP concentrations at discharge have also been reported as a predictor of in-hospital outcome, but with controversial results. Considering that albumin is a negative acute-phase protein and its decrease may be an indicator of disease severity, we hypothesized that the CRP/albumin ratio could be a marker of unfavorable outcomes in the post-ICU period.
Objective This study aimed to investigate whether the CRP/albumin ratio at ICU discharge may be a predictor of post-ICU death. We also evaluated which is the best cut-off value of the CRP/albumin ratio to predict mortality.
Methods Patients discharged from the ICU after at least 72 hours of stay were retrieved from our prospective collected database. A multivariate analysis was performed using a backward-LR binary logistic model taking in-hospital death as a dependent variable and age, APACHE II at admission, comorbidities, ICU length of stay (LOS), support during ICU, SOFA at ICU discharge, admission characteristics and CRP/albumin ratio as independent variables. ROC curves and the Youden index were used to calculate the best cut-off value of the CRP/albumin ratio.
Results We retrieved 548 patients. Mean age was 49 ± 19 years, median APACHE II score at admission was 16 (10 to 21) and median SOFA score at discharge was 2 (1 to 3). The main causes of admission were septic syndromes and respiratory failure. The in-hospital mortality after ICU discharge was 18.6%. The ICU length of stay was 7 (4 to 11) days. At the moment of ICU discharge the median CRP was 47 (22 to 109) mg/l, albumin 27 (23 to 31) g/l and the mean of CRP/albumin ratio was 3. The multivariate analysis resulted in the following independent in-hospital death predictors: age (OR = 1.028, 95% CI = 1.014 to 1.043, P <0.001).
Conclusion We demonstrated that the CRP/albumin ratio, a possible marker of residual inflammation, in addition to classical variables, could be a useful and objective tool to support the clinical judgment on the ICU discharge decision process. The best value of the CRP/albumin ratio to predict death after ICU discharge is 2. Further prospective investigations are necessary to confirm these findings.
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P53

Daily multidisciplinary rounds reduce ICU length of stay

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Critical Care 2011, **15(Suppl 2):**P53 (doi: 10.1186/cc10201)

Introduction Daily multidisciplinary rounds (DMR) can be helpful to improve communication, share common goals and result in better patient outcome [1].
Objective To evaluate the impact of the institution of DMR in clinical outcomes in a mixed ICU of a private hospital.
Methods DMR were instituted in our mixed tertiary 16-bed ICU in October 2010. Using our patient data bank (Epimed©) we retrieved admission clinical and demographic data and outcome information in two different admission periods: 1 year before and 1 year after institutions of DMR. Four independent multivariate analysis were performed with the ICU length of stay (LOS), hospital LOS, ICU mortality and hospital mortality as dependent variables. The independent variables were: period (previous to DMR and post DMR), age, SAPS III score, Charlson score and type of admission (clinical vs. scheduled surgery vs. unscheduled surgery).
Results From October 2008 to October 2010, 1,600 patients were admitted to our ICU: 656 in period 1 (before DMR) and 944 in period 2 (after DMR). There was no gender or age difference between the two periods. However, there were significant differences in the type of admission (more urgent surgery in period 1, P <0.01), greater SAPS III (53.4 vs. 46. 4; P <0.01) and Charlson score (2.9 vs. 1.7; P <0.01) in period 1 in comparison with period 2. In the multivariate linear analysis, the ICU LOS was independently associated with the SAPS III (standardized beta = 0.17; P <0.01) and period 2 – after DMR (standardized beta = –0.07; P = 0.01). Only the SAPS influenced hospital LOS (standardized beta = 0.27; P <0.01). ICU mortality was only independently associated with SAPS III (standardized beta = 1.11; P <0.01). Hospital mortality was independently associated with SAPS III (standardized beta = 1.09; P <0.01) and Charlson score (standardized beta = 1.07; P = 0.02).
Conclusion The institution of multidisciplinary rounds was independently associated with a reduction in the ICU length of stay, without any significant effect in hospital outcomes.
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P54

