Critical Care Volume 11 Suppl 3, 2007

Fourth International Symposium on Intensive Care and Emergency Medicine for Latin America

São Paulo, Brazil, 20–23 June 2007

Published online: 19 June 2007
These abstracts are online at http://ccforum.com/supplements/11/S3

Basic science

P1

Platelet-derived exosomes are redox signaling particles

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Critical Care 2007, **11(Suppl 3):**P1 (doi: 10.1186/cc5788)

Sepsis, the body's response to infection, is associated with extremely high mortality rates. Why a protective mechanism turns into a deadly clinical picture is a matter of debate, and goes largely unexplained. In previous work we demonstrated that platelet-derived microparticles (MP) can induce endothelial and vascular smooth muscle cell apoptosis in septic patients through NADPH oxidase-dependent superoxide release [1]. In this work we sought to create a model for *ex vivo* generation of septic-like MP and to identify the pathways responsible for MP free radical release and effects. Septic shock is a condition related to the generation of high amounts of thrombin, TNFα and nitrogen reactive species. Human platelets exposed to the NO donors diethylamine-NONOate (0.5 mM) and nitroprusside (2 mM) for 20 minutes generated MP similar to those found in the blood of septic shock patients. Flow cytometry and western blot analysis of those MP, like their septic counterparts, revealed exposure of the tetraspanin markers CD9, CD63, and CD81, but little phosphatidylserine. Such a membrane exposure, associated with their size, characterizes them as exosomes. Furthermore, we identified the Nox2 and p22phox NADPH oxidase subunits and the inducible isoform of NO synthase (NOS), but not the NOS I and III isoforms. On the other hand, platelets exposed to thrombin or TNFα released particles with clearly distinct characteristics, such as high phosphatidylserine and low tetraspanin. Like the septic MP, the MP obtained by NO exposure generated the superoxide radical and NO, as disclosed by lucigenin (5 μM) and coelenterazine (5 μM) chemiluminescence and by 4,5-diaminofluorescein (10 mM) and 2′,7′-dichlorofluorescein (10 mM) fluorescence. As expected, NOS inhibitors or NADPH oxidase inhibitors significantly reduced signals. In addition, endothelial cells exposed to this type of MP underwent apoptotic death, while control MP had negligible effects. NADPH oxidase as well as NOS inhibition significantly reduced apoptosis rates. Concomitant generation of NO and superoxide suggests biological effects of the highly reactive radical peroxynitrite. In fact, the peroxynitrite scavenger urate (1 mM) showed an additive effect on fluorescent signal inhibition, as well as on endothelial apoptosis rate reduction. We thus propose that platelet-derived exosomes may be another class of actors in the complex play known as 'vascular redox signaling'. In this sense, an exosome-based approach can provide novel tools for further understanding and even treating vascular dysfunction related to sepsis.

Reference

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P2

Which is the worst factor in sepsis aggravation: translocated bacterial amount or gut-associated lymphoid tissue activation?

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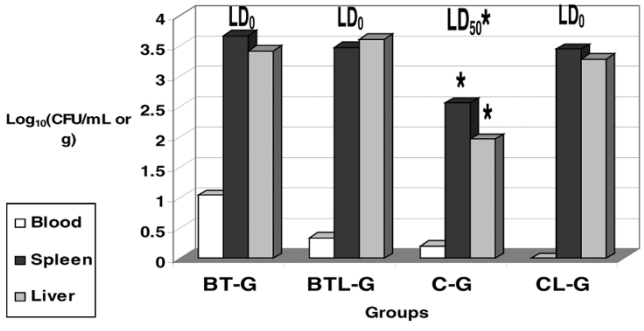
Critical Care 2007, **11(Suppl 3):**P2 (doi: 10.1186/cc5789)

Introduction The intestinal hypothesis of sepsis has been attributed to bacterial translocation (BT), and the aggravation of sepsis is related to the increased vascular permeability state that potentates the BT index. In this study we examined the BT index during sepsis with or without mesenteric lymph exclusion.
Materials and methods Wistar rats (±200 g) were submitted to the BT process (*E. coli* R6 10 ml of 10^{10} CFU/ml) and nonlethal sepsis (*E. cloacae* 89 2 ml of 10^7 CFU/ml) plus BT, with or without mesenteric lymph interruption by mesenteric lymph node resection and lymph duct ligature 5 days prior to the experiments. Samples (blood, spleen and liver) were collected 2 hours after the innoculation and cultured to recover bacteria of intestinal origin. One-half of the animals per group was observed to mortality. Groups ($n = 20$/group): BT group (BT-G), BT with lymphadenectomy group (BTL-G), combination group (C-G) and combination with lymphadenectomy group (CL-G).
Results BT was 100% positive in all groups. The BT index was similar between the BT-G, the BTL-G and the CL-G ($P = 0.6$), and mortality was not observed in these groups although a considerable amount of translocated bacteria could be recovered,

Figure 1 (abstract P2)



Bacterial recovery of BT-origin and mortality. *$P < 0.05$.

particularly at the liver and spleen (Figure 1). When BT was added to the sepsis without lymph exclusion (C-G), the BT index was statistically lower ($P = 0.04$); however, 50% (LD_{50}) of mortality occurred within 30 hours (Figure 1).

Conclusion These results show that, more than the amount of translocated bacteria, the gut-associated lymphoid system activation by the BT process played a pivotal role in the worsening of sepsis. Besides, BT occurred independently of mesenteric lymph interruption, showing that the hematological route of BT might be the principal route for bacterial dissemination into the bloodstream.

P3

Toll-like receptor 2 induces chemokine receptor CXCR2 downregulation and neutrophil migration impairment in severe sepsis

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Critical Care 2007, **11(Suppl 3):**P3 (doi: 10.1186/cc5790)

There is a marked defect in neutrophil migration into the infectious focus during severe sepsis, which is associated with the severity of disease. Recently, we demonstrated that this phenomenon is a consequence of downregulation of the chemokine receptor CXCR2 on the surface of circulating neutrophils. Toll-like receptors are pattern-recognition receptors that are important in innate immune responses to bacterial infection. Toll-like receptor activation in phagocytes produces proinflammatory cytokines and chemokines that contribute directly to elimination of infectious agents. A sustained inflammatory response, however, can result in tissue damage and sepsis. Here, we address the role of Toll-like receptor 2 (TLR2) in the downregulation of CXCR2 and the establishment of neutrophil migration impairment in severe sepsis. TLR2-deficient ($TLR2^{-/-}$) and C57BL/6 (WT) mice were subjected to severe polymicrobial sepsis by the cecal ligation and puncture model, and neutrophil migration, bacteremia, CXCR2 expression and cytokine levels were evaluated. It was observed that TLR2 is critical for downregulation of CXCR2 expression on circulating neutrophils during severe sepsis, since this event was prevented in $TLR2^{-/-}$ mice. In accordance, $TLR2^{-/-}$ mice did not present failure of neutrophil migration into the infectious focus and, consequently, they presented lower bacteremia and did not display systemic inflammation determined by reduced levels of circulating cytokines, showing an improve of survival rate. Furthermore, *in vitro*, TLR2 agonist (lipoteichoic acid) was able to downregulate CXCR2 expression and markedly to inhibit neutrophil chemotaxis induced by CXCR2 ligand. The downregulation of CXCR2 was associated with enhanced expression of G-protein-coupled receptor kinases-2 (GRK-2), which is known to play an important role in desensitization and internalization of this chemokine receptor. Finally, we showed that *in-vitro* lipoteichoic acid-stimulated neutrophils adoptively transferred into naïve WT mice display a significantly reduced competence to migrate into peritoneal cavity in response to thioglycolate. Altogether, these findings suggest that TLR2, through GRK2 signaling, downregulates CXCR2 expression on the surface of circulating neutrophils, which is a critical determinant of impairment of neutrophil migration into the infection focus during severe sepsis.

Hemodynamics/shock

P4

Effects of hypertonic saline and lactated Ringer's solutions on bacterial translocation in a rat model of intestinal obstruction and ischemia

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Critical Care 2007, **11(Suppl 3):**P4 (doi: 10.1186/cc5791)

Introduction Clinical evidence suggests that bacterial translocation (BT) may not be the primary cause in the development of sepsis and multiple organ dysfunction. However, BT has an important role in the activation of the immune system. Therapies have been extensively investigated to improve tissue perfusion and reduce intestinal ischemia. The aim of this study is to evaluate the effects of hypertonic saline (HSS) 7.5% and lactated Ringer's (LR) solutions on intestinal BT in rats that underwent intestinal obstruction and ischaemia (IO).

Methods Wistar rats (300 ± 50 g) underwent anesthesia with sodium pentobarbital (50 mg/kg, i.p.) and were submitted to IO: (i) cecum exposure, (ii) ileum ligation at 1.5 cm proximal to the ileocecal valve, and (iii) ligation of the mesenteric vessels that supply a 7–10 cm length of the ileal loop. Two hours after surgical procedures, 4 ml/kg of 7.5% HSS or LR were administered intravenously, during 5 minutes. Animals were killed 24 hours after IO, and microbiological assays were performed in mesenteric lymph nodes, liver, spleen, and blood.

Results See Table 1.

Conclusion HSS reduced the number of CFU/g in the liver, spleen, and blood after IO, resulting in improvement of the 'gut barrier function'.

Table 1 (abstract P4)

Microbiological assays

	Mesenteric lymph nodes		Liver		Spleen		Blood
Group	+/*n*	CFU/g	+/*n*	CFU/g	+/*n*	CFU/g	+/*n*
Sham	1/7	57	0/7	NG	0/7	NG	0/7
IO	6/7	2,939 ± 1,751	6/7	953 ± 525	6/7	4,616 ± 1,973	4/7
LR	7/7	1,862 ± 1,178	5/7	3,080 ± 1,832	6/7	4,376 ± 2,836	6/7
HSS	6/7	2,371 ± 1,451	3/7	104 ± 67	4/7	174 ± 75	1/7

Sham group, false operated; +/*n*, number of animals with positive cultures for *E. coli*/total number of animals; CFU/g, colony formation units/g tissue (mean value ± SEM, $n = 7$ animals in each group); NG, no growth.

Table 1 (abstract P6)

Data	Group	Pre-shock	Post-shock	1 hour	3 hours	6 hours	*P* value
Mean arterial blood pressure (mmHg)	Shock	111 ± 19	76 ± 13*,&	87 ± 22*	82 ± 10*,&	72 ± 7*,&	<0.001#
	Control	111 ± 16	115 ± 9	115 ± 9	102 ± 7	97 ± 8	<0.001$
Stroke volume (ml/min/beat)	Shock	65 ± 9	22 ± 5*,&	44 ± 8*,&	38 ± 12 &	36 ± 8&	<0.001#
	Control	59 ± 16	59 ± 13	53 ± 7	54 ± 9	45 ± 12	<0.001$
SVO_2 (%)	Shock	73 ± 9	65 ± 8	69 ± 8	55 ± 15&	56 ± 13&	0.023#
	Control	75 ± 7	72 ± 6	72 ± 6	68 ± 5&	62 ± 6&	0.002$
Lactate (mg/dl)	Shock	15 ± 6	72 ± 19*,&	51 ± 22*,&	23 ± 19	14 ± 6	<0.001#
	Control	25 ± 13	18 ± 8	12 ± 5	17 ± 13	14 ± 10	<0.001$
Temperature (ºC)	Shock	36.8 ± 0.6	37.5 ± 0.4	38.7 ± 0.7*,&	39.6 ± 0.7*,&	39.7 ± 0.6*,&	<0.001#
	Control	36.5 ± 0.3	37.0 ± 0.6	37.5 ± 0.7	38.0 ± 0.6	38.4 ± 0.4	<0.001$

Two-way ANOVA between groups# and within groups$. Tukey *$P < 0.05$ vs control and &$P < 0.05$ vs baseline.

P5

Experimental pulmonary microembolism: effects on hemodynamics, lung mechanics and histopathology

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Critical Care 2007, **11(Suppl 3):**P5 (doi: 10.1186/cc5792)

Objectives To characterize an experimental model of pulmonary embolism by studying hemodynamics, lung mechanics and histopathologic derangements caused by pulmonary microembolism in pigs. To identify lung alterations after embolism that may be similar to those evidenced in pulmonary inflammatory conditions.
Materials and methods Ten Large White pigs (weight 35–42 kg) were instrumented with arterial and pulmonary catheters, and pulmonary embolism was induced in five pigs by injection of polystyrene microspheres (diameter ~300 μM), in order to obtain a pulmonary mean arterial pressure of twice the baseline value. Five other animals injected with saline served as controls. Hemodynamic and respiratory data were collected and pressure x volume curves of the respiratory system were performed by a quasi-static low flow method. Animals were followed for 12 hours, and after death lung fragments were dissected and sent to pathology.
Results Pulmonary embolism induced a significant reduction in stroke volume (71 ± 18 ml/min/bpm pre vs 36 ± 9 ml/min/bpm post, $P < 0.05$), an increase in pulmonary mean arterial pressure (27 ± 4 mmHg pre vs 39 ± 6 mmHg post, $P < 0.05$) and pulmonary vascular resistance (193 ± 122 mmHg/l/min pre vs 451 ± 149 mmHg/l/min post, $P < 0.05$). Respiratory dysfunction was evidenced by significant reductions in the PaO_2/FiO_2 ratio (480 ± 50 pre vs 159 ± 55 post, $P < 0.05$), the dynamic lung compliance (27 ± 6 ml/cmH_2O pre vs 19 ± 5 ml/cmH_2O post, $P < 0.05$), the increase in dead space ventilation (20 ± 4 pre vs 47 ± 20 post, $P < 0.05$) and, the shift of pressure x volume curves to the right, with reduction in pulmonary hysteresis. Pathology depicted inflammatory neutrophil infiltrates, alveolar edema, collapse and hemorrhagic infarctions.
Conclusion This model of embolism is associated with cardiovascular dysfunction, as well as respiratory injury characterized by a decrease in oxygenation, lung compliance and hysteresis. Pathology findings were similar to those verified in inflammatory pulmonary injury conditions. This model may be useful to study pathophysiology, as well as pharmacologic and ventilatory interventions useful to treat pulmonary embolism.

P6

Hemodynamic and metabolic features of a porcine systemic low flow state model

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Critical Care 2007, **11(Suppl 3):**P6 (doi: 10.1186/cc5793)

Objective To describe a new experimental systemic low flow state model induced by cardiac tamponade.
Methods Ten Large White pigs (43 ± 5 kg) were instrumented with arterial and pulmonary catheters, cystostomy and splenectomy, and a latex balloon was inserted anterior to the heart. Pigs were randomized to a shock group or a control group. The shock group had the balloon inflated with 620 ± 344 ml to keep the mean arterial blood pressure at 45–55 mmHg (mean = 49 ± 4 mmHg) for 1 hour. Hemodynamic data were collected and shown as the mean ± SD. Two-way ANOVA was used with Bonferroni's correction.
Results During shock, the SvO_2 was 34 ± 8%, the heart rate was 173 ± 36 bpm, and the stroke volume was 18 ± 12 ml/min/beat. After shock, see Table 1.
Conclusion In our model, transient cardiac tamponade caused persistent hypotension and cardiovascular dysfunction. Hyperthermia was an interesting finding in the last hours of the experiment in animals submitted to cardiac tamponade.