Efficacy of a palliative care program in critically ill patients

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Introduction For some critically ill patients, ICU treatment is more burdensome than beneficial and is inconsistent with these people's values, goals and preferences. Integration of palliative care in the ICU can help address this issue. We developed in our hospital a proactive palliative care program focusing on critically ill patients with chronic limitations aiming at: timely implementation of care plans that are realistic, appropriate and consistent with the patients' preferences and reductions in use of nonbeneficial treatments, thus also reducing the lengths of stay in ICU.
Objective To describe onset of a new palliative care program in a private hospital ICU.
Methods All critically ill patients with Karnofsky score <40% were evaluated by the multidisciplinary team when ICU transfer was considered or, when this was not possible, soon after arriving in the ICU. In the first familiar conference, the main family surrogate was identified and the patient's or family surrogate's preferences concerning advanced life support and end of life were discussed according to the clinical situation. Revaluation of these decisions was performed whenever necessary, according to the multidisciplinary team or family surrogate. Specific forms were filled to ensure adequate communication with the remaining hospital staff and for data acquisition.
Results Between November 2010 and January 2011, 61 patients were included in our palliative care program. The patients' median age was 78 (range: 38 to 101) years, with a slight predominance of women (54%). The main reason for palliative care was severe dementia. All patients had severe cognitive impairment, so all decisions were discussed solely with family surrogates. The program was started at the ICU in 52 (85%) and at the ER in nine (15%) cases. In the nine cases started outside the ICU, an ICU admission was avoided in eight (89%) of them. In 79% of the cases, decisions were made to withhold or withdraw some kind of life support. There were three family-assisted withdrawals of mechanical ventilation in the ICU. Several family surrogates reported that their decision was based on previously expressed patient's wishes.
Conclusion A proactive palliative care program focusing on critically ill patients with chronic and irreversible limitations is feasible and results in a better alignment of a patient's or their family's wishes and medical-related decisions and attitudes.

P55

Impact of mechanical ventilation on the functional status in patients admitted to the intensive care unit

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Introduction Many ICU survivors report limitations in physical function that, despite showing slow improvement over time, may be long-lasting. As a complication of critical illness, weakness frequently slows and even dominates the course of recovery from critical illness. Patients requiring mechanical ventilation (MV) often have substantial weakness of the respiratory and limb muscles that further impairs their functional status and health-related quality of life.
Objective The aim of this study was to evaluate the impact of the use of MV on the functional status.
Methods This is an observational, retrospective and analytical study that included patients aged >18 years who were discharged from ICUs from July 2010 to December 2010. We excluded patients transferred to another hospital and who had not been evaluated by the physiotherapy team at the time of discharge. Functionality was assessed at discharge from the ICU and at discharge from the hospital through the Functional Independence Measure (FIM) scale. The following variables were considered: age, gender, APACHE II, length of ICU, length of stay, length of MV and FIM. We used the normality tests, Mann–Whitney test and Wilcoxon test.
Results The sample consisted of 158 patients, 51.9% female, mean age 62.5 ± 19.8 years. Of these patients, 30.6% used mechanical ventilation in the ICU. The length of ICU and hospital stay was higher among patients who received MV (length of ICU: 28.3 ± 24.2 days vs. 9.58 ± 16.5 days, $P = 0.001$; length of stay: 37.6 ± 27.4 days vs. 18.9 ± 28.6 days, $P = 0.001$). APACHE II was also higher in this group (13.9 ± 8.3 vs. 10.8 ± 6.57, $P = 0.02$) (Table 1). The functional status was lower in the group undergoing MV at discharge from the ICU (65.3 ± 37.5 vs. 89.2 ± 37.6, $P = 0.001$) and at discharge from hospital (74.6 ± 41.9 vs. 94.3 ± 37.7, $P = 0.008$) (Figure 1).
Conclusions In this population we observed that patients submitted to MV have a lower functional status, and higher APACHE II, length of ICU and length of stay.
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Table 1 (abstract P55). Characteristics of the subjects

	MV ($n = 37$)	Without MV ($n = 121$)	P value
Age (years)	62.6 ± 17.8	62.4 ± 20.4	0.84
APACHE II	13.9 ± 8.3	10.8 ± 6.57	0.02
SAPS II	38.03 ± 14.4	32.5 ± 11.9	0.02
Length of ICU (days)	28.3 ± 24.2	9.58 ± 16.5	0.001
Length of stay (days)	37.6 ± 27.4	18.9 ± 28.6	0.001
FIM at discharge from ICU	65.3 ± 37.5	89.2 ± 37.6	0.001
FIM at discharge from hospital	74.6 ± 41.9	94.3 ± 37.7	0.008

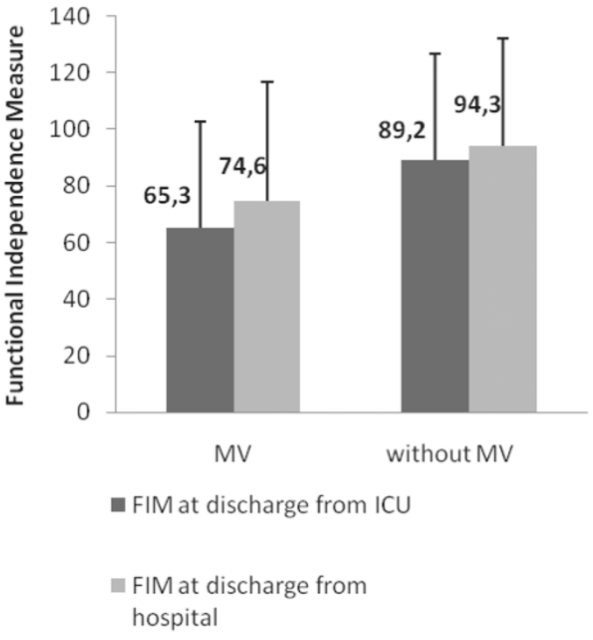

Figure 1 (abstract P55). Values for FIM in patients on MV. *$P < 0.01$.

P56

Improved outcome of critically ill patients treated by the Rapid Response Team outside the intensive care unit

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Introduction Due to the limited number of intensive care unit (ICU) beds in Brazilian public hospitals, many critically ill patients are treated in hospital wards while waiting to be transferred to the ICU. Care for these patients is provided by ward staff, while waiting for ICU bed availability. These healthcare providers are not trained in critical care and are not as experienced in caring for ICU patients. In the Londrina University Hospital, the Rapid Response Team (RRT) staff is composed of intensivist healthcare providers who help to deliver specialized care to critically ill patients in general hospital wards.
Objective To compare clinical outcomes of critically ill patients treated in general hospital wards in two periods of time, before and after the implementation of a RRT.
Methods A prospective longitudinal study developed in two periods: from January to December 2005 before RRT implementation and from January to December 2010 after the RRT is already performing outreach care for critically ill patients. Patients entered the study on the first day an ICU bed was requested and were followed until ICU admission, death or the request for ICU was cancelled due to clinical improvement. The chi-square test was used for statistical analyses.
Results We analyzed 699 patients in the first period of 2005 and 889 in the second period of 2010. There was no difference in mortality of these patients comparing the two study periods. We observed an increase in the proportion of patients who presented clinical improvement and had their ICU bed request cancelled in the year 2010 compared with the year 2005 (28.57% vs. 19.03%, $P < 0.001$). There was a decrease in the proportion of patients admitted to the ICU after waiting for bed availability in the second period (45.67 vs. 59.80%, $P < 0.001$) compared with the first period. We also observed the inclusion of end-of-life discussions during routine rounds in these patients outside the ICU and decisions to withhold or withdraw treatment were the reason to cancel an ICU bed request in 34 (3.82%) patients in the year 2010. See Table 1.

Table 1 (abstract P56). Number of patients according to clinical outcome

	2005		2010	
	n	%	*n*	%
Patient transfer to another institution*	24	3.43	5	0.56
Death**	124	17.74	190	21.37
Clinical improvement*	133	19.03	254	28.57
ICU admission*	418	59.80	406	45.67
Withhold/withdraw treatment*	0	0	34	3.82
Total	699	100.00	889	100.00

Number of patients according to clinical outcome in Londrina University Hospital, Londrina, Paraná State, Brazil, January to December 2005 and 2010. *P = 0.08. **P <0.001.

Conclusion We observed improvement in clinical outcome of critically ill patients after the implementation of outreach intensive care support delivered by a RRT in a teaching hospital. This effect apparently decreased the need for ICU beds, since more patients improved before an ICU bed was available. We also observed the inclusion of end-of-life discussions in the routine care of these patients.