P7

Effects of hypertonic saline solution and pentoxifylline on rat mesenteric microcirculation after hemorrhagic shock/reperfusion followed by cecal ligation/puncture: an intravital microscopic study

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Critical Care 2007, **11(Suppl 3):**P7 (doi: 10.1186/cc5794)

Objective Hemorrhagic shock/reperfusion followed by sepsis triggers systemic microcirculatory disturbances that may induce multiple organ failure. The present *in-vivo* study evaluated the

Table 1 (abstract P7)

Leukocyte–endothelial interactions in mesenteric postcapillaric venules

Group	*n*	Rollers (10 min)	Adherent cells (100 μm venule length)	Migrated cells (5,000 μm²)	Total white blood (cells/mm³)
SHAM	6	96 ± 12	3 ± 1	2 ± 1	12,367 ± 2,641
LR	7	207 ± 19[a]	17 ± 1[a]	17 ± 1[a]	16,771 ± 5,703[a]
HSS	8	108 ± 16	9 ± 3[b]	12 ± 3[b]	12,388 ± 6,629
HSS + PTX	7	102 ± 26	6 ± 1[b,c]	6 ± 1[b,c]	10,757 ± 2,483
LR + PTX	5	115 ± 20	7 ± 1[b]	7 ± 1[b,c]	11,650 ± 1,570

[a]$P < 0.001$ vs other groups, [b]$P < 0.001$ vs SHAM, [c]$P < 0.001$ vs HSS.

effects of hypertonic saline solution (HSS) (7.5%, 4 ml/kg) and pentoxifylline (PTX) (4 mg/kg) on mesenteric microcirculation in double-injured rats.

Methods Thirty-three anesthetized Wistar rats (~250 g) were randomly assigned to: (1) SHAM: no injury group; (2) HSS: hemorrhagic shock/reperfusion with HSS; (3) LR: hemorrhagic shock/reperfusion with lactated Ringer's solution (LR), three times shed blood volume; (4) HSS + PTX: hemorrhagic shock/reperfusion with HSS associated with PTX; and (5) LR + PTX: hemorrhagic shock/reperfusion with LR associated with PTX. The animals were submitted to cecal ligation/puncture (second injury).

Results Leukocyte–endothelium interactions (Table 1) were assessed by intravital microscopy at mesenteric postcapillaric venules (~21.07 μm diameter).

Conclusion The *in-vivo* observation of the rat mesenteric microcirculation showed that, in a double-injury model, reperfusion of the animals with HSS and PTX did attenuate the inflammation response compared with LR-reperfused animals.

Acknowledgements Funded by FAPESP and PRONEX.

P8

Increased pulse pressure variations observed in a pulmonary experimental thromboembolism model

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Critical Care 2007, **11(Suppl 3):**P8 (doi: 10.1186/cc5795)

Background Pulse pressure respiratory variation (PPV), which is the difference between the maximal and minimal arterial pulse pressure values after each positive-pressure breath, is largely used for early identification of hypovolemic status. Increased PPV observed in hypovolemia results from exaggerated respiratory variation in transpulmonary blood flow that results in corresponding left ventricular preload variations during respiratory cycles. Hence, any modulations that affect the left ventricular preload would influence PPV.

Objective To test the hypothesis that PPV amplification observed in hypovolemia can also be detected after pulmonary thromboembolism obtained with central venous injection of blood cloth.

Methods PPV was studied in five anesthetized and mechanically ventilated male rabbits weighing 1.6 ± 0.3 kg. The heart rate (HR) and mean arterial pressure (MAP) were monitored after central venous (jugular) and arterial (carotid) catheterization, and 1.5 ml/kg autologous blood cloth were injected slowly through the jugular catheter into the central circulation. The HR, MAP and PPV were registered before and after blood cloth injection and compared using the Student *t* test.

Results The HR did not change, but the MAP was significantly lowered as much as PPV significantly increased after cloth injection. See Table 1.

Table 1 (abstract P8)

	Before	After	*P* value
HR	249 ± 50	295 ± 22.9	0.2
MAP	55 ± 4.2	21 ± 3.4	<0.001
PPV	5.5 ± 1.8	30 ± 5.6	<0.009

Conclusion PPV amplification observed in hypovolemia can be also detected after pulmonary thromboembolism obtained with central venous injection of blood cloth. It is possible to conclude that pulmonary hypertension should be assumed as a limitation for cardiovascular fluid responsiveness determination by PPV.

P9

Pharmacological vasodilatation increased pulse pressure variation mimicking hypovolemic status in rabbits

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Critical Care 2007, **11(Suppl 3):**P9 (doi: 10.1186/cc5796)

Background Pulse pressure respiratory variation (PPV), which is the difference between the maximal and minimal arterial pulse pressure values after one positive-pressure breath, is largely used for early identification of hypovolemic status. Increased PPV, as seen in hypovolemia, results from exaggerated respiratory variation in transpulmonary blood flow that results in corresponding left ventricular preload variations during respiratory cycles. Hence, any factor that affects left ventricular preload can be associated with PPV amplification.

Objective To test the hypothesis that PPV amplification observed in hypovolemia can also be observed during pharmacological vasodilatation, induced by sodium nitroprusside (SN).

Methods Ten anesthetized, mechanically ventilated rabbits, underwent progressive hypotension by either controlled hemorrhage (CH) or intravenous SN infusion. CH group: five rabbits were submitted to graded hemorrhage of 10%, 20%, 30%, 40% and 50% of their blood volume. Mean arterial pressure steps were registered and assumed as pressure targets. SN group: five rabbits were submitted to a progressive SN dose infusion to reach similar pressure targets observed in the CH group (Table 1). PPV was measured at each arterial pressure step.

Table 1 (abstract P9)

Pulse pressure respiratory variation values in every step in both groups

	BL	T1	T2	T3	T4	T5
Hemorrhage	3.9 ± 1.2	6.7 ± 1.8	9.7 ± 2.4	13.5 ± 1.6	15.1 ± 0.9	19.6 ± 2.4
Nitroprusside	5.6 ± 2.1	10.7 ± 2.4	10.7 ± 2.4	16.3 ± 4	22.1 ± 5.3	22.6 ± 5.4

Table 1 (abstract P10)

	T0	T30	T90	T120	T150	T270
MAP (mmHg)						
NS	102 ± 3.8	87 ± 5.4*	54 ± 7.3*	73 ± 9.5*	65 ± 10.2*	69 ± 15.7*
HH	105 ± 5.2	87 ± 7.8*	54 ± 7.3*	63 ± 8.1*	66 ± 9.3*	56 ± 9.4*
CO (l/min)						
NS	2.1 ± 0.2	1.7 ± 0.1*	1.2 ± 0.2*,a,b	2.3 ± 0.3*	1.6 ± 0.2*,d	1.2 ± 0.2*
HH	2.2 ± 0.1	1.5 ± 0.1*	1.1 ± 0.1*,a,b	1.5 ± 0.2*	1.5 ± 0.2*	0.8 ± 0.1*
PVBF (ml/min)						
NS	510 ± 91	324 ± 60	160 ± 44*,a	396 ± 85	275 ± 72*	167±53*
HH	561 ± 32	287 ± 31*	218 ± 39*	233 ± 47*	204 ± 29*	129 ± 29*
SpO_2 (%)						
NS	92 ± 1.2	86 ± 3.5	74 ± 4.6*	87 ± 3.2	79 ± 4.3	65 ± 6.9*
HH	89 ± 1.8	81 ± 3.9	68 ± 2.4*	70 ± 4.2	70 ± 3.6d	52 ± 6.9*

$P < 0.05$ for the following comparisons: *vs baseline, [a]T90 vs T120, [b]T90 vs T270, [c]T120 vs T150, [d]T150 vs T270.

Results The heart rate was significantly greater in the SN group than in the CH group ($P < 0.05$). PPVs were similar among the experimental models in all steps ($P = 0.17$).
Conclusion Pharmacologic vasodilatation by SN induced a PPV amplification similar to that observed in hypovolemia. Our results reinforce the idea that PPV amplification may be associated with potential cardiovascular response and not necessarily hypovolemic status. Hence, caution should be exercised before assuming that PPV is a marker of intravascular volume status.

P10

Early fluid replacement with hypertonic isoncotic solution guided by mixed venous oxygen saturation in experimental hypodynamic sepsis

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Critical Care 2007, **11(Suppl 3):**P10 (doi: 10.1186/cc5797)

Introduction Volume replacement is one of the cornerstones in the management of sepsis. The type and amount of fluid are still controversial.
Hypothesis A hypertonic isoncotic solution could promote superior hemodynamic benefits as the initial fluid regimen than standard crystalloid resuscitation, and mixed venous oxygen saturation could be useful to guide fluid administration in experimental sepsis.
Methods Anesthetized mongrel dogs received an intravenous infusion of 1.2 x 10^{10} cfu/kg live *E. coli* in 30 minutes (T0–T30). After 60 minutes (T90), the dogs were randomized to receive isotonic saline solution, 32 ml/kg over 20 minutes (NS, $n = 7$) or 7.5% hypertonic isoncotic solution (Hyper-Haes) 4 ml/kg over 5 minutes (HH, $n = 7$). After 30 and 60 minutes (T120 and T150), additional isotonic saline solution 32 ml/kg was administered if mixed venous oxygen saturation was below 70% in both groups. the mean arterial pressure (MAP), cardiac output (CO) and portal blood flow (PVBF) were monitored; blood gases and lactate levels were analyzed at each timepoint.
Results See Table 1. Data are expressed as the mean ± SEM.
Conclusion Both solutions promoted similar and partial benefits at systemic and regional levels in this hypodynamic sepsis model. Although initial fluid requirement after HH was lower than NS, overall fluid infused was not statistically different between groups (HH 31.4 ± 10.9 ml/kg vs NS 50.3 ± 6.5 ml/kg).
Acknowledgement Supported by FAPESP 05/51176-5.

P11

Dynamic evaluation of central venous pressure for fluid responsiveness assessment in spontaneous breathing dogs

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Critical Care 2007, **11(Suppl 3):**P11 (doi: 10.1186/cc5798)

Background Variations in intrathoracic pressure interfere with venous return and cardiac output (CO). Inspiratory fall in central venous pressure (CVP) traces (ifCVP) during spontaneous breathing have been recommended for cardiovascular fluid responsiveness (CFR) evaluation. We recently described the usefulness of CVP wave amplitude variation (pressoric vena cava collapsibility index, Cvc_i) during mechanical ventilation for CFR estimation in critically ill patients. There are no data about the Cvc_i evaluation during spontaneous breathing.
Objective To test the hypothesis that Cvc_i can be used for CFR evaluation during spontaneous ventilation.
Methods In six male, anesthetized, intubated and spontaneous breathing dogs, CO measurements and CVP waves were registered through a Swan–Ganz catheter while the mean arterial pressure (MAP) was measured through an intraarterial catheter.

Table 1 (abstract P11)

Step	0	−10%	−20%	−30%	−40%	−50%	−40%	−20%	0
CO	2.8 ± 0.5	2.4 ± 0.4	2.2 ± 0.4	1.8 ± 0.5	1.6 ± 0.5	1.4 ± 0.5	1.8 ± 0.4	3.0 ± 0.7	3.5 ± 0.8
ifCVP	2.8 ± 0.4	3.1 ± 0.5	3.8 ± 0.7	3.3 ± 0.5	2.1 ± 0.2	2.7 ± 0.5	4.1 ± 1	3.0 ± 0.5	2.3 ± 0.2
Cvc_i	−8 ± 6	−11 ± 13	−19 ± 8	−18 ± 15	−27 ± 10	−17 ± 7	−12 ± 20	−11 ± 7	−8 ± 4

After baseline measurements a graded hemorrhage was performed in 10% quota until 50% of the estimated volemia. The total shed blood volume was then re-infused in the same quota. Measurements of the heart rate (HR), CO, MAP, CVP, ifCVP, and Cvc_i are performed in every bleeding and re-infusion step. The Cvc_i was calculated with the following formula: Cvc_i (%) = [($CVPP_{exp}$ − $CVPP_{ins}$) / $CVPP_{exp}$] x 100, using the inspiratory ($CVPP_{ins}$) and expiratory central venous pulse pressure ($CVPP_{exp}$). ifCVP = CVP measured in the 'a' wave base at expiration minus CVP measured in the 'a' wave base at inspiration. Correlations among the CO and other variables were performed using the Spearman coefficient test.

Results See Table 1. The correlations encountered were: CO and SvO_2 ($r = 0.94$, $P < 0.001$); CO and Cvc_i ($r = 0.61$, $P < 0.04$); and CO and ifCVP ($r = -0.02$, $P < 0.9$).

Conclusion We conclude that a pressoric vena cava collapsibility index may be used to detect cardiovascular fluid responsiveness during spontaneous ventilation.

P12

Evaluation of tissue perfusion parameters and intravascular volume, emphasizing the inferior vena cava diameter and collapsibility

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Critical Care 2007, **11(Suppl 3):**P12 (doi: 10.1186/cc5799)

Introduction Echocardiography in critically ill patients enables diagnosis of a large number of cardiac conditions, including life-threatening ones. Intensivists can use it as a powerful diagnostic tool.

Objective A comparison of intravascular volume and tissue perfusion parameters in critically ill patients to enhance beneficial conduct in treatment and outcome using the inferior vena cava diameter as guidance.

Materials and methods Patients were enrolled from November until December 2006 in the ICU of the Emergency Department at HMSA. Inclusion criteria: (a) hemodynamic instability or dependency on vasoactive drugs, at the first 6 hours; (b) age >18 years; (c) deep vein access in superior vena cava. Evaluation of the intravascular volume and tissue perfusion parameters followed after admission, with normal values being defined as cardiac rate (CR: 80–100 bpm); mean blood pressure (MBP: >90 mmHg); central venous pressure (CVP: 8–12 mmHg); serum lactate (Lac: < 1 mmol/l); arterial oxygen saturation (SaO_2: >90%); central venous oxygen saturation ($ScvO_2$: >75%); ΔPCO_2 (<4 mmHg indicates a cardiac index >2.5 l/min/m^2); inferior vena cava diameter (IVC: >15 mm) and its variation with inspiration (ΔIVC: <50%).

Results A total of 32 patients were investigated – of which five presented with the following apparent divergences:

1. CR: 98 bpm; MBP: 80 mmHg, in use of norepinephrine (NE); CVP: 12 mmHg; Lac: 1.6 mmol/l; SaO_2: 98.1%; $SvcO_2$: 54.9%; ΔPCO_2: 5 mmHg; IVC: 24 mm; ΔIVC: 10%. Procedure: patient with severe left ventricular dysfunction. Increased IVC demanded initiation of inotropic drugs.
2. CR: 128 bpm; MBP: 119 mmHg, in use of NE; CVP: 18.4 mmHg; Lac: 9.6 mmol/l; SaO_2: 96.5%; $SvcO_2$: 83.8%; ΔPCO_2: 1.7 mmHg; IVC: 3 mm; ΔIVC: 66%. Procedure: septic patient, hyperdynamic. Decreased IVC resulted in volume replacement.
3. CR: 86 bpm; MBP: 75 mmHg; CVP: 6.5 mmHg; Lac: 1.1 mmol/l; SaO_2: 87%; $SvcO_2$: 81.2%; ΔPCO_2: 6.2 mmHg; IVC: 7 mm; ΔIVC: 70%. Procedure: trauma victim with ARDS, in mechanical ventilation (PEEP: 12 cmH_2O). Decreased IVC resulted in volume infusion.
4. CR: 106 bpm; MBP: 60 mmHg; CVP: 5.5 mmHg; Lac: 1.6 mmol/l; SaO_2: 95.9%; $SvcO_2$: 74.3%; ΔPCO_2: 3.4 mmHg; IVC: 12 mm; ΔIVC: 60%. Procedure: patient with subarachnoid hemorrhage. Normal IVC diameter and collapsibility helped to maintain MBP > 100 mmHg and prevent vasospasm.
5. CR: 128 bpm; MBP: 90 mmHg; CVP: 18.5 mmHg; Lac: 1.4 mmol/l; SaO_2: 80%; $SvcO_2$: 71.2%; ΔPCO_2: 3.2 mmHg; IVC: 25 mm; ΔIVC: 5%. Procedure: hypervolemic patient with ARDS, in mechanical ventilation (APRV-Bilevel). Increased IVC resulted in volume restriction and use of diuretics to improve P/F.

Conclusion Cases reported in this study demonstrate how the IVC helped monitor hemodynamics in critically ill patients and led to further decisions in treatment. Other studies also recommend the incorporation of this technology as a routine in ICUs due to its noninvasivity, feasibility, accessibility and lower risks.