P57

Nursing in the ICU: comparison of the NAS and time on bedside

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Introduction The increasing costs of treatment in intensive care units (ICUs) and the need to use resources efficiently require adequacy between nursing staff and nursing workload, as a high cost is attributed to the nurse staff of ICUs. The intensity of the nursing work effort should be considered because staffing needs vary according to the amount of patients being cared for, as well as the type of care provided for each of those patients. As the intensity of the nursing work effort increases, the amount of nursing staff required to properly care for patients also increases.
Objective To analyze the adequacy of nursing staff according to NAS, and compare the time of care according to NAS and time of care according to Nurse Call.
Methods An exploratory, descriptive prospective study was performed in an adult 32-bed ICU of a private general hospital in São Paulo, Brazil. In our study we included 18 beds for which the Nurse Call System by Austco was available. The Nurse Call System by Austco enables nurses to provide prompt and effective responses to patients' calls at all times. For the analysis of the adequacy of the nursing staff, the mean NAS expressed as percentage time was initially converted into hours considering a 6-hour shift (6 hours equivalent to an NAS of 100%).
Results Follow-up of 1,710 patients who were admitted to the ICU between July and December 2009 resulted in 4,592 NAS assessments. Analysis of the nursing workload showed a mean NAS of 90.1 ± 4.4% (ranging between 82.9 and 93.7%). The number of patients ranged from 26.5 to 34.7 in the ICU. The ICU occupation rate fluctuated between 82.8 and 113.9%, during the study, suggesting that managing of the unit was suboptimal. The hours available for nursing care in the 6-hour shift remained constant throughout the studied period and represented a total of 156 hours per shift-day. This number was the same for the entire study period, as the number professionals was fixed. According to the NAS, during half of the studied period (July to September) there was a need for an increased number of nursing professionals, as there was an average deficit of 30 hours (range 4.4 and 48.9 hours). In the second half of the study (October to December) the number of nurses available exceeded that considered necessary by NAS. This surplus was of 14.2 hours on average (range 9.0 and 22.5). The time required for nurse care per patient per day was very similar between the two assessment tools (NAS and Nurse Call). While for NAS the mean time required by patient was 5.4 hours per day (ranging between 5.0 and 5.6), for the Nurse Call this time was 5.3 hours per day (ranging between 4.9 and 5.5).
Conclusion The Nurse Call System can help the ICU nurse manager on the staff required, showing us a new strategy for managing the nurse staff. Regarding it being more easy to use, it can be adequately evaluated in the ICU.

P58

Patients readmitted to intensive care: who they are and what happens to them?

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Introduction There is growing interest in quality-of-care indicators in the ICU. Readmission is one of the proposed indicators to be measured.
Objective To investigate the incidence of, outcomes and possible risk factors for readmission in a large cohort of patients in a medical–surgical ICU and to evaluate the accuracy of Simplified Acute Physiology Score III (SAPS III) and Acute Physiologic and Chronic Health Evaluation IV (APACHE IV) to predict readmissions.
Methods We conducted an analysis of prospectively collected data from all patients admitted between January 2009 and December 2010 who survived their first ICU stay. Patients aged <18 years, patients transferred to another hospital and those who were not yet discharged until 1 February 2011 were excluded from the analysis. The following variables were evaluated as possible risk factors for readmission: sex, age, type of admission (medical vs. surgical), SAPS III, APACHE III score, APACHE IV mortality predicted risk, ICU length of stay (LOS), ICU discharge at night and on weekends. Accuracies of SAPS III and APACHE IV mortality predicted risk were assessed by calculating the area under the receiver operating characteristic curve. Categorical variables are presented as absolute numbers and percentages. Continuous variables are presented as medians and interquartile ranges.
Results A total of 3,993 patients were admitted during the study period and 3,637 fulfilled study inclusion criteria. Two hundred and eighty-three (7.8%) had at least one readmission. Patients' characteristics are displayed in Table 1. In the multivariate analysis, SAPS III (OR = 1.020; P = 0.008), APACHE III score (OR = 1.015; P <0.001).
Conclusion Readmitted patients were older, had longer ICU LOS and higher severity scores at admission. Readmission was an independent factor associated with in-hospital mortality. SAPS III and APACHE IV at first admission had only moderate ability to predict readmissions.

Table 1 (abstract P58). Characteristics and outcomes of readmitted and nonreadmitted patients to ICU

	Readmitted patients (*n* = 283)	Nonreadmitted patients (*n* = 3,354)	*P* value
Male sex	142 (50.2)	1,722 (51.3)	0.707
Age	73 (56 to 82)	63 (47 to 77)	<0.001
Type of admission			0.379
Medical	243 (85.9)	2,813 (83.9)	
Surgical	40 (14.1)	541 (16.1)	
SAPS III	48 (38 to 57)	41 (33 to 49)	<0.001
APACHE III score	36.5 (23 to 51)	26 (18 to 36)	<0.001
APACHE IV risk (%)	8.36 (3.07 to 18.51)	2.94 (1.18 to 7.10)	<0.001
ICU LOS	3.92 (2.20 to 8.39)	2.45 (1.58 to 3.85)	<0.001
Discharge at night	62 (21.9)	589 (17.6)	0.068
Discharge on weekend	67 (23.7)	939 (28.0)	0.119
In-hospital mortality	81 (28.6)	43 (1.3)	<0.001

P59

Systemic inflammatory response syndrome and organ dysfunctions are early predictors for ICU readmission

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Introduction Previous studies have indicated risk factors for ICU re-admission; sepsis, respiratory insufficiency, medical admission, organ dysfunctions and age are associated with this outcome. Specific physiological and laboratory data were explored in some studies, but no association was shown with readmission. Our hypothesis is that inflammation and organ dysfunctions are more important for this outcome than demographic data or type of admission.
Methods We selected all consecutive patients admitted to the five ICUs of a tertiary hospital. All patients discharged from the ICU at least once were included. Demographic, physiological and laboratory data were collected on the first day after the first admission and organ support resources (mechanical ventilation, use of vasopressors and renal dialysis) were researched throughout the ICU stay. Organ dysfunctions were defined as they are in the SOFA score. A logistic regression was made with all of the parameters with $P < 0.2$ in the univariate analysis.
Results There were 1,073 patients admitted to all five ICUs during the study period. Seventy patients died during the first admission and were excluded, resulting in the analysis of 1,003 patients. There were 160 ICU readmissions from 130 patients. The readmission rate was 13%. Sepsis and respiratory or cardiovascular decompensation were the most common causes of readmission. ICU readmitted patients were more likely to be older (median 75 x 69 years, $P = 0.004$), medical rather than surgical type (70 x 61%, $P = 0.04$), originated from the ward or intermediate care unit (15 x 6%, $P < 0.001$), with any infection on ICU admission (38 x 29%, $P = 0.03$), and higher Charlson index (1 x 0 point, $P < 0.001$).
Conclusion Systemic inflammatory response syndrome with organ dysfunctions are predictors for ICU readmissions, despite the patient's origin, type of admission and the presence of infection at admission.

Nutrition/Metabolism

P60

Hyponatremia severe and symptomatic in a critically ill infant

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Objective To report a case of severe symptomatic hyponatremia secondary to previously undiagnosed congenital adrenal hyperplasia.
Case A 37-day-old infant, born at 38 weeks gestation, presented with hypoactivity, weight loss, poor feeding and vomiting in the hospital. The main clinical features were irritability, dehydration, hyponatremia, hyperkalemia and ambiguous genitalia. The biochemical data are presented in Table 1. The patient received isotonic fluids (first day) and treatment for severe chronic hyponatremia (developing over more than 48 hours) calculated to 125 mEq/l under slow correction in 96 hours. The sodium levels did not exceed 0.5 mEq/l/hour or 12 mEq/l/day. On the first day was initiated hydrocortisone (100 mg/m^2) and afterwards 50 mg/m^2. There were no complications of treatment and the child was discharged 2 weeks later without sequels. The karyotype was 46,XX.
Conclusion Hyponatremia is a frequent electrolyte disorder. It is considered severe (<115 mEq/l) and chronic when the duration is >48 hours or the installation time is unknown. Irreparable harm can happen when abnormal serum sodium levels are corrected too quickly or too slowly. The correct diagnosis and understanding of the pathophysiology and mechanisms associated with hyponatremia allows establishing safe treatment criteria and consequently avoiding the sequels.
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P61

Time to meet energy requirements in enteral nutrition and its impact on patient tolerance and clinical outcomes in the ICU