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P13

Base excess and early mortality in patients admitted to the general intensive care unit at a university hospital in Fortaleza

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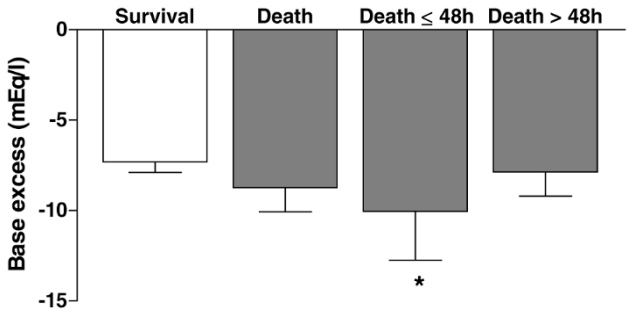
Critical Care 2007, **11(Suppl 3):**P13 (doi: 10.1186/cc5800)

Introduction Base excess is considered an indicator of injury, shock and adequate resuscitation. We looked to establish a relation between base excess and serum bicarbonate obtained on admission to the ICU and the prognostics of patients.

Methods A retrospective study with analysis of 110 patients admitted consecutively to the ICU, during the period June–December 2006.

Figure 1 (abstract P13)



Results Of the 110 patients, there was a predominance of women and mean age 54.2 ± 18.7 years. The length of stay in the ICU was 6.5 ± 7.4 days and the mean APACHE II index, at the first 24 hours of admission, was 21.0 ± 8.1 points. Most patients survived (71.9%), 9.3% died during the first 48 hours in the ICU and 18.6% after 48 hours from admission to this unit. The standardized mortality ratio was 0.715. Patients with early mortality, during the first 48 hours in the ICU, had lower base excess (−7.75 ± 8.33 vs −3.17 ± 5.43) and serum bicarbonate (16.7 ± 6.2 vs 20.9 ± 5.6) than survivors ($P < 0.05$). Patients with permanence in the ICU up to 7 days and patients that stayed in this unit for more than 7 days had similar base excess and serum bicarbonate (−3.24 ± 5.37 vs −2.98 ± 5.72 and 20.9 ± 5.3 vs 20.9 ± 6.3) ($P > 0.05$).

Conclusion Serum bicarbonate and base excess were associated with early mortality during the ICU stay. However, these parameters did not correlate with ICU length of stay.

P14

Specificity of the pulmonary artery catheter in classifying the type of shock

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Critical Care 2007, **11(Suppl 3):**P14 (doi: 10.1186/cc5801)

Objective To evaluate the utility of the pulmonary artery catheter (PAC) to classify the type of shock in hemodynamic instability patients with no known reason.

Materials and methods Nineteen patients from Grajau State Hospital ICU who had shock diagnosis and those who needed a PAC to diagnose were evaluated.

Results The average age was 49 years and the APACHE II average score was 17. The average catheter length of stay was 3.68 days. The most common reason for inpatient admission was cardiovascular (42.1%), followed by respiratory (26.3%); 52.6% of clinical diagnoses were of distributive shock, only 42.1% were confirmed by catheter. Cardiogenic shock was diagnosed in 42.1% before the catheter, and after the PAC it was 26.3%. Hypovolemic shock had the same rate of 5.2% before and after catheter insertion.

Conclusion Even with a clinical body being well trained to classify shock and the low number of patients in this study, the PAC is certainly useful to predict the type of shock.

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P15

Systemic and regional hemodynamic and metabolic changes in an experimental model of brain death

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Critical Care 2007, **11(Suppl 3):**P15 (doi: 10.1186/cc5802)

Introduction Despite the evolution of transplant techniques, the great number of donated organs continues to proceed from donors in brain death (BD). The need for stabilization in patients with BD, in the view of the triggered autonomic storm, is basic in such a way that knowledge of the physiopathologic, hemodynamic and metabolic disturbances becomes essential.

Objective We evaluated hemodynamic and metabolic changes induced by experimental BD in dogs.

Materials and methods Ten anesthetized and ventilated mongrel dogs (17–25 kg) were subjected to BD, by brainstem herniation, induced through an intracerebral balloon filled to maintain intra-

Table 1 (abstract P15)

	Baseline	T5	T15	T30	T60
Mean arterial pressure (mmHg)	115.3 ± 6.3	187.8 ± 13.6*	110.2 ± 11.1	57.4 ± 4.4*	53.8 ± 3.1*
ICP (mmHg)	19 ± 4	274 ± 16.6*	194 ± 25.2*	137 ± 12.3*	37 ± 3.31*
Cardiac index (l/min)	3 ± 0.2	3.6 ± 0.4	4 ± 0.4*	3.2 ± 0.4	2.6 ± 0.3
PVBF (ml/min)	685.6 ± 114.2	883.6 ± 167.7	1074 ± 179.2*	846 ± 165	622.9 ± 130
HABF (ml/min)	277.2 ± 33.1	521.2 ± 88*	332.1 ± 65.7	178.3 ± 39.7	134.9 ± 28*
Cerebral perfusion pressure (mmHg)	96.5 ± 6.2	−55.5 ± 30.8*	−64.3 ± 32.7*	−65.9 ± 18.2*	−15 ± 3.6*
SvO_2	89.4 ± 1.7				86.9 ± 2.2
SpO_2	94.3 ± 1.7				86.3 ± 2.5*
Arterial lactate (mmol/l)	0.6 ± 0.3				0.9 ± 0.4
Portal vein lactate (mmol/l)	0.6 ± 0.3				0.8 ± 0.3
Cerebral lactate (mmol/l)	1 ± 0.3				1.1 ± 0.5

*$P < 0.05$ vs baseline.

cranial pressure (ICP) > systolic arterial pressure for 30 minutes (baseline–T30). The animals were observed for 30 minutes thereafter (T60). Systemic hemodynamics was evaluated by arterial and pulmonary artery catheters, while regional perfusion was assessed by portal vein blood flow (PVBF) and hepatic artery blood flow (HABF) with ultrasonic flow probes.
Results See Table 1. The data are expressed as the mean ± SEM.
Conclusion BD promoted an initial hyperkinetic state followed by marked hypotension without systemic and regional lactic acidosis. In spite of the severe hypotension, the hepatosplachnic blood flow was preserved.

Sepsis

P16

Potential role of poly(ADP-ribose) activation in myocardial contractile dysfunction of human septic shock

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Critical Care 2007, **11(Suppl 3):**P16 (doi: 10.1186/cc5803)

Objective To study whether cardiodepression found in septic patients is associated with plasma markers of myocardial necrosis and with myocardial polyADP(ribose)polymerase (PARP) activation. Sepsis is associated with increased production of superoxide and nitric oxide with consequent peroxynitrite ($ONOO^-$) generation. Cardiodepression is induced in the heart during oxidative stress associated with septic shock. Oxidative and nitrosative stress can lead to activation of the nuclear enzyme PARP, with subsequent loss of myocardial contractile function.
Design A prospective and observational study.
Setting A university hospital ICU for clinical and surgical patients.
Participants We assigned 25 patients presenting severe sepsis or septic shock.
Interventions Patients were followed for 28 days, and data were collected and analyzed *a posteriori*, separating into two groups: survivors and nonsurvivors.
Measurements and main results Function of the heart in septic patients correlates to PARP activation in dead patients. The study population included 25 individuals, of whom 12 died during the follow-up period of 6 days. The initial data of inflammation marker C-reactive protein and APACHE severity were similar in both groups. Overall, an increase in the plasma troponin level was related to increased mortality risk. Patients that died presented heart dysfunction, and histological analysis of the heart showed inflammatory infiltration, increased collagen in the interstitium, and derangement of mitochondrial cryptae. Immunohistochemical staining for poly(ADP-ribose) (PAR), the product of activated PARP, was demonstrated in septic hearts. There was a positive correlation between PAR staining score and troponin I ($r^2 = 0.81$); and a correlation of PAR staining score and LVSSW ($r^2 = 0.61$).
Conclusion Septic patients with impaired cardiac function demonstrate inflammatory alterations and PARP activation. We suggest that PARP activation may be, in part, responsible for the cardiac function depression observed in patients with severe sepsis.

P17

Mitochondrial injury in sepsis

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Critical Care 2007, **11(Suppl 3):**P17 (doi: 10.1186/cc5804)

Background Sepsis-induced multiple organ failure is the major cause of mortality and morbidity in critically ill patients. However, the precise mechanisms by which this dysfunction is caused remain to be elucidated. It seems that, in sepsis, mitochondria dysfunction results in raised tissue oxygen tensions and organ failure. Possibly due to oxide nitric, that is produced in excess in sepsis, and is known to inhibit mitochondrial respiration *in vitro*.
Objective To analyze cellular damage to electronic microscopy and evaluated its possible relation with serum cardiac markers (troponin, MB-creatin phosphate kinase), and homodynamic data.
Methods We selected all consecutive patients who met the criteria for septic shock, and we collected blood samples from the first through the 12th day, or until death. We also analyzed homodynamic parameters by pulmonary catheter. From the patients that died, a fragment of the left ventricle was sent for electronic microscopy. The exclusion criteria were previous coronary artery disease or dilated miocardiopathy.
Results We studied 22 patients, age 53 ± 4 years, APACHE scores 22 ± 2; mortality was 45%. The patients who died showed data of cardiac damage from the first day. This was shown by troponin (0.54 ± 0.08 U/Ml vs 1.7 ± 0.3 U/Ml) and the left ventricular systolic worth index (64.2 ± 3.7 vs 37.6 ± 1.3), respectively, in survivor and nonsurvivor groups. The electronic microscopy from the myocardial of the nonsurvivor group showed a significant injury in the mitochondria, represented by an increase in its numbers. There was an alteration on organelle organization and mitochondria crest lesions. The histology of the heart demonstrated inflammatory infiltration and increases of collagen fibers.
Conclusion Septic patients with impaired cardiac function demonstrate inflammatory alterations and mitochondrial damage. We hypothesize that mitochondrial damage may, in part, be responsible for the cardiac depression seen in severe septic patients.

P18

Septic lipidic dysregulation is related to heart rate variability alteration

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Critical Care 2007, **11(Suppl 3):**P18 (doi: 10.1186/cc5805)

Context Although observational studies have demonstrated an alteration of heart rate variability (HRV) in septic patients, no single study has systematically addressed the relationship of heart damage by systemic inflammation and metabolic alterations.
Objective To determine whether heart damage from sepsis is caused by free fatty acids (FFA) and may be detected with HRV analysis.
Design A prospective and observational study of patients presenting with severe sepsis or septic shock.

Setting A university hospital ICU for clinical and surgical patients.
Participants Thirty-one patients were included with sepsis. Exclusion criteria were previous myocardial dysfunction, coronary artery disease and cancer. The data were collected and analyzed *a posteriori*, in two groups: survivors and nonsurvivors.
Main outcome measures Association between troponin I elevation, FFA elevation and HRV reduction. Association between clinical evolution and HRV index, troponin, and hemodynamic parameters.
Results The study population included 31 individuals, of whom 19 died during the follow-up of 6 days. The initial measurements of C-reactive protein and gravity APACHE score were similar in the two groups. Overall, an increase in the plasma troponin level was related to an increased mortality risk. From the first day the nonsurvivor group presented a reduced left ventricular stroke work systolic index (LVSWI), and a reduced low frequency (LF) index. The correlation coefficient for LF values and troponin was $r^2 = 0.75$. Patients showed FFA elevation; survivors presented 0.62 ± 0.08 mmol/l and nonsurvivors 1.05 ± 0.12 mmol/l.
Conclusion Understanding damage to the heart from sepsis requires specific analysis of biochemical markers such as troponin I, and of hemodynamic parameters such as the LVSWI or the HRV index. Our results suggest that damage to the heart by systemic inflammation is the cause of an aberrant beat-to-beat response. FFA produce cell death (apoptosis and necrosis) through oxidative stress and induced LF alterations. FFA inducing LF alterations has been shown in the literature for healthy and diabetic patients; this is the first time it has been shown in septic patients.

P19

Serum lipids analysis in septic shock patients

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Critical Care 2007, **11(Suppl 3):**P19 (doi: 10.1186/cc5806)

Objective We conducted a prospective study to analyze serum lipids, glucose, triglycerides and C-reactive protein in septic shock patients to evaluate its relation with outcome.
Design Prospective observational analysis of septic shock patients.
Setting A 28-bed medico-surgical ICU.
Participants Eighteen patients were analyzed.
Materials and methods We collected blood samples for analysis on days 1, 3, 6, 9, 12 or until death. *Statistical analysis* All results are presented as the mean with standard deviation. For analysis we divided patients into survivors and nonsurvivors at day 12. We performed a paired Student *t* test for differences in continuous variables, and correlation coefficients were determined according to multiple-level regression analysis. $P < 0.05$ was considered significant.
Results Our mortality rate was 60%.The two groups had similar APACHE II scores. At day 1 there were no statistical differences for any of the substances analyzed. From day 3 onward, significant differences were found between groups for total cholesterol, HDL fraction, triglycerides, glycemia and C-reactive protein. As independent variables, we found glycemia and triglycerides.
Conclusion Low levels of cholesterolemia, HDL fraction, hypertriglyceridemia and hyperglycemia were statistically significantly related to a poor prognosis.

P20

Clinical factors associated with mortality in septic shock

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Introduction Septic shock (SS) is a disease associated with high mortality worldwide. In Brazil, mortality in SS reaches 60%. The aim of our study was to identify clinical variables easily accessed in the presentation of SS and their correlation with mortality.
Methods Between January 2003 and December 2004, all patients with SS criteria according to the ACCP/SCCM were included in this observational study. At the time of SS diagnosis the following variables were collected: age, gender, heart rate (HR) and mean arterial pressure (MAP). On the ICU admission day the APACHE II and SOFA scores were calculated. Data were retrieved from the patient chart by one of the investigators, then transferred to STATA version 9.0 software, where all analyses were run. All patients were followed until ICU discharge or death.
Results During the period of study, there were 794 admissions to the ICU, of whom 239 (30%) presented SS. Sixty-seven percent were male, mean age was 57.0 (SD = 17.7) years, mean HR was 108 (SD = 26.3) bpm, and mean MAP was 64.5 (SD = 21.2) mmHg. The mean APACHE II score was 23.3 (SD = 8.6) and the mean SOFA score was 9.7 (SD = 3.2). The ICU mortality rate was 66.5%. In the analysis of the prevalence of mortality and its crude association with independent variables, age and gender show no association. Patients with HR above 108 bpm presented a mortality OR of 1.78 (0.98–3.24) compared with those patients with HR equal to or less than 108 bpm ($P < 0.05$). An APACHE II score greater than 24 points was associated with a mortality OR of 2.91 (1.52–5.78) compared with those patients with a score equal to or less than 24 ($P < 0.001$). A SOFA score greater than 8 points was associated with a mortality OR of 1.89 (1.04–3.42), compared with patients with values equal to or less than 8. The analysis of MAP demonstrated a trend to a lower mortality, in association with a higher level.
Conclusion Our study confirmed, as previously demonstrated, that a HR less than 110 bpm at SS presentation is associated with low mortality, as well a higher level of MAP. The severity of illness (APACHE II score >24 points) is indicative of high-risk mortality; multiple organ dysfunction (SOFA score >8 points), and a worse outcome.