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Introduction Delivering early nutrition support therapy, primarily using the enteral route, is seen as a strategy that may reduce disease severity, diminish complications, decrease length of stay in the ICU, and favorably impact patient outcome. SCCM and ASPEN guidelines support that after the initiation of enteral feeding we have 10 days to meet 100% of predicted energy requirements before we consider supplementation with parenteral nutrition (PN). There are scarce data about the clinical effects of using a more accelerated approach to reach full caloric adequacy with enteral nutrition (EN).
Objective The aim of this observational study is to evaluate whether a diminished time to target caloric goal is associated with more patient intolerance and clinical benefits in ICU patients receiving EN.
Methods From January 2010 to June 2010 we prospectively followed all consecutive ICU patients receiving EN. We collected epidemiological data, APACHE II score, LOS (ICU and hospital), need for mechanical ventilation, incidence of nosocomial infection and hospital mortality. We also collected data on nutrition therapy as the time to target caloric goal (120 hours), total time on nutrition therapy, incidence of diarrhea and other signs of EN intolerance (vomits, abdominal pain and distension). For statistical analysis we used the Kolmogorov–Smirnov test, Student's *t* test and Pearson's correlation coefficient.
Results We enrolled 32 patients (17 male/15 female) in the study. The mean age was 66 ± 18 years, mean APACHE II score 21 ± 9, mean ICU and hospital LOS were 21.3 and 35 days respectively, incidence of nosocomial infection was 21.8%, mean total time in nutrition therapy was 18.3 ± 14 days and hospital mortality was 28%. There was need for mechanical ventilation in 56%. There was need for PN supplementation in 9.4% ($n = 3$) of patients. Comparing the different groups (120 hours, $n = 16$) we were unable to detect any difference with statistical significance regarding incidence of diarrhea, EN intolerance, need for MV, total time on nutrition therapy, incidence of nosocomial infection, ICU and hospital LOS and hospital mortality.
Conclusion These preliminary data have shown no correlation of a diminished time to meet energy requirements in EN with patient tolerance to nutrition therapy and clinical benefits.

Table 1 (abstract P60). Serum electrolyte concentration during the first week

mEq/l	Admission	1st day	2nd day	3rd day	4th day	5th day	6th day	7th day
Na^+	101	108	120	122	133	129	127	130
K^+	7.9	6.1	4.7	3.3	4.5	5.8	5.3	5.6
Cl^-	78	84	94	96	103	95	95	94

Surgery/Trauma

P62

Large venous–arterial PCO_2 is associated with poor outcomes in surgical patients

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Introduction This study evaluated whether a large venous–arterial CO_2 gap (PCO_2 gap) during the preoperative period is associated with poor surgical outcome.
Methods A prospective observational study that included high-risk surgical patients who were 18 years of age or older. Palliative surgery, Child B and Child C cirrhosis, and class IV heart condition patients or ejection fraction <30% were excluded. The patients were divided into two groups: wide [P(v-a)CO_2] versus narrow [P(v-a)CO_2]. In order to determine the best value to discriminate hospital mortality, the receiver operating characteristic curve was used for the [P(v-a)CO_2] values collected during the preoperative period, and the most accurate value was chosen as a cut-off to define the groups.
Results The study included 66 patients. The preoperative [P(v-a)CO_2] value that best discriminated hospital mortality was 5.0 mmHg, area = 0.73. Preoperative patients with [P(v-a)CO_2] of more than 5.0 mmHg presented a higher hospital mortality (36.4% vs. 4.5%, $P = 0.004$), higher prevalence of circulatory shock (56.8% vs. 22.7%, $P = 0.01$) and acute renal failure in the postoperative period (27.3% vs. 4.5%, $P = 0.02$), and longer length of hospital stays (20.0 (14.0 to 30.0) vs. 13.5 (9.0 to 25.0) days, $P = 0.01$). The groups did not present any differences regarding demographic and physiological data.
Conclusion The PCO_2 gap values of more than 5.0 mmHg in the pre-operative period were associated with worse postoperative outcome.

P63

Analysis of head trauma management in a secondary hospital without neurosurgical service

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Introduction Head injuries are one of the most common causes of trauma patient admission. A key part of the management of these patients is airway control, rapid transport to appropriate trauma care facilities and prompt resuscitation. Many trauma patients who have suffered a head injury are initially taken to non-neurosurgical (NS) centers. In most instances, patients with severe head injury have to be transferred to a NS unit. Theoretically, the reason to transfer is the potential need for immediate surgical intervention. The purpose of the study was to evaluate head trauma patients who were transferred to NS units to determine the incidence of this occurrence, patients' profile and criteria adopted.
Methods A 6-month retrospective study was conducted from January through July 2010 at Hospital Municipal Dr. Moses Deutsch, located in Jardim Angela, south of São Paulo, 30 kilometers away from downtown. It is the only hospital within a radius of 7 miles and serves a population of approximately 600,000 inhabitants. It is a secondary hospital that provides medical staff in the emergency room for 24 hours as well as on-site computed tomographic (CT) scanning capability and the intensive care unit. All head trauma patients who were transported to NS were included. Data collected were demographics, mechanism of injury, Glasgow Coma Scale (GCS), clinical finding, CT findings, transfer times and returns from the NS.
Results There were 17,880 ED patient admissions and 2,255 were trauma related. A total 296 were head-injured patients requiring hospitalization. Eighteen seven patients demanded interhospital transfer, because of CT findings and clinical picture. The main mechanism of injury was falls (59.4%). The median transport delay to the neurosurgical service site was 10 ± 1.2 hours. Mean GCS were 12 and 56% of the CT had abnormal findings. Seventy-five percent returned after NS evaluation.
Conclusion Most of the cases are referred for assessment because of lack of local expertise leading to unnecessary transfers. This often resulted in the inappropriate transfer of ill patients and the unnecessary occupation of neurosurgical beds in a tertiary center. Furthermore, after assessment, many of these patients are sent back to the original hospital. Emergency neurosurgical teleconsultation may have an important role in the remote care of patients with head injuries and other neurosurgical emergencies.

P64

Outcome of surgical patients who present acidosis postoperatively

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Introduction Acidosis is a very frequent disorder in surgical patients. In this patient set there remains uncertainty of the clinic implications from acidosis and characteristics postoperatively. Therefore, it is very important to evaluate the role of acidosis in outcome for high-risk surgical patients.
Methods A prospective observational study was performed in five specialized intensive care units (ICUs) in surgical patients from three different hospitals. The patients who needed postoperative intensive care were involved in the study consecutively. Patients with low life expectancy (cancer without treatment), hepatic failure (Child B or C), renal failure (clearance of creatinine <50 ml/min or previous hemodialysis), and diabetic diagnosis were excluded. The patients were stratified by admission from the ICU related to kind of acidosis in the immediately postoperative period. The stratification evaluated metabolic acidosis by base excess <2 mmol/l and anion gap and lactate, both >12 and 2 mmol/l, respectively.
Results The study involved 188 patients during 3 months. The incidence of acidosis was bigger, but 52 (27.6%) presented a high anion gap without hyperlactatemia, 50 (26.6%) showed a high anion gap with hyperlactatemia, 48 (25.5%) a normal anion gap and in 38 (20.2%) there was no metabolic acidosis. Overall, gastric surgery presented higher percentages from metabolic acidosis (46.2% vs. 11.1% nonacidosis, $P < 0.05$). However, patients did not present difference in severity (SAPS III, SOFA and ASA), age and length of surgery. Patients with high anion gap and hyperlactatemia immediately postoperative showed greater complications, mainly shock, in comparison with only high anion gap patients, normal anion gap patients and nonacidosis patients, respectively 66%, 48.1%, 47.9% and 39.5% ($P < 0.05$). The same was verified in related to mortality rate, respectively 14.5%, 10.2%, 6.1% and 2.0% ($P = 0.04$).
Conclusion Metabolic acidosis in surgical patients is a very important complication postoperatively, mainly in gastric surgery. Patients who developed metabolic acidosis with a high anion gap and hyperlactatemia presented worst outcomes compared with patients with other kinds of acidosis or patients with nonacidosis.

P65

Red blood cell transfusion is an independent risk factor for cardiovascular complications in adult patients undergoing cardiac surgery: a propensity score-matched analysis

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Introduction Red blood cell (RBC) transfusion is associated with a higher occurrence of clinical complications after cardiac surgery. However, the cause–effect relationship is confounded by other risk factors for worse outcomes as advanced age, valve or combined procedure, high EuroSCORE, redo surgery, longer bypass time and previous anemia. The objective of this study was to evaluate the effect of RBC transfusion in a propensity score-matched case–control analysis.

Table 1 (abstract P65). Comparison between propensity-matched patients groups with and without red blood cell transfusion after cardiac surgery

	RBC transfusion		
Variable	**No (*n* = 132)**	**Yes (*n* = 132)**	***P* value**
Sex (female)	34 (26%)	48 (36%)	0.063
Age (years), mean (95% CI)	59 (57 to 61)	60 (58 to 63)	0.295
Procedure			
CABG	89 (67%)	87 (66%)	0.873
Valve	36 (27%)	36 (27%)	
CABG + valve	7 (5%)	9 (7%)	
EuroSCORE, median (IQR)	4 (3 to 6)	4 (3 to 6)	0.683
Redo surgery	13 (10%)	14 (11%)	0.839
Bypass time (minutes), median (IQR)	89 (75 to 110)	91 (75 to 112)	0.418
Hemoglobin (g/dl), mean (95% CI)	13.3 (13.1 to 13.6)	13.1 (12.9 to 13.3)	0.192
Cardiovascular complications	22 (17%)	39 (30%)	0.013
	OR = 2.1 (95% CI = 1.2 to 3.8)		

CABG, coronary artery bypass surgery; CI, confidence interval; IQR, interquartile range; OR, odds ratio. Statistical tests: Mann–Whitney and chi-square.