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P21

Acid–base disturbances in critically ill septic patients: a longitudinal quantitative study

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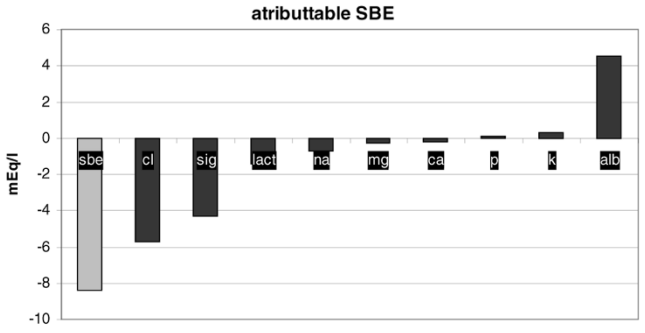
Critical Care 2007, **11(Suppl 3):**P21 (doi: 10.1186/cc5808)

Introduction Applying a quantitative methodology, we described the acid–base status of severe septic patients in the first 5 days after admission to the ICU.
Patients and methods Patients were studied if they had a diagnosis of severe sepsis with less than 24 hours of organ dysfunction. Data were prospectively collected daily until the fifth day after inclusion.
Results Sixty patients were included in the study. At admission to the ICU, septic patients presented a severe metabolic acidosis with an average pH of 7.29; $PCO_2 = 36$ mmHg and SBE = –8.0. Figure 1 presents the several components of the metabolic acid–base disturbances found on the first day in the ICU. We found that the magnitude of metabolic acidosis, measured by the SBE, was greater among the nonsurvivors than the survivors. However, the components of acid–base disturbances are kept proportionally constant among different clinical outcome subgroups.
During the study period, the survivor group presented an increased SBE from –6.4 to –1.5 due to a significant decrease in serum lactate level and SIG. No change occurred in the albumin serum level, which persisted as an alkalinizing force. In contrast, the nonsurvivor group became even more acidemic due to an increase in the PCO_2 and persistence of a highly negative SBE. From the metabolic point of view, no significant change occurred in this group from the first to the last day of the study, except for a small increase in the phosphate serum level.
Conclusion Severe septic patients present, on the first day in the ICU, a complex metabolic acid–base disturbance marked by a mixed high-degree acidosis partially attenuated by a hypoalbuminemic alkalosis. Over the study period, the survivor group partially corrected its acidosis mainly through the disappearance of unmeasured anions and lactate. Nonsurvivors did not change significantly their metabolic acidosis over time.

Figure 1 (abstract P21)



Components of SBE on the first day.

P22

Institutional evaluation of a new methodology for early sepsis risk identification in hospitalized patients

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Critical Care 2007, **11(Suppl 3):**P22 (doi: 10.1186/cc5809)

Background The effectiveness of sepsis, severe sepsis and septic shock management on prognosis depends strongly on early clinical suspicion and rigorous diagnosis methods. Early clinical suggestive infection sign recognition is therefore also a cornerstone of successful treatment.
Objective To evaluate a new institutional methodology for early sepsis risk identification in hospitalized patients.
Methods A before–after study design with prospective consecutive data collection in a 124-bed private medical center. Twelve months after the institutional Surviving Sepsis Campaign implementation and current use of the respective treatment bundles, this medical center adopted a standardized hospital maneuver to anticipate the identification of two or more suggestive infection signs. Demographic data, the time interval for recognition of two or more infection risk signs, and the mortality rate are evaluated during the next 5 months (phase II) and compared with the same data obtained during the initial 12 months (phase I).
Results A total of 85 patients with two or more suggestive infection signs were enrolled. Thirty-two patients were recognized with severe sepsis during phase I and 22 patients in phase II. Demographic variables and severity of illness measured by the APACHE II score ($P = 0.12$) were similar for both groups. The phase I severe sepsis patients were identified after 29 ± 32 hours from the initial presentation of two or more infections signs. On the other hand, during phase II this time was lower: 14.5 ± 16 hours ($P < 0.07$). The hospital mortality was greater in the phase I group (50%) when compared with the phase II group (27.3%) ($P < 0.08$).
Conclusion These preliminary data suggest that the implementation of the proposed methodology for early sepsis risk identification in hospitalized patients was associated with early severe sepsis recognition and reduced mortality.

P23

Sepsis provokes host's microbiota overgrowth of commensal Gram-negative bacteria and subsequent induction of bacterial translocation in rats

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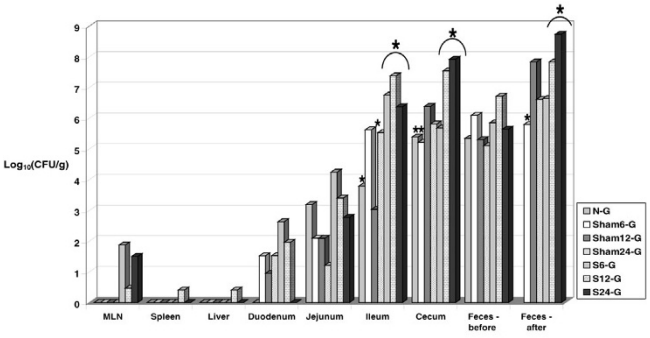
Critical Care 2007, **11(Suppl 3):**P23 (doi: 10.1186/cc5810)

Introduction The literature has shown the participation of intestinal microbiota in the genesis of primary infections as well as of sepsis. In this study we examine the role of sepsis on the microbiota by examining the most frequently recovered Gram-negative bacteria (G–).
Materials and methods Adult Wistar rats (±200 g) were submitted to the induction of semi-lethal sepsis (S-G) (*E. coli* R6 1 ml of 10^8 CFU/ml/100 g body weight, i.v.). Firstly, fecal G– kinetic following sepsis induction was examined (6, 12, 24, 48, 72, 120 and 216 hours) ($n = 6$). After sepsis induction, in other groups ($n = 18$), samples were harvested from the small bowel (duodenum, jejunum, ileum) and large bowel (cecum and feces before and after sepsis) at 6, 12 and 24 hours, and the BT index

Figure 1 (abstract P23)



Intestinal microbiota kinetic of sepsis vs controls and BT index. *$P < 0.05$.

was examined at the mesenteric lymph nodes (MLN), liver and spleen by culture in MacConkey medium. Control groups were the sham group (Sham-G, saline injection) ($n = 18$) and the naïve group (N-G, without any procedure) ($n = 6$).

Results Overall data showed that, after sepsis induction, fecal G– microbiota increased progressively up to 24 hours ($P < 0.05$) returning to control level after 72 hours (data not shown). Gut segment overgrowth was also found until 24 hours and BT occurred during this period (Figure 1).

Conclusion Sepsis provoked G– overgrowth and this was able to induce the BT process. Other factors, such as splanchnic hypoperfusion, decreased peristalsis and gut immunity by sepsis, might have also contributed to this event.

P24

Influence of bacterial translocation in the genesis of the microcirculation: hypoperfusion in sepsis

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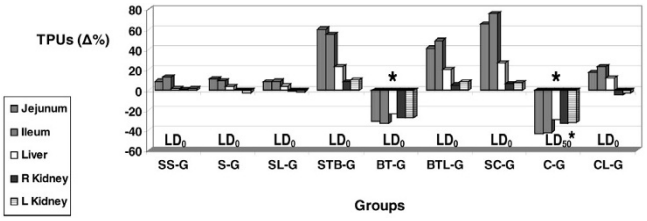
Critical Care 2007, **11(Suppl 3):**P24 (doi: 10.1186/cc5811)

Introduction Increasing evidence suggests that bacterial translocation (BT) has been implicated in the pathogenesis of sepsis and multiple organ failure. In this study we examined the role of the mesenteric lymph during the BT process on the intestinal and systemic tissue perfusion in association with nonlethal sepsis.

Materials and methods Adult Wistar rats (±200 g) were submitted to the induction of BT (*E. coli* R6 10 ml of 10^{10} CFU/ml), sepsis (*E. cloacae* 89 2 ml of 10^7 CFU/ml, i.v.) and sepsis plus BT, with or without interruption of the mesenteric lymph flow by mesenteric lymph node resection and lymph duct ligature 5 days prior to the experiments. The tissue perfusion (jejunum, ileum, liver and kidneys) was monitored (laser Doppler) before and 2 hours after the inoculation. Groups ($n = 16$/group): BT group (BT-G); BT with lymphadenectomy group (BTL-G); sepsis group (S-G); sepsis with lymphadenectomy group (SL-G); combination of sepsis plus BT group (C-G); combination with lymphadenectomy group (CL-G); sham BT group (SBT-G); sham sepsis group (SS-G); and sham combination group (SC-G).

Figure 1 (abstract P24)



Mean tissue perfusion units (Δ%) and mortality in all groups. *$P < 0.05$.

Results Following BT induction, with or without sepsis or lymphadenectomy, the bacterial recovery was 100% in all groups. A significant and similar reduction of the tissue perfusion was observed in all organs in BT-G ($P < 0.0001$) and C-G ($P < 0.0001$). However, with lymph interruption (BTL-G and CL-G), the tissue perfusion drop was completely abrogated and was as similar as the respective sham groups (Figure 1). Mortality of 50% (LD_{50}) was observed only in C-G.

Conclusion The components of the mesenteric lymph during the BT process were a determinant factor related to the impairment of the splachnic and systemic tissue perfusion index possibly by gut-associated tissue activation, suggesting a possible participation of BT in the genesis of the hypodynamic state of sepsis.

P25

Kinetic study of gut and systemic tissue perfusion following one challenge of bacterial translocation

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Critical Care 2007, **11(Suppl 3):**P25 (doi: 10.1186/cc5812)

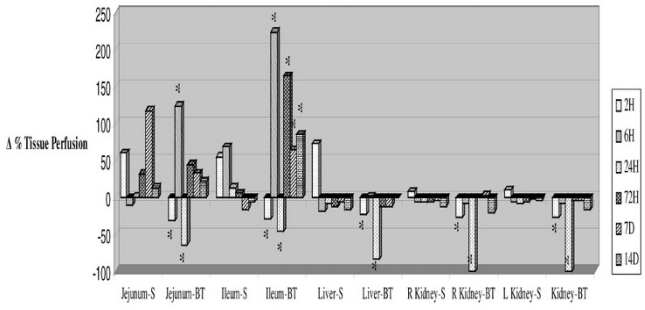
Introduction The pathogenesis of sepsis and multiple organ failure has been associated with bacterial translocation (BT). In a previous study we observed intestinal and systemic tissue hypoperfusion 2 hours after a BT process. In this study we examined the perfusion kinetics a longer period after one unique challenge of BT.

Materials and methods Adult female Wistar rats (±200 g) were submitted to the induction of 2 hours of BT (*E. coli* R6 10^{10} CFU/ml, 5 ml/100 g weight by oroduodenal catheterization). Sham groups received saline. The tissue perfusion (jejunum, ileum, liver and right and left kidneys) was monitored before BT and 2, 6, 24 and 72 hours, 7 and 14 days after BT ($n = 6$/group).

Results and discussion The tissue perfusions in BT groups were statistically decreased at 2 and 24 hours in all organs, returning to normal levels after 72 hours up to 14 days compared with sham groups, except the ileum that remained with a high perfusion index after 72 hours onward. Interestingly, in the 6 hours BT group a transitory increased perfusion occurred in all organs, being significant at gut tissues, denoting that at this time point transient inflammatory-response-dependent vasodilatation might have occurred (Figure 1). The BT-related hypoperfusion effect seems to be related to a BT-induced host inflammatory response.

Conclusion Single BT challenge provoked significant and enduring local and systemic tissue hypoperfusion. These findings can support the hypothesis of BT-related sepsis aggravation.

Figure 1 (abstract P25)



Mean tissue perfusion units (Δ%) of sham and BT groups.

P26

Oxidative stress and serum concentrations of vitamin A in septic patients

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Critical Care 2007, **11(Suppl 3):**P26 (doi: 10.1186/cc5813)

Sepsis, which may be considered systemic inflammatory response syndrome facing an infectious stimulus, is the main cause of mortality in patients in ICUs. As a result of the systemic inflammatory response and of the decrease of the aerobic metabolism in sepsis, oxidative stress occurs. Vitamin A is recognized by the favorable effect that it exerts on the immune response to infections and antioxidant action.
The aim of the present study was to assess the association between serum concentrations of retinol, carotenoids and oxidative stress in septic patients in the ICU.
The subjects were to hospitalized adult patients with diagnosis of sepsis in the ICU from Hospital São Vicente de Paulo and from Hospital Universitário Clementino Fraga Filho, UFRJ, Rio de Janeiro State, Brazil, in the period from January to December 2006. The diagnosis of sepsis was based on the definitions of the International Sepsis Definitions Conference. Serum levels of retinol, total carotenoids and C-reactive protein (CRP) were measured. Oxidative stress was assessed through the lipid peroxidation dosage, which was estimated by thiobarbituric acid reactive substance (TBARS) levels. The APACHE II score was assessed. Forty-six patients were studied and divided into two groups: patients with diet (n = 24) and patients without diet (n = 22). The median age was 64.7 ± 19.4. Reduced levels of retinol and carotenoids were found in 65.2% and 73.9% of the sample, respectively. The group with diet had an inadequacy of retinol in 54% and carotenoids in 62.5%. CRP was high in 100% of the patients. The median vitamin A intake was 8,622 IU, the APACHE II score was 16.1 ± 4.68 and TBARS was 4.48 ± 4.49 nmol/ml. No significant difference was found related to retinol levels, TBARS and APACHE II score between the groups (P = 0.33/P = 0.24/P = 0.43). This was found between CRP levels and carotenoids (P = 0.001/P = 0.047). The results bring subsidies for the establishment/revision of the nutritional protocol directed to the group, particularly as regards the intake of vitamin A, aiming at improvement of the prognosis, evolution and survival of these patients.

P27

Evaluation of the source of infection in patients with severe sepsis

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Introduction The growing frequency of patients with severe infection in the ICU, resulting in persistent high mortality associated with high costs, is a concern that calls for attention in critical care medicine. It is important to amplify knowledge about severe sepsis and septic shock, in an attempt to prevent it, to identify it early and to reduce mortality. The objective of this study is to evaluate the source of infection and the evolution of patients with severe infection in the ICU.
Methods All patients admitted to the ICU of a public university hospital in the period January–June 2004 were included. The variables collected were demographic data, admission diagnostic, SOFA and APACHE II scores, definition of sepsis and sepsis-related conditions were in accordance with the ACCP/SCCM definitions, and the source and site of infection were recorded for each of first sepsis event. The length of stay and mortality were also recorded. For statistical analysis, the program Epi Info version 3.3.2 was used.
Results During the study period 316 patients were admitted to the ICU, the male sex was more frequent (65.8%), and the mean age was 56.5 ± 20.4 years. At admission 141 patients (44.6%) had a diagnostic of severe infection, 86 (28.5%) being severe sepsis and 55 (18.2%) septic shock. The most frequent admission diagnoses of these patients were sepsis, gastrointestinal surgery and intracranial hemorrhage. When comparing the group of patients with severe infection with the other patients we found a higher APACHE II score (25.09 ± 8.7 and 17.93 ± 6.7, respectively; P<0.0001), and a higher SOFA score (9.4 ± 4.3 and 5.5 ± 3.3, respectively; P < 0.0001). The sites of infection more frequently observed were pulmonary (63.8%), abdominal (11.3%) and urinary (7.8%). The source of infection was in the community in 46.1% of the cases of severe infection and nosocomial in 53.2% (P = 0.23). The mortality stratified by the source of infection did not differ among patients (60% community and 62.6% in the nosocomial infection group, P = 0.52).
Conclusion Severe infection was a common cause of admission to the ICU in this study. The patients with severe infection had a higher severity of disease and more organ failure when compared with the other patients admitted to the ICU. The frequency of community and nosocomial infection was similar in the group of patients with severe infection, as was the associated mortality.

P28

The critical role of heme oxygenase in neutrophil migration impairment in polymicrobial sepsis

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Introduction and objective During severe sepsis a marked impairment of neutrophil migration into the infectious focus occurs, which is associated with dissemination of infection resulting in high mortality. We recently showed that heme oxygenase (HO) products, carbon monoxide and biliverdin, downregulate neutrophil recruitment by reducing the neutrophil/endothelium rolling and

adhesion in a noninfectious inflammatory model. This study aimed to investigate a possible role of the HO-1 pathway on the failure of neutrophil recruitment in mice subjected to severe (S-CLP) polymicrobial sepsis induced by cecal ligation and puncture (CLP).
Methods and results Balb/c mice were pretreated with vehicle or with specific HO-1 inhibitor (ZnPPIX, 30 mg/kg, s.c.) and subjected to S-CLP. Mice were killed 6 hours after CLP, and HO-1 expression in the mesentery and in circulating neutrophils were determined. In another set of experiments, mice were sacrificed 6 and 12 hours after sepsis induction, and intraperitoneal neutrophil migration, bacteremia, lung neutrophil sequestration, cytokines and mean arterial pressure were evaluated. A significant increase in HO-1 expression was observed in the mesentery and in circulating neutrophils of mice pretreated with vehicle and subjected to S-CLP. The inhibition of HO-1 prevents the failure of neutrophil endothelium rolling, adhesion and migration observed in animals pretreated with vehicle and submitted to S-CLP. As consequence, the HO-1 inhibition promoted a reduction of bacteremia, low levels of circulating cytokine and lung neutrophil sequestration, and improves the mean arterial pressure, resulting in an increase of the survival rate.
Conclusion These data suggest that during an infectious process HO-1 displays a crucial role in the failure of neutrophil migration to the infectious focus, and consequently in the susceptibility in severe sepsis.
Acknowledgements Supported by FAPESP/CAPES/FAEPA.

P29

Mortality-associated factors in old patients with severe sepsis or septic shock in the medical intensive care unit

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Introduction With the aging of the population, the old-aged will represent a large portion of the patients admitted to the ICU presenting singular characteristics that need to be studied.
Methods A cohort of 104 old-aged patients with severe sepsis or septic shock, according to the 1992 Consensus, during January 2005–November 2006 was studied. The starting point was systolic arterial pressure under 100 mmHg, and the exclusion criteria were: presence of advanced neoplasia, excuse to sign the free consent term and transfer from the ICU. The variables used were: SOFA score, CRP, lactate and albumin on days 1, 3, 5, 7, 14 and 28, APACHE II score, troponin I, BNP, number of organic failures, cardiovascular diseases before the sepsis, need for mechanical ventilation, length of ICU stay, presence of hypoglycemia and echocardiogram parameters. For the statistical analyses, we used Student's *t* test and the Fisher Exact test, the chi-square test and Spearman's correlation considering a significant level of 5%.
Results The average age was 83 ± 8 years (minimum = 60, maximum = 99) and 65% were female. Septic shock represented 71% of cases and the mortality was 44%. The average length of ICU stay was 16 ± 9 days (minimum = 1, maximum = 28). The average APACHE II score was 19 ± 6 (minimum = 6, maximum = 44) and the average SOFA scores on days 1, 3, 5, 7, 14, 28 were 8 ± 3, 8 ± 4, 7 ± 4, 7 ± 3, 8 ± 3, respectively. The variables associated with mortality were: SOFA score on days 1, 3, 5, 7, 14 and 28 ($P = 0.00010$), CRP on days 5, 14 and 28 ($P = 0.03$, $P = 0.005$ and $P = 0.02$, respectively), lactate on days 14 and 28 ($P = 0.023$ and $P = 0.005$), albumin on days 14 and 28 ($P = 0.00010$), APACHE II score ($P = 0.44$), presence of two or more organic failures ($P = 0.0001$), need for mechanical ventilation ($P = 0.001$) and length of ICU stay ($P = 0.002$).
Conclusion The SOFA score, APACHE II score, number of organic failures and the need for mechanical ventilation were associated with mortality from the beginning admission to the ICU, while the metabolic and inflammatory parameters were associated with late mortality. These variables should be studied as potential candidates for the models of prediction of death in the aged.

P30

Mortality rate reduction associated with a severe sepsis management protocol implementation

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Critical Care 2007, **11(Suppl 3):**P30 (doi: 10.1186/cc5817)

Introduction The Surviving Sepsis Campaign is an international effort to reduce severe-sepsis-associated mortality. We have decided to implement the recommendations proposed by the Campaign through a management protocol in our institution.
Objective To describe the impact of the Surviving Sepsis Campaign recommendations on mortality in severe sepsis patients admitted to the ICU.
Methods The study was conducted within the emergency department and ICU of a tertiary hospital in Brazil. A management protocol for the care of severe sepsis and septic shock based on the Surviving Sepsis Campaign guidelines was implemented by a 'sepsis' team comprising emergency department physicians, pharmacists, and critical care physicians, chaired by a coordinator. Also, we have used the individual collected data proposed by the Surviving Sepsis Campaign to obtain information about quality indicators.
Results A total of 160 patients with septic shock were identified. Ninety-four patients were managed before the implementation of the standardized protocol, constituting the Control group, and 66 patients were evaluated after the implementation of the standardized protocol (Intervention group). Demographic variables and severity of illness scores (APACHE II and SOFA) were similar for both groups. Patients in the Intervention group showed statistically significant larger numbers of cultures obtained, earlier antibiotics and a more rigorous glucose control. In addition, those patients received more corticoids and activated protein C. The ICU and hospital lengths of stay were similar in both groups. The hospital mortality rate was significantly lower in the after group (56.4% vs 37.9%, $P < 0.05$).
Conclusion The implementation of the Surviving Sepsis Campaign guidelines through a standardized protocol was associated with improved patient care and a reduction in severe-sepsis-related mortality.

P31

Implementation strategy of a severe sepsis management protocol in a tertiary hospital

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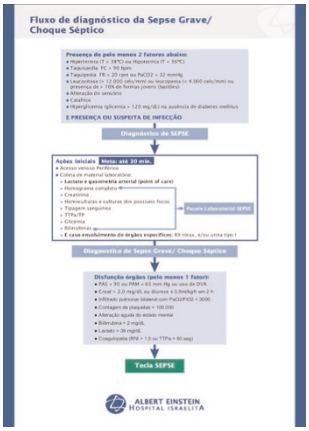
Critical Care 2007, **11(Suppl 3):**P31 (doi: 10.1186/cc5818)

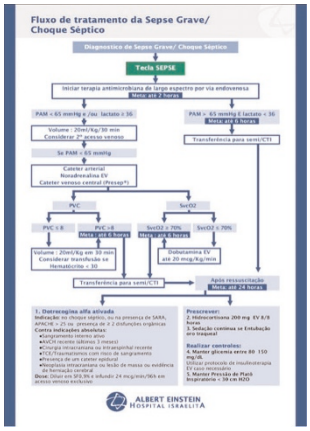
Introduction Large variability in clinical practice, in addition to the increasing awareness that certain processes of care are associated with improved medical outcome, has led to the development of clinical practice guidelines. Severe sepsis guidelines have been

Figure 1 (abstract P31)



Diagnosis flow for severe sepsis.

Figure 2 (abstract P31)



Treatment flow for severe sepsis.

developed and there is a multinational effort to implement them at bedside.

Objective To describe the methodology of sepsis protocol implementation in a tertiary hospital.

Methods A team composed of a case manager, physicians, nurses, a clinical pharmacist and a respiratory therapist was created to organize the flow of septic patients in our institution. Every severe septic patient recognized by a physician was followed by the case manager and every member of the team was alerted. The ICU, ER, central lab and imaging service receive simultaneously a message about this patient. Several tools were created in order to facilitate the implementation process, such as patient flow (Figures 1 and 2), continuous education by the web, multidepartmental training and sepsis kit (normal saline bags, arterial and central venous catheter Presep). Also, we have used the individual collect data proposed by the Surviving Sepsis Campaign to obtain information about quality indicators.

Conclusion The management protocol is a useful and feasible tool to implement guidelines for severe sepsis. A specific team is necessary to accomplish this task.

Infection

P32

Trichosporon asahii as an emerging etiologic agent of fungal infection and colonization in heart failure patients in the intensive care unit: epidemiologic characteristics of a 44-patient cohort

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Critical Care 2007, **11(Suppl 3):**P32 (doi: 10.1186/cc5819)

Introduction In the last years, the fungal infection incidence is increasing progressively in severely ill patients in the ICU. *Trichosporon asahii* (*TA*) (formerly *Trichosporon beigelii*) reported risk factors for infection less usually include acquired immunodeficiency caused by drugs, AIDS and critical illness in patients with chronic comorbidities. There is no description of these infections in heart failure patients in the ICU.

Objective To describe the characteristics of a cohort of severely ill patients colonized or infected by *TA* in a medical ICU.

Methods A 5.5-year (January 2000–July 2005) retrospective study of all urinary tract infections/colonizations that occurred in a tertiary care ICU of a teaching hospital.

Results Among 585 urinary tract infections (UTI) and colonization episodes, 253 (43%) were caused by fungi. Of these, 44 (17%) were caused by *TA*. They were divided into two groups: GI, symptomatic UTI; and GII, colonization (NNISS – CDC Atlanta). In GI, $n = 24$ patients with age 68 ± 12 years, 71% were male. The ICU length of stay (LOS) before the diagnosis was 34 ± 39 days. These patients had an ejection fraction (EF) of 42 ± 19% (62% had EF <40%). Fifty percent had renal failure (Cr > 2.0), creatinine 2.3 ± 1.3 mg/dl. Inhospital mortality was 83%. Three UTI episodes were observed in 2000–2001, 14 in 2002–2003 and seven in 2004–2005. One patient of GI had bloodstream infection. In GII, $n = 20$ patients with age 73 ± 11 years, 70% were male. The ICU LOS before diagnosis was 26 ± 18 days. EF was 40 ± 14% (65% had EF <40%). Fifty-five percent had renal failure, creatinine 2.3 ± 1.2 mg/dl. Inhospital mortality was 85%.

Conclusion Although the overwhelming majority of cases of *TA* infection had been described in haematologic patients, these data highlight the importance of considering severely ill heart failure patients as a risk group for *TA* infection/colonization in the ICU. High mortality in both groups, despite infection or colonization, reinforces *TA* as a marker of severity in these patients.

P33

Vancomycin-resistant enterococci outbreak in an intensive care unit: prevention and control

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Critical Care 2007, **11(Suppl 3):**P33 (doi: 10.1186/cc5820)

Introduction Infection caused by vancomycin-resistant enterococci (VRE) is associated with high morbidity and mortality rates; it poses a serious threat, in particular, to critically ill patients. It generates high costs and challenges infection control programs. An important component of VRE control is the identification of colonized patients. Since December 2001 we have monitored patients in high-risk units, who would be most susceptible for acquiring VRE. Contact precautions are implemented for VRE-colonized or VRE-infected patients.

Objective To describe an outbreak of VRE in an adult ICU with 30 beds from a 450-bed tertiary care, private hospital.

Methods A monthly surveillance for VRE was performed in patients considered at risk for acquiring VRE in high-risk areas (adult ICU and semi-ICU). Patients with hospitalization longer than 30 days were screened for the presence of VRE by the collection and culture of stools or perirectal swab. In September 2005 we detected an increase in the number of colonized and infected patients with VRE, and we expanded the VRE surveillance to every 15 days. The positive samples were characterized for antimicrobial susceptibility followed by pulsed-field gel electrophoresis.

Results Nine of 231 patients (3.9% of screened patients) were VRE-positive between August and November 2005. The samples were plated on chromogenic agar medium and all suspected VRE were confirmed by manual and automated methods. Pulsed-field gel electrophoresis identified four different patterns. One pattern ('B') was found in five different patients and another one ('C') in two different patients, suggesting a clone dissemination. The other two patterns were isolated in one patient each. All patients with a positive stool were followed until three negative results, collected

with an interval of 1 week or when they had been discharged. At the same time, revision of the basic procedure such as dealing with materials and equipments, training, an informative leaflet though the web, and visits in the unit were performed in order to provide education and orientation to the staff. There was a reduction in the number of new cases of VRE after all measures, and the outbreak was considered controlled in December 2005.
Conclusion The active surveillance program among high-risk patients resulted in the complete control of the VRE outbreak at our institution.

P34

Application of a new *Candida* score for early antifungal treatment in an adult medical–surgical critical care unit

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Critical Care 2007, **11(Suppl 3):**P34 (doi: 10.1186/cc5821)

Introduction The incidence of infections caused by *Candida* species in critical care has substantially increased in recent years. Recently, *Candida* infections have been increasing especially in critical care patients. Invasive candidiasis has been associated with severe sepsis, septic shock and multiple organ failure. With a clinical scenario very similar to bacterial infections, this infection is a diagnostic challenge with an estimated mortality rate of 40%.
Objective To evaluate the impact of a *Candida* score on early antifungal treatment in a general critical care unit.
Methods The Candidemia incidence rate ratio from July to December 2005 was compared with the same period in 2006 after the implementation of a *Candida* score system (Software Stata 8.0). Surveillance cultures of urine, tracheal and digestive samples from each patient were obtained weekly. According to Leon and colleagues [1], patients with at least two positive sites and sepsis or with total parenteral nutrition or a recent surgical intervention received antifungal treatment (fluconazole or Caspofungin) – preemptive treatment. The incidence after the *Candida* score implementation was reduced from 1.91 (2/1,049 patient-days) to 0.92 (1/1,081 patient-days) with no statistical significance ($P = 0.3$).
Conclusion In this preliminary report, the *Candida* score seems to be a helpful tool to reduce the incidence of *Candida* infections in a general critical care unit. In a large population, the use of the *Candida* score system may assist in identifying candidates for preemptive antifungal treatment among the critical care population.
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P35

Utilization of a tool to help intensivists in the implementation and monitoring of the ventilator-associated pneumonia bundle protocol running in an adult medical–surgical critical care unit

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Background Ventilator-associated pneumonia (VAP) is an airways infection that must have developed more than 48 hours after the patient was intubated. VAP is the leading cause of death among hospital-acquired infections, exceeding the rate of death due to central line infections, severe sepsis, and respiratory tract infections in the nonintubated patient. The hospital mortality of ventilated patients who develop VAP is 46%, compared with 32% for ventilated patients who do not develop VAP. Reducing mortality due to VAP requires an organized process that guarantees early recognition of pneumonia and consistent application of the best evidence-based practices. The Ventilator Bundle is a series of interventions related to ventilator care that, when implemented together, will achieve significantly better outcomes than when implemented individually.
Objective To evaluate the implementation effect of a VAP bundle in a general ICU, with the utilization of homemade software designed for this purpose (http://www.bundle.com.br).
Methods In a 15-bed general ICU, implementation of the bundle was done over 3 months beginning in January 2006. The key components of the VAP bundle are: elevation of the head of the bed; daily sedation interruptions; a ventilation tube with a subglotic aspiration system; peptic ulcer disease prophylaxis; deep venous thrombosis prophylaxis; an oral feeding tube instead of a nasal feeding tube; and oral hygiene with chlorexidine twice a day. We compared the incidence density rate from April to December 2005 with the same period in 2006 (Software Stata 8.0).
Results The VAP incidence rate reduced from 21.15/1,000 to 6.72/1,000 mechanical ventilation days ($P < 0.01$) – an incidence rate ratio of 3.15 (95% CI 1.2–9.5). After 5 months, the rate of VAP was zero. This period was the lowest incidence of VAP ever registered in the ICU. The incidence of multiresistant Gram-negative bacteria infections was also lower than before bundle implementation.
Conclusion After 5 months of VAP bundle implementation with the aid of homemade software to help clinicians follow the results in daily basis, results have demonstrated an important reduction in the incidence of VAP in our ICU. The impact of this system implementation for a longer period should be followed with the aid of homemade software.

P36

Severe imported malaria: a case report

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Critical Care 2007, **11(Suppl 3):**P36 (doi: 10.1186/cc5823)

Purpose Malaria is still considered a major global health problem. The severity form of the disease is caused mainly by *P. falciparum* and may occur together with cerebral, kidney, pulmonary, hematologic, circulatory and hepatic complications. This report is about a patient with a case of severe imported malaria.
Case report A 30-year-old male, mulatto, Philippine, sailor, from a ship arriving from Nigeria, with a history of abdominal pain on the right hypochondrium, jaundice, fever, and a decrease in consciousness. Laboratory tests on admission showed hyperbilirubinemia at a level of 50 mg/dl, severe metabolic acidosis, thrombocytopenia, creatinine levels of 5.6 mg/dl and leukocytosis with deviation through metamyelocytes. The APACHE II score was 37, with a death estimated risk of 88%. During the patient's stay at the hospital, *P. falciparum* malaria was diagnosed through the thick drop test. Even with the adequate antimalaria therapy, the patient's condition evolved to an acute renal failure requiring hemodialysis, acute respiratory distress syndrome, septic shock, and a hematological disorder, forming a multiple organ dysfunction syndrome. After being discharged from the hospital, the patient did not present any cerebral, pulmonary or kidney sequel.

Discussion From the criteria described in the medical literature to define critical malaria, the patient fulfilled the following: acute renal failure, acute respiratory distress syndrome, metabolic acidosis, altered level of consciousness, macroscopic hemoglobinuria, hyperparasitism and hyperbilirubinemia, related to a lethality rate of over 10% depending on early treatment and available resources. Severe malaria requires fast diagnosis allied to quick access to an intensive care treatment, since any delay increases the morbidity–mortality of the disease.

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P37

Catheter-related bloodstream infections in the intensive care unit

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Background In ICUs, physicians insert many central venous catheters every year. Central venous catheters allow measurement of hemodynamic variables, delivery medications, hemodialysis and nutritional support. Unfortunately, catheter-related bloodstream infections are common, costly, and potentially lethal. Infection complication is reported to occur in 5–26% of patients.
Objectives To identify rates of catheter-related infection in ICU patients. To identify whether catheter-related infection prolongs the time of hospitalization in the ICU.
Methods A retrospective analysis of patients with catheter-related infection was performed, including 132 patients admitted to the ICU. All patients with catheter-related infection were identified regardless of the diagnosis at ICU admission.
Results The average age was 58.27 years, 58% were male. Thirty-two patients (24.24%) had catheter-related bloodstream infection. The medium time of ICU stay in the infection group was 23.96 days against 12.18 days in the control group.
Conclusion The use of central venous catheters was associated with bloodstream infection and was hazardous to patients. In these patients, catheter-related infection prolongs hospitalization in the ICU.

Cardiology

P38

Is the widening of the QTc associated with mortality in sepsis?

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Critical Care 2007, **11(Suppl 3):**P38 (doi: 10.1186/cc5825)

Introduction The widening of the QTc is a mortality predictor in acute coronary syndromes and cerebral vascular accident.
Objective To study the alterations on the correlation among QTc, troponin and the echocardiogram with sepsis mortality.
Methods Holter and echocardiogram were performed, where we were able to analyze the QTc space and the chamber's size. We checked the troponin, CPK and CKMB levels on the 1st, 6th and 12th day after admission. Magnesium and potassium levels were also checked.
Results Nineteen patients were studied. Ten of them died (52%). The APACHE score (29.8 ± 8.4 and 26.8 ± 6.5) and age (48 ± 6.4 and 58 ± 6.4 years) were similar in survivor and nonsurvivor groups, respectively. There was no meaningful difference in the daily dosage of vocative drips. Troponin was significantly elevated among those who died during the first 12 days (day 1: 0.5 ± 0.3 and 1.4 ± 1.1; day 6: 0.4 ± 0.1 and 1.4 ± 1.2; day 12: 0.3 ± 0.1 and 1.0 ± 0.8; $P < 0.05$). The QTc was elevated in the nonsurvivor group (day 1: 0.44 ± 0.05 and 0.46 ± 0.04; day 6: 0.45 ± 0.05 and 0.46 ± 0.08; day 12: 0.41 ± 0.02 and 0.45 ± 0.09; $P < 0.05$ – survivors and nonsurvivors, respectively). There was an increase in acute events in the nonsurvivor group (40 ± 6 mm) on the 12-day trial.
Conclusion QTc, troponin and acute event data were elevated among the nonsurvivor patients. There is therefore an evident correlation of these parameters and their clinical evolution.

P39

Implementation of evidence in clinical practice for prevention of thromboembolic events in intensive medicine

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Critical Care 2007, **11(Suppl 3):**P39 (doi: 10.1186/cc5826)

Objective To determine the association between the high risk to embolic events and the application of guidelines for their prevention in ICU patients.
Methods A retrospective study evaluating the medical files of 200 ICU patients. Inclusion criteria: patients ≥18 years old that did not have diagnosis of deep-vein thromboembolism (DVP) and pulmonary embolism (PE) at internment. Exclusion criteria: use of previous or present anticoagulant, counterindication for use of heparin in prophylactic doses. The patients were classified according to risk stratification to thromboembolism of low, moderate and high risk.
Results One hundred and seven patients were included. The most prevalent risk factors to PE were: age over 40 years old (72.0%), longer than 3 days in bed (49.5%), longer than 60 minutes of surgery (43.0%), central venous catheterization (32.7%) and cancer (21.5%). The risk stratification showed 15.9% low-risk patients, 63.6% moderate-risk patients and 20.6% high-risk patients. The performance of any type of prophylaxis (physical or pharmacological) was 64.8% (80 patients). Out of these 80 patients, 30 patients (37.5%) received physical prophylaxis (26.7% precautious walking, 46.7% inferior limb elevation and 93.3% physiotherapy) and 75 patients (93.8%) received pharmacological prophylaxis (37.3% unfractionated heparin, 64% heparin with low molecular weight). The association between high risk and prophylaxis was not significant ($P = 0.269$, Fisher's test).
Conclusion This study showed a nonsignificant association ($P = 0.269$) between high risk for thromboembolism and the performance of thromboprophylaxis, which is a potential risk factor for mortality in the ICU.

P40

Critically ill patients with Takotsubo cardiomyopathy

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Critical Care 2007, **11(Suppl 3):**P40 (doi: 10.1186/cc5827)

Background A cardiac syndrome of 'apical ballooning', also named Takotsubo cardiomyopathy, consists of an acute onset of transient akinesia of apical and mid portions of the left ventricle, without significant coronary stenosis. It is considered to be trigged by emotional stress. Recently, it has also been described in critically ill patients. Cardiogenic shock can occur but is not usual.
Objective To describe one HIV patient with Takotsubo cardiomyopathy in an ICU admission.
Methods and results NSB, a Caucasian 54-year-old female, with previous history of anemia and depression, was admitted to the ICU due to altered mental status. Her family reported mood changes and lethargy. Her physical examination showed oral candidiasis and loss of consciousness. After ventilatory support, an MRI image was obtained showing ring-enhancing mass lesions suggesting intracerebral toxoplasmosis. Folinic acid, pyrimethamine and sulfadizine were initiated. Screening and confirmatory tests were positive for HIV.
Over the following days the patient developed haemodynamic instability requiring intravenous vasopressors. Troponin, CKMB and CK were normal and the ECG showed an inverted T wave in leads V2–V5. An echocardiography showed anteroapical akinesia. The cardiac catheterization did not reveal any obstructive coronary lesion; however, ventriculography demonstrated an abnormal left ventricle with anterioapical akinesia. After 3 days, the patient was stable and without inotropic support. In a second echocardiography, the left ventricular wall motion was normal.
Conclusion Critically ill patients can present a cardiomyopathy with reversible anteroapical akinesia without coronary stenosis. This diagnosis should be considered among ICU patients.

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P41

Cardiovascular complications related to cocaine use: a case report

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Critical Care 2007, **11(Suppl 3):**P41 (doi: 10.1186/cc5828)

Background and objective Cocaine is the most commonly used illicit drug and its acute and chronic effects are related to a variety of physiological changes, mainly in the cardiovascular system. This study is a case report of a patient with cardiomyopathy related to cocaine use.
Case report A 19-year-old man, who has been using cocaine and crack since he was 15 years old, was admitted to the Emergency Department in February 2006 with progressive dyspnea during minimal efforts and bloody expectoration. During the physical examination, leg edema, jugular stasis and dyspnea at rest were observed. The echocardiogram demonstrated left ventricular hypocinesia, a 17 mm ventricular thrombus and a 12% ejection fraction. Bleeding from the left upper lobe was identified during a pulmonary bronchoscopy, which was treated with arterial embolization. After 48 hours of the procedure, the patient was asymptomatic and antithrombotic treatment with warfarin and enoxaparin was started. No obstruction was found at the cineangiography and the patient was discharged after clinical improvement. The patient was admitted again to the ICU in July with intensive chest pain and dyspnea at rest. A new cineangiography was performed and occlusion in the anterior descendent coronary artery was observed.
Conclusion The acute effects of cocaine are commonly seen in the Emergency Department but the chronic effects, such as the cardiovascular manifestations, can take longer to be correlated as a side effect of cocaine use. Its prolonged use is related to left ventricular systolic dysfunction due to hypertrophy or myocardial dilation, atherosclerosis, arrhythmias, myocyte apoptosis and sympathetic damage.

P42

Factors associated with the door-to-electrocardiogram time in patients with acute myocardial infarction

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Critical Care 2007, **11(Suppl 3):**P42 (doi: 10.1186/cc5829)

Introduction and objective The door-to-electrocardiogram (ECG) time is recommended to be 10 minutes or less in patients with chest pain presenting to the emergency department (ED). The aim of this study was to identify factors associated with delays in the door-to-ECG time in patients admitted to the ED with acute myocardial infarction (AMI).
Patients and methods A total of 186 patients (70% male, mean age: 65.0 ± 14.0 years) hospitalized for AMI were evaluated. The door-to-ECG time was prospectively measured from the time of patient arrival in the ED to the time of initial ECG acquisition (minutes). Statistical analysis was performed using ANOVA and multiple comparison tests (Bonferroni, Scheffé, Tukey, Duncan). $P < 0.05$ was considered statistically significant.
Results The mean door-to-ECG time was 9.0 ± 12.3 minutes (1–60 min). See Table 1.

Table 1 (abstract P42)

Variable	*n*	Mean door-to-ECG time (min)	*P* value
Chest pain on admission (yes/no)	132/53	7.7/12.4	0.037
STEMI/NONSTEMI	93/93	7.4/10.6	0.121
Age (<65/≥65 years)	91/95	10,0/8,1	0.244
Killip class (I–II/III–IV)	176/10	9.0/8.8	0.646
Gender (male/female)	146/40	8.8/9.7	0.925
Workday/weekend	132/54	9.14/8.7	0.941

Conclusion Our data show that among the analyzed factors only the absence of chest pain on admission was significantly associated with a prolonged door-to-ECG time. This finding suggests that early identification of AMI patients with atypical presentation should facilitate appropriate and timely management.

P43

Increase in prescription rate of angiotensin-converting enzyme inhibitors or angiotensin receptor blocker for hospitalized patients with acute myocardial infarction and left ventricular systolic dysfunction

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Introduction and objective The rate of angiotensin-converting enzyme inhibitors/angiotensin receptor blocker (ACEi/ARB) at discharge is a quality indicator for acute myocardial infarction (AMI) care. The aim of the study was to evaluate changes in drug prescription before and after the implementation of a managed AMI protocol in patients hospitalized for AMI with moderate to severe left ventricular systolic dysfunction (LVSD).
Patients and methods A total of 578 consecutive AMI patients (mean age: 68.0 ± 14.4 years) were evaluated. Of these, 92 were eligible for ACEi/ARB therapy at discharge (had LVEF <40% and/or narrative of LVSD and/or did not have a contraindication to ACEi/ARB and had survived their hospital stay without transfer to another facility). The managed AMI protocol was implemented in a tertiary hospital on 1 March 2005. Quality indicators were prospectively followed by a nurse case-manager, and periodic performance feedback (reports) were given to local hospital managers and clinical staff. Patients were divided into three groups: G1, pre-protocol (March 2004–February 2005); G2, first year post-protocol (March 2005–February 2006); and G3, second year post-protocol (March 2006–February 2007). Statistical analysis was performed using the chi-square test and Fisher's exact test. $P < 0.05$ was considered statistically significant.
Results The results are presented in Table 1.

Table 1 (abstract P43)

Group	*n*	% ACEi/ARB prescription	*P*
G1, $n = 15$	8/15	53.3	0.03 (G1 x G2)
G2, $n = 31$	26/31	83.8	0.0004 (G1 x G3)
G3, $n = 46$	44/46	95.6	0.05 (G2 x G3)

Conclusion A significant increase in the rate of ACEi/ARB prescription was observed both in the first and the second years after AMI protocol implementation. A trend toward an increase was also observed when the first and second years post-protocol are compared. These data suggest that managed protocols that include continuous monitoring of quality indicators are useful tools for implementing scientific evidence into clinical practice.

P44

Women with acute myocardial infarction are more likely than men to have a delayed door-to-electrocardiogram time

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Critical Care 2007, **11(Suppl 3):**P44 (doi: 10.1186/cc5831)

Introduction and objective Inhospital treatment delays experienced by women may limit their potential to achieve the maximum benefits of acute myocardial infarction (AMI) therapies. The door-to-electrocardiogram (ECG) time is recommended to be 10 minutes or less in patients with chest pain presenting to the emergency department (ED). The aim of this study was to examine gender differences in the door-to-ECG time for patients admitted to the ED with AMI.
Patients and methods A total of 384 patients hospitalized for AMI were evaluated. Of those, 107 were female (27%) and the mean age was 67.1 ± 14.2 years. The door-to-ECG time was prospectively measured from the time of patient arrival in the ED to the time of initial ECG acquisition (minutes). Statistical analysis was performed using the chi-square test and the Fisher exact test. $P < 0.05$ was considered statistically significant.
Results The mean door-to-ECG time was 6.7 ± 12.6 minutes for men and 12.7 ± 21.8 minutes for women ($P = 0.007$). Women were older (72.3 ± 13.6 years vs 65.2 ± 13.9 years, $P < 0.0001$), had a lower prevalence of ST-elevation myocardial infarction (STEMI) (20.5% vs 79.5%, $P < 0.0001$) and tended to present less often chest pain on admission (47.1% vs 58.2%, $P = 0.05$) in comparison with men.
Conclusion Women with AMI had a door-to-ECG time twice as high compared with male patients. Factors such as older age, lower prevalence of STEMI and atypical clinical presentation, more common among women in this cohort, may have contributed to the longest delay in the door-to-ECG time.

P45

Electrocardiographic manifestations of hypothermia and the 'J (Osborn) wave'

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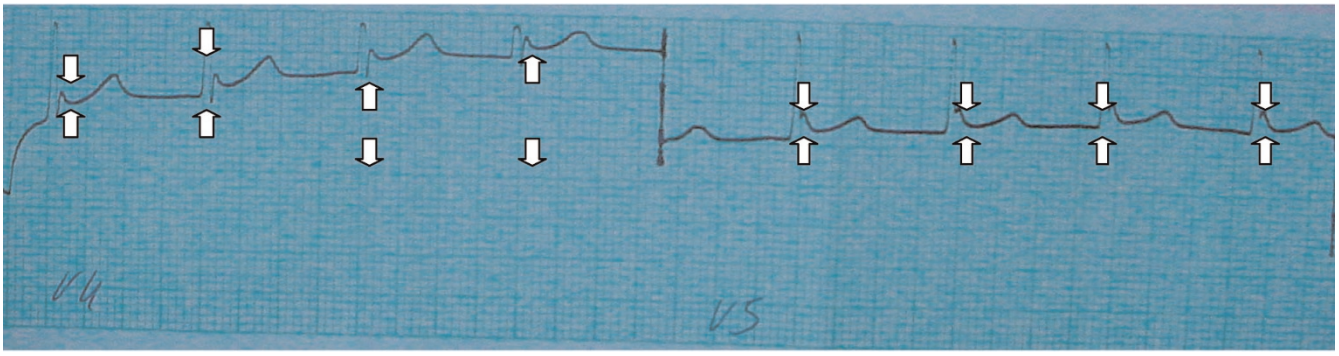
Background Hypothermia is defined as a core temperature less than 35°C. Critical trauma patients usually are hypothermic. A reversible coma simulating cerebral death could be one of the clinical manifestations of hypothermia. Life-threatening ventricular arrhythmias could be evident when moving the patient and during the rewarming process. Electrocardiographic manifestations of hypothermia are: bradycardia, absence of atrial activity, narrow QRS complexes and a prolonged QT interval. The presence of the 'J (Osborn) wave', a second upward wave immediately following S waves, is pathognomonic. The 'J (Osborn) wave' is the result of the difference of potential action between the epicarde and endocarde during phases 1 and 2 of the ventricular repolarisation and is related to increase in mortality.
Objective To report a case of penetrating thoracic gunshot wound with electrocardiographic manifestations of hypothermia, including a 'J (Osborn) wave', who died.
Methods Case report and literature review.
Results A 30-year-old male injured in the left hemithorax was transferred to our emergency department 8 hours after aggressive initial resuscitative thoracotomy, total left pneumectomy and cardiopulmonary maneuvers. He was admitted in shock, midriasis and with core temperature of 32°C, after 1.5 hours of interhospital transportation. A ventricular fibrillation occurred and was treated with two biphasic shocks. An electrocardiogram showed: an absence of P waves, a ventricular rate of 78 beats, narrow QRS complexes, a prolonged QT interval and a 'J (Osborn) wave' (Figure 1). The patient was resuscitated by the principles of early goal direct therapy and was submitted to external and internal rewarming processes. Although there was an effective and clear

Figure 1 (abstract P45)



Electrocardiographic manifestations of Hypothermia: absence of P waves, ventricular rate of 78 beats, narrow QRS complexes, a prolonged QT interval and the 'J (Osborn) wave' (white arrows).

diuresis, an improvement in lactic acidosis and central venous saturation, and a body temperature of 36°C, the patient had cerebral death declared on the second day and died on the third day.
Conclusion The search for electrocardiographic manifestations of hypothermia should be part of the routine for critical trauma patients and, when reported, should alert the surgical team about the possibility of supporting a bad prognosis.

P46

Simulation-based training on emergencies in cardiology: experience with 497 trainees

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Critical Care 2007, **11(Suppl 3):**P46 (doi: 10.1186/cc5833)

Background Emergencies in cardiology are among the key requirements of appropriate therapy in emergency and critically ill patients. Medical simulation used in combination with traditional training methods can provide a comprehensive learning opportunity that allows the clinician to safely learn, practice, and repeat the procedures until proficiency is achieved.
Objectives (1) To address the use of medical simulation as a way for medical learners to acquire and maintain skills needed to manage emergencies in cardiology. (2) To evaluate the students' satisfaction with the course.
Methods The study was performed at Berkeley Training Center – Brazil, between March 2002 and December 2006, with a total number of 497 trainees. Trainees received a baseline evaluation ($n = 283$) followed by an 8-hour training session that involved an introductory lecture, skills management with a mannequin simulator, clinical scenarios for the training ACLS algorithm, and instructor-facilitated debriefings. After finishing the course, the trainees were retested and completed a numerical scale survey ($n = 497$) of their perceptions about our course (1 = poor, 2 = fair, 3 = good, and 4 = excellent).
Results (a) Performance improved significantly after simulator training (76.7% vs 58.1%, $P < 0.001$). (b) Seventy-five percent of participants scored less than 70% in the baseline evaluation, while only 25% scored less than 70% in the retest. (c) The course was considered excellent by 63% of the participants and good by 36%.
Conclusion The extremely positive response to simulation-based training on emergencies in cardiology found in this pilot study suggests that this training modality may be valuable in the training of medical students and physicians. Simulation-based training is expected to become routine in many healthcare settings in the coming decade.

P47

Impact of a new triage tool for screening acute myocardial infarction patients on the door-to-electrocardiogram time in an emergency department

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Critical Care 2007, **11(Suppl 3):**P47 (doi: 10.1186/cc5834)

Background and objective Early diagnosis and treatment of acute myocardial infarction (AMI) have direct implications on clinical outcome. Initial triage has the challenge of being able to identify both typical and atypical cases. The aim of this study was to investigate the impact of implementing a new triage tool in the emergency department on the door-to-electrocardiogram (ECG) time of patients admitted with AMI.
Patients and methods A total of 50 consecutive AMI patients (mean age 71.0 ± 12.9 years, 76.0% male) were evaluated. Patients were divided into two groups: G1 consisted of 27 patients evaluated in the 4 months before tool implementation (April–July 2006), and G2 consisted of 23 patients evaluated in the first 4 months after tool implementation (August–November 2006). This new triage tool was developed to guide the nurse's decision and was based on three key questions: presence of cardiovascular risk factors, previous atherosclerotic disease (coronary artery disease, stroke, peripheral arterial disease, carotid stenosis, aortic aneurysms, renal artery stenosis), and symptoms on admission. After triage team training, the tool was implemented on 1 August 2006. The door-to-ECG time was prospectively measured from the time of patient arrival in the emergency department to the time of initial ECG acquisition (minutes). Statistical analysis was performed using Student's *t* test. $P < 0.05$ was considered statistically significant.
Results The comparison between groups found a significant decrease in the door-to-ECG time in the post-implementation period ($P = 0.00002$) (Table 1).

Table 1 (abstract P47)

Phase	*n*	Door-to-ECG time (minutes)	±SD
Before implementation	27	14.6	20.0
After implementation	23	6.9	6.8

Conclusion The implementation of this new triage tool had a significant impact on reducing the door-to-ECG time and it may become a useful tool for identifying atypical AMI patients.

P48

Relationship between B-type natriuretic peptide plasma levels and echocardiography parameters in compensated chronic heart failure patients treated with levosimendan

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Critical Care 2007, **11(Suppl 3):**P48 (doi: 10.1186/cc5835)

Background B-type natriuretic peptide (BNP) plasma levels have recently been demonstrated as significant neurohormonal markers of chronic heart failure (CHF) progression and prognosis. Additionally, clinical studies have shown that the calcium sensitizer levosimendan beneficially affects the central hemodynamics of CHF patients and improves their long-term prognosis.
Objective To investigate whether levosimendan-induced hemodynamic improvement, as confirmed by echocardiogram of CHF patients, is related to respective changes in BNP levels.
Methods Circulating levels of BNP were measured by ELISA in 37 patients with decompensated advanced CHF at baseline and 72 hours after the initiation of levosimendan treatment. Echocardiographic parameters – pulmonary artery pressure (PAP), end-diastolic volume, end-systolic volume and left ventricular ejection fraction (LVEF) – were also measured at baseline and 72 hours after infusion initiation. We used the threshold of 500 pg/ml for BNP, 30 mmHg for PAP and 50% for LVEF to define patients as having altered results.
Results We retrospectively analyzed 37 consecutive CHF patients to whom levosimendan was prescribed by the attending physician besides standard measures. BNP levels were significantly lower within 72 hours of levosimendan treatment ($P < 0.01$). A significant reduction of PAP ($P < 0.05$) was also found during the same period. A good correlation between the levosimendan-induced changes in LVEF and the respective reduction of BNP levels ($P < 0.01$) was observed.
Conclusion Our results indicate that changes in BNP levels may be useful as biochemical markers of levosimendan-induced improvement in echocardiographic and clinical parameters.

P49

Rotational thromboelastography in a patient with heparin-induced thrombocytopenia: a case report

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Critical Care 2007, **11(Suppl 3):**P49 (doi: 10.1186/cc5836)

Background Thrombocytopenia is a common problem in the ICU and in cardiovascular patients. It has been considered to play a role in worsening the prognosis of ICU patients. Especially, patients submitted to cardiac surgery may be exposed to prolonged heparin infusions. After open-heart surgery, as opposed to other surgical procedures, the platelet count falls, primarily due to platelet damage and destruction in the bypass circuit and hemodilution. Heparin is the most common drug to be implicated in thrombocytopenia in ICU patients. Determining the etiology for the low platelet count is important for the implementation of appropriate management. The use of a direct thrombin inhibitor in treatment should be considered early if a diagnosis of heparin-induced thrombocytopenia is possible.
Objective The aim of the study is to present one case of heparin-induced thrombocytopenia after a mitral valve replacement surgery and to compare the rotational thromboelastography (roTEG) and coagulation tests before and after argatroban use.
Case report An 83-year-old female patient was hospitalized because of acute mitral regurgitation secondary to chordal rupture and was submitted to a mitral valve replacement. Past medical history included hypertension, diabetes, chronic atrial fibrillation and mild renal failure. Before the surgery, a coronary angiography was performed and revealed normal coronary arteries and a normal left function. After 4 days using unfractionated heparin, the platelet count dropped 30% and the anticoagulation was changed from unfractionated heparin to fractionated heparin. Postoperatively, the patient presented shock, acute renal failure and signs of peripheral hypoperfusion and increased abdominal pressure. Seven days after the surgery, the suspicion of heparin-induced thrombocytopenia was confirmed by ELISA test for PF4–heparin antibodies. Heparin was stopped and argatroban was initiated. The patient died from multiple organ failure 1 week later.
Methods We evaluated the roTEG and coagulation tests (platelets; PTT; TAT; PAI; PTN-C; fibrinogen; D-dimer and antithrombin III) before and after argatroban use.
Comments In this case the roTEG was as good as a wide coagulation profile test to evaluate the effects of anticoagulation using argatroban in a heparin-induced thrombocytopenia patient.

P50

Analysis of the TIMI score in patients admitted with ST-segment elevation myocardial infarction in an intensive care unit

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Critical Care 2007, **11(Suppl 3):**P50 (doi: 10.1186/cc5837)

Objective To correlate the TIMI score in patients admitted to an ICU with ST-segment elevation myocardial infarction (STEMI) with age, treatment and mortality.
Materials and methods From July 2004 to December 2006, the data of 359 patients with ACS were collected prospectively. One hundred and fifty-six patients were admitted with STEMI and were classified by TIMI score. Statistical analysis was performed with one-way ANOVA with the Tukey post test and Pearson correlation.
Results The TIMI score was between 0 and 12; 76.9% of patients were men. Details are presented in Table 1.
Conclusion The patient age was significantly lower in TIMI scores 0–3. The mortality increased proportionally with TIMI score. Nevertheless, there was no mortality in the higher TIMI scores, probably because of the small number of patients.

Table 1 (abstract P50)

TIMI score	*n*	Mean age	Mortality (%)	Clinical treatment	Mortality (%)	Angioplasty	Mortality (%)	CABG	Mortality (%)
0	6	49.0*	–	01	–	05	–	–	–
1	26	52.6*	–	04	–	17	–	6	–
2	22	53.4*	–	05	–	12	–	5	–
3	26	59.4*	3.8	05	40.0	17	–	4	–
4	20	68.8	10.0	05	50.0	11	–	4	–
5	16	69.7	25.0	02	–	11	18.2	4	–
6	15	63.3	13.3	03	50.0	12	8.3	–	–
7	10	68.0	30.0	05	60.0	04	–	1	–
8	5	74.2	40.0	02	50.0	03	33.3	–	–
9	6	74.2	33.3	02	100.0	04	25.0	–	–
10	2	82.0	50	–	–	02	50.0	–	–
11	1	71.0	–	–	–	01	–	1	–
12	1	74.0	–	01	–	–	–	–	–
P		<0.01	<0.0001	<0.01	<0.001	0.90	0.06	0.2	0.07

CABG, coronary artery bypass graft surgery. *Significantly lower than 4–12 ($P < 0.01$).

Table 1 (abstract P51)

TIMI score	*n*	Mean age	Mortality (%)	Clinical treatment	Mortality (%)	Angioplasty	Mortality (%)	MRS	Mortality (%)
0	2	54.5	–	02	–	–	–	–	–
1	21	59.4*	4.8	14	7.1	06	–	01	–
2	35	59.2*	2.9	20	5.0	10	–	06	–
3	43	65.7	2.3	25	4.0	11	–	07	–
4	39	70.9	7.7	26	11.5	06	–	07	–
5	47	72.1	8.5	34	11.8	06	–	07	–
6	12	67.7	–	06	–	03	–	03	–
7	4	57.8	–	03	–	–	–	01	–
Total	203	66.3	4,9	130		42			
P		0.0001	0.53	0.62	0.58	0.07	0.20	0.21	0.17

*Significantly different from groups 4 and 5 ($P < 0.0001$).

P51

Unstable angina and non-ST-segment elevation myocardial infarction: an analysis by TIMI score

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Critical Care 2007, **11(Suppl 3):**P51 (doi: 10.1186/cc5838)

Objective The TIMI score was created to categorize a patient's risk of death and ischemic events, providing the basis for therapeutic decision-making. In this study, the characteristics of patients with acute coronary syndrome (ACS) were analyzed using the TIMI score.
Materials and methods From July 2004 to December 2006, the data of 359 patients with ACS were collected prospectively. Two hundred and three patients out of the initial 359 patients were admitted with unstable angina and non-ST-segment elevation myocardial infarction (NSTEMI) and were classified by the TIMI score. Statistical analysis was performed with one-way ANOVA with the Tukey post test and Pearson correlation.
Results Of the 203 patients, 92 had unstable angina and 111 had NSTEMI. The mean age was 66.3 years, and 65.5% were men. The details of each group of TIMI score are shown in Table 1. The groups that were submitted to angioplasty and myocardial revascularization surgery (MRS) had no mortality.
Conclusion The mortality was higher in the group with clinical treatment. The age was a determinant of higher mortality when compared with the TIMI score. There was no correlation of the TIMI score and mortality.

P52

Influence of obesity in patients admitted with acute coronary syndrome to the intensive care unit

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Critical Care 2007, **11(Suppl 3):**P52 (doi: 10.1186/cc5839)

Objective To analyze the characteristics of obese patients admitted with acute coronary syndrome (ACS) to an ICU.
Materials and methods From October 2003 to December 2006, 501 patients with ACS were admitted to the ICU. The data collection was made prospectively. The follow-up was made 6 months after initial hospitalization for evaluation of later death, new cardiac hospital admission and persistence of symptoms after the coronary event. Statistic analysis was performed with Fisher's exact test and the Mann–Whitney test.
Results Ninety-six patients with obesity (BMI ≥ 30 kg/m^2) were analyzed. The mean age was 61.8 years old (43–90 years), being significantly lower in obese patients than in nonobese patients

($P < 0.001$). Seventy-seven percent of the patients were men (74 patients) ($P < 0.0001$); 35.4% of the patients had unstable angina, 30.2% had non-ST-segment elevation myocardial infarction (NSTEMI) and 24.3% had ST-segment elevation myocardial infarction (STEMI). The most common risk factors were hypertension (78.1%) ($P = 0.062$), followed by sedentarism (66.6%) ($P = 0.01$), dyslipidemia (43.7%) ($P = 0.49$) and diabetes (29.1%) ($P = 0.70$). Previous angina was related by 40 patients ($P = 0.07$) and previous myocardial infarction by 36 ($P = 0.29$). Nine patients had previous stent ($P = 0.85$) and 19 previous coronary artery bypass graft surgery (CABG) ($P = 0.36$). At admission, 88.5% related precordial pain. Coronariography was made in 81 patients, with 36 submitted to angioplasty (34 with stent). The most affected coronary was the anterior descending (64.1%) followed by the right coronary (51.8%) and the circumflex (27.1%). Thrombolytic was used in 14 patients and 15 were submitted to CABG. Forty-four patients received only clinical treatment. The hospital mortality was significantly lower in obese patients (2.0%) than in nonobese patients (11.6%). The mean time of stay in the ICU was 2.38 days ($P = 0.37$) and the hospital stay was 9.53 days ($P = 0.58$). Follow-up was made with 78.3% (65 of 83 patients). The later mortality by cardiac causes was 1.5%. There was 19 new hospital admissions for cardiac causes and 15 had persistence of symptoms.

Conclusion Obesity predisposes to a higher risk of cardiovascular disease in the young population. Nevertheless, mortality was lower, probably because of the lower mean age of this obese group with ACS.

P53

Evaluation of the percutaneous coronary intervention as a diagnostic or therapeutic tool in 501 consecutive cases of acute coronary syndrome

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Critical Care 2007, **11(Suppl 3):**P53 (doi: 10.1186/cc5840)

Objective The evaluation of the percutaneous coronary intervention (PCI) as a diagnostic or therapeutic tool in patients with acute coronary syndrome (ACS) admitted to an ICU.

Materials and methods From October 2003 to December 2006, 501 patients with ACS were admitted to the ICU. The data collection was made prospectively using interviews with patients, chart reviews and examinations. The follow-up was made 6 months after the coronary event for evaluation of later death and new hospital admission (351 patients) using telephone calls. Statistical analysis was performed with the chi-square test.

Results A total of 419 patients with ACS were submitted to PCI. In this group, 124 patients (29.5%) had unstable angina, 112 (26.7%) had non-ST-segment elevation myocardial infarction and 183 (43.6%) had ST-segment elevation myocardial infarction. The mean age was 62.43 years old (27–95 years) and 71.1% were men. The diagnostic PCI was made in 234 patients (55.9%) and the therapeutic in 185 patients (44.1%). One hundred and four patients (56.2%) received a nonpharmacological stent and 73 patients (39.4%) received a pharmacological stent. The most affected arteries were the anterior descending (58.2%), right coronary (44.8%), and circumflex (24.8%). Seventy-six patients were submitted to coronary artery bypass graft after PCI. Hospital mortality was 6.2%, corresponding to 5.5% of diagnostic PCI and 7.0% of the angioplasty group ($P = 0.54$). Follow-up was made with 304 or 86.6% of the patients at least 6 months after the initial hospitalization. The mean time of follow-up was 12.68 months (6–31 months). The later mortality was 2.3%, corresponding to 3.4% of diagnostic PCI and 0.7% from the angioplasty group ($P = 0.14$). There were 33 (19.4%) new hospital admissions for cardiac causes in the diagnostic group and 29 (21.9%) in the angioplasty group ($P = 0.56$).

Conclusion There were no significant differences in mortality between diagnostic and therapeutic PCI.

P54

Cardiac arrest and its epidemiologic variables in an emergency room

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Critical Care 2007, **11(Suppl 3):**P54 (doi: 10.1186/cc5841)

Introduction Cardiac arrest is the sudden interruption of ventricular and respiratory activities, sufficient equipment for the maintenance of life. Atherosclerosis is the most frequent cause, although in Brazil there is Chagas disease and its arrhythmias.

Methods A retrospective analysis of 66 adults admitted to our emergency room in cardiac arrest in 2004. A series of clinical and epidemiologic variables was evaluated. They included: sex, age, causes, electrocardiographic rate, comorbidity, and time between the arrest and the beginning of cardiopulmonary resuscitation. Comparison was made between the findings of the retrospective analysis and the literature. The literature search was carried out through the electronic databases Medline and LILACS in January 2007.

Conclusion The average age, the causes and the electrocardiographic rate are concordant with the studied literature. We could not correlate the time between the arrest and the beginning of cardiopulmonary resuscitation with the prognosis. We demonstrated a high rate of mortality, 83%, as in the literature. The unsuitable filling in of the hospital cards did contribute to the small number of analysed cases. However, the results demonstrate the urgency of accurate filling of the hospital charts and also for the publication of this type of research, due to the lack of this information in the literature.

P55

Heart rate variability and pulmonary function behavior in patients undergoing coronary artery bypass grafting and physiotherapy intervention

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Critical Care 2007, **11(Suppl 3):**P55 (doi: 10.1186/cc5842)

Objective To assess the behavior and relationship of heart rate variability (HRV) and pulmonary function in patients undergoing coronary artery bypass grafting (CABG) and physiotherapy intervention (PI).

Methods Fourteen patients undergoing CABG and PI underwent a prospective study consisting of HRV analysis, spirometry and respiratory muscle strength (RMS) evaluation before and after (1 and 4 days) surgery. The heart rate (HR) and R–R intervals were recorded by the cardiofrequencimeter (Polar S810i), beat-to-beat, in the resting condition and 10 minutes in a supine position. HRV was evaluated in the time domain by the RMSSD index. The spirometry (Vitalograph 2120) was evaluated and the forced vital capacity (FVC), the forced expiratory volume in 1 second (FEV_1)

and the maximal voluntary ventilation (MVV) were obtained. RMS was measured by maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) obtained by an aneroid manovacuometer (Ger-Ar). All patients had initiated PI after 24 hours of the extubation, following a program of steps previously established. The Friedman test followed by the Dunn post-hoc test was utilized to compare the variables among conditions before and after surgery, and Spearman correlation analysis to verify relationship among RMSSD and pulmonary parameters. The significance level was set at 5% for all analyses.

Results Significant correlations were observed between the RMSSD and FVC, FEV_1, MMV and MIP ($r = 0.6$) and the RMSSD and MEP ($r = 0.7$). Table 1 presents the comparisons among conditions.

Table 1 (abstract P55)

Results of heart rate variability and pulmonary function on the preoperative, first postoperative and fourth postoperative days of CABG

	Preoperative	1st postoperative day	4th postoperative day
RMSSD (ms)	21.2	9.2*	14.5
FVC (l)	3.2	0.7*	1.1
FEV_1 (l)	2.7	0.6*	0.9†
MVV (l/min)	100.6	23.3*	33.9†
MIP (cmH_2O)	76.4	25.4*	32.8†
MEP (cmH_2O)	111.1	35.8*	39.3†

Values as median. *$P < 0.05$ preoperative vs 1st day postoperative, †$P < 0.05$ preoperative vs 4th day postoperative.

Conclusion The present findings showed that the RMSSD index associated positively with pulmonary function and that cardiac autonomic regulation is impaired after CABG. Additionally, the PI can be a potential therapeutic to reestablish the parasympathetic activity in these patients.

Acknowledgements This work was supported by grants from FAPESP and CNPq.

Nephrology

P56

Preliminary report of an enoxaparin dose protocol based on anti-Xa activity in continuous renal replacement therapy

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Critical Care 2007, **11(Suppl 3):**P56 (doi: 10.1186/cc5843)

Background During continuous renal replacement therapy (CRRT), anticoagulation of the extracorporeal circuit is generally required to prevent clotting of the circuit, preserve filter performance, optimize circuit survival, and prevent blood loss due to circuit clotting. Unfractionated heparin and low-molecular-weight heparin are generally used to perform this strategy. This anticoagulation may cause dangerous bleeding, however, especially in acute renal critical patients. In these patients, it is very difficult to predict bleeding or thrombosis correctly during CRRT.

Objective To asses the safety and efficacy of the use of an enoxaparin dose protocol based on anti-Xa activity in CRRT.

Methodology From September 2005 to December 2006, 26 patients were submitted to 55 CRRT sessions. All sessions used an enoxparin dose protocol based on anti-Xa activity (target 0.25–0.4 U/ml). The endpoints analyzed were the circuit time (hours) to judge efficacy, and death (30-day mortality) and serious bleeding (red cell transfusion) to judge safety.

Results Continuous veno-venous hemodiafiltration was a frequently used method in 53 sessions (96.4%). The average circuit time was 41.6 ± 26.6 hours. Ten patients received red blood transfusion (19 transfusions required) related to CRRT and four patients had bleeding complications (retroperitoneal hemorrhage, hemothorax, puncture complication, acute gastric lesion). No death was reported during 30 days of follow-up.

Conclusion In this series, the use of an enoxaparin dose protocol based on anti-Xa activity in CRRT was considered relatively safe and effective. The circuit time of 41 hours was acceptable in effectiveness and efficiency.

P57

Evaluation of acute renal failure in surgical patients in the intensive care unit

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Background Acute renal failure (ARF) is a common and serious complication in the postoperative period of critically ill patients. It occurs, depending on specific definition, in up to 30% of patients submitted to cardiac surgery. Recent evidence suggests that even small oscillations in serum creatinine are associated with significant effects on mortality. The objective of this study is to evaluate the impact of ARF on the morbidity and mortality of surgical patients in the ICU.

Methods A retrospective observational study conducted in the ICU of a public university hospital during the period January 2004–December 2004. The research was realized in an electronic database and included demographic data, diagnostic, SOFA and APACHE II scores, length of stay in the ICU and mortality. The renal dysfunction was defined as a SOFA score ≥2 (creatinine ≥2 mg/dl or oliguria <500 ml/day). Patients with chronic renal failure were excluded. For statistical analysis, the Epi Info program version 3.3.2 was used.

Results One hundred and five surgical patients were admitted to the ICU in the study period, male sex was more frequent (55.2%), with a mean age of 53.2 years, mean APACHE II score of 17 ± 7, and length of stay varying from 1 to 65 days (median 3 days). The most frequent surgeries were gastrointestinal (16.2%), multiple trauma (13.3%), intracranial hemorrhage (9.5%) and metabolic/renal (9.5%). In this sample the cardiovascular surgery was not representative (2.9%).

ARF occurred in 19% (95% CI: 11.3–26.8%) of the surgical patients and the mortality in this group was greater than in the group of patients that did not develop this complication, respectively 63.2% and 15.1% ($P < 0.001$). The patients with ARF were older than the patients without this complication (64.9 ± 7.9 years vs 50.6 ± 21.14 years, $P < 0.007$) and the APACHE II score was higher (20.3 ± 4.9) in the ARF patients when compared with patients without ARF (16.5 ± 7.4, $P < 0.06$). The median length of stay was higher in the patients with ARF, being 6 days, varying from 3 to 65 days, while in the patients without ARF the median was 2 days, varying from 1 to 33 days ($P < 0.001$).

Conclusion The high frequency of ARF found in this study was probably due to the definition criteria adopted, including transient

oliguria and pre-renal ARF. The occurrence of renal dysfunction resulted in higher morbidity and mortality in this group of patients. Several studies have been carried out to determine the patients at high risk of developing ARF in the postoperative period, and protective strategies have been developed, but the results are as yet inconclusive.

P58

Acute renal failure patients submitted to conservative and dialytic treatment in an intensive care unit

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Critical Care 2007, **11(Suppl 3):**P58 (doi: 10.1186/cc5845)

Twenty to 25% of ICU patients have acute renal failure (ARF). Dialytic treatment in ARF patients reduces mortality and is well used worldwide. The objective of this study was to analyze ICU patients with a creatinine rate above 1.3 ng/dl who were treated and nontreated with dialysis. The epidemiologic study was of 392 inpatients from the ICU of the HEG where 42% had ARF diagnosed. Only 29.1% were submitted to hemodialysis as inpatients. We can realize the high creatinine rate before dialysis treatment and the lower ICU stay of patients that did not need this treatment. The ARF incidence in the ICU of the HEG was higher than that in the literature, but dialysis was less used. This can be easily explained by the low availability of necessary equipment. Sepsis is the first cause of ARF, but in this study it is the number two cause, especially in dialytic patients. Mortality was similar to other studies. In conclusion, the ARF mortality rate is still high, even with new dialytic treatments. Dialysis is therefore associated with better life quality and less time in hospital.

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P59

Acute renal failure and other complications induced by cocaine abuse

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Critical Care 2007, **11(Suppl 3):**P59 (doi: 10.1186/cc5846)

Introduction Cocaine is a social and medical problem. In the United States, 14.6% of a trialed population has already used cocaine. The physiopathology of the renal injury is multifactorial and largely remains unknown, and rhabdomyolysis is most frequently responsible for the renal injury.

Objectives To describe and analyze the case of a patient with anuric acute renal failure (ARF) due to cocaine overdose. To compare and identify more recent scientific evidence for the treatment.

Materials and methods A search and analysis of the case of a patient with anuric ARF treated in the ICU of a public emergency hospital.

Results GC, male, 29 years old, a cocaine and marihuana user, presented a sudden condition of irritability, aggressiveness and delirious after consuming the drugs. In the subsequent days he presented hyperthermia, jaundice, oliguria, and respiratory insufficiency. He was admitted to the ICU in a severe condition with hypertension, hyperthermia and P/F = 128. Due to anuric ARF, the patient went to daily hemodialysis.

Discussion Physiopathologic effects include hemodynamic alterations, failure in the synthesis of glomerular matrix, degradation and oxidative stress and induced renal atherogenesis.

Rhabdomyolysis is the main cause responsible for renal injury. It has a high index of mortality and its mechanisms remain unknown. There is evidence that it is intimately related to vasoconstriction due to ischemia, direct toxicity, hyperpyrexia and increased muscular activity. A quick implementation of treatment for convulsions, hyperpyrexia and agitation improves prognosis and decreases complications.

The therapeutic goals are removal of precipitating factors, handling of complications and early dialysis. The treatment of rhabdomyolysis is based on hydration, induced osmotic diuresis and urine alkalinization.

Conclusion There are few renal injury cases reported in the literature. These generally describe renal infarction after having inhaled the drug, acute interstitial nephritis and cocaine-induced ARF with or without rhabdomyolysis. However, it is imperative that well-designed epidemiologic studies are designed to better elucidate the physiopathology of cocaine-induced renal injuries.

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Pneumology

P60

The influence of different ventilatory modes on the intensity of pulse pressure variation

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Critical Care 2007, **11(Suppl 3):**P60 (doi: 10.1186/cc5847)

Background Pulse pressure variation (PPV) has been recommended to evaluate the cardiac responsiveness to fluid infusion in mechanically ventilated patients with sepsis shock or following cardiac surgery. The recommendation is that PPV measurements must be performed during the volume-controlled ventilatory mode (VC) and not with the pressure control mode (PC).

Objective To test the hypothesis that the PC should not cause an important change on PPV when compared with the VC during mechanical ventilation.

Methods A prospective, nonrandomized, observational and comparative study that compares effects on PPV of the VC with another three PC ventilatory settings applied in sedated and mechanically ventilated critically ill patients with an arterial catheter in place. Initial/control setting (S1): VC with tidal volume (Vt) = 10 ml/kg; setting 2 (S2): PC with the peak pressure (Pp) obtained in S1; setting 3 (S3): PC with the Pp set in the plateau pressure level obtained in S1; setting 4 (S4): PC with pressure values

determined with the Vt set at 10 ml/kg. All settings included PEEP of 5 cmH_2O and a respiratory rate of 15 rpm. The mean arterial pressure and PPV obtained in each ventilatory set are compared with each other using the paired Student *t* test.
Results Thirty-four patients were evaluated. The Pp was significantly lower in S3 and S4 ($P < 0.001$). The Vt was significantly greater in S2 ($P < 0.001$) with a parallel PPV increment at this time (S2) ($P < 0.001$). We found strong clinical concordance between S1 and S4 (accuracy = 98.1%, kappa = 0.93, $P < 0.001$). Significant but weaker concordance was found between S1 and S2 (accuracy = 91.2%, kappa = 0.80, $P < 0.001$) and between S1 and S3 (accuracy = 94.1%, kappa = 0.86, $P < 0.001$).
Conclusion The pressure-controlled mode should not cause important changes or significant clinical misinterpretation on PPV when compared with the volume-controlled mode during mechanical ventilation. These findings are especially evident when the pressure-controlled mode with the Vt limited at 10 ml/kg (S4 set) is used, demonstrated by the best accuracy on reproducing the PPV obtained during the volume-controlled mode.

P61

Application of a mechanical ventilation weaning protocol in a coronary unit

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Introduction Weaning is the transitional period when a patient under mechanical ventilation (MV) transfers to unassisted spontaneous breathing. Failure in the discontinuation of ventilatory support is associated with an increase in the number of complications. The use of standardized guidelines to carry out weaning is already well established in general ICUs. The conditions most commonly seen in the coronary unit of care (CUC), such as acute myocardial ischemia, left ventricular dysfunction and after coronary artery bypass grafting surgery, however, cause completely different hemodynamic and circulatory alterations to those observed in other types of severely ill patients. The effects of mechanical ventilation and of weaning should therefore be tested specifically for these patients.
Objective To compare MV weaning performed according to the application of a series of guidelines versus nonstandardized weaning in patients hospitalized in a CUC.
Method Initially a pilot