Table 1 (abstract P66). Characteristics of the study participants and mortality

Age	66 (± 17)
Female gender, % (*n*)	34 (11)
APACHE II score, mean (±SD)	18 (± 4)
Emergency surgery, % (*n*)	0 (13)
Elective surgery, % (*n*)	22 (7)
Medical, % (*n*)	38 (12)
IAH, % (*n*)	62 (20)
ACS, % (*n*)	12.5 (4)
Length of stay (days)	
Hospital	60 (± 55)
ICU	14 (± 15)
Mortality (%)	
28-day	31
ICU	38
Hospital	62

Methods A total of 502 patients who underwent cardiac surgery with cardiopulmonary bypass from February 2009 to February 2010 were evaluated. We performed a propensity score-matching analysis in 264 patients, considering the following risk factors for cardiovascular complications: sex, age, type of procedure, EuroSCORE, redo surgery, bypass time and previous hemoglobin.
Results Cardiovascular complications occurred in 39 patients (30%) exposed to red blood cell transfusion, and in 22 patients (17%) not exposed. The propensity score-matched analysis showed an odds ratio of 2.1 (95% CI = 1.2 to 3.8) for cardiovascular complications in patients exposed to RBC transfusion (Table 1).
Conclusion RBC transfusion after cardiac surgery increases the risk of cardiovascular complications in a group of patients paired for other risk factors. These findings bring into perspective the importance of an adoption of a restrictive strategy of RBC transfusion to avoid cardiovascular complications.

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Risk factors for intra-abdominal hypertension and abdominal compartment syndrome in patients admitted to the ICU

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Introduction Intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS) as well as their risk factors were defined recently by consensus. These diseases have a high incidence and morbi-mortality in patients admitted to the ICU and represent a huge problem among critically ill patients.
Objective To determine the incidence of IAH or ACS in patients admitted to a university hospital ICU with two or more risk factors.
Methods All patients admitted to the ICU were evaluated daily. Those with at least two risk factors were submitted to intraabdominal pressure (IAP) monitoring by intravesical pressure method once daily, during 7 days or until death or ICU discharge. In each measure, the abdominal perfusion pressure (APP) (that is, IAP – mean arterial pressure) was recorded. Demographic data, APACHE II, ICU and hospital length of stay and mortality were determined. Results are presented as the percentage or mean ± standard deviation (Table 1).
Results Patients were assessed from February 2010 to October 2010 and 164 were enrolled. Thirty-two patients fulfilled criteria for IAP monitoring (mean age 62 ± 17 years, 37% (12) female, mean APACHE II score 18 ± 4). Among these 32 patients, 62% (20) had at least one IAH episode and 12.5% (four) developed ACS. Only patients with ACS had APP <60 mmHg. Hospital LOS was 60 ± 55 days, ICU LOS was 14 ± 15 days. The 28-day, ICU and hospital mortalities were 31% (10), 38% (20) and 62% (20), respectively.
Conclusion Risk factors have a high incidence in our ICU. IAH/ACS patients present a high mortality and a long LOS.

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Correction: C-reactive protein/albumin ratio at ICU discharge as a predictor of post-ICU death: a new useful tool

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Correction After the publication of this abstract [1], we found that not all data of results section were published. The complete multivariate analysis and the best cut-off value of the CRP/albumin ratio are now published: The multivariate analysis resulted in the follow independent in-hospital death predictors: Age (OR 1.028, 95% CI 1.014-1.043, *P* <0.001), comorbitidies (OR 1.247, 95% CI 1.036-1.500, *P* = 0.020), ICU LOS (OR 1.031, 95% CI 1.003-1.0609, *P* = 0.029), Septic Syndrome (OR 1.683, 95% CI 1.027-2.758, *P* = 0.039), SOFA (OR 1.284, 95% CI 1.151-1.432, *P* <0.001) and CRP/albumin ratio (OR 1.809, 95% CI 1.099-2.977, *P* = 0.020). The best value of CRP/albumin ratio to predict death after ICU discharge was 2.

Reference

1. Azevedo LCP, Ranzani OT, Prada LF, Zampieri FG, Pinaffi JV, Battaini LC, Setogute YC, Forte DN, Azevedo LC, Park M: C-reactive protein/albumin ratio at ICU discharge as a predictor of post-ICU death: a new useful tool. *Critical Care* 2011, **15(Suppl 2):**P52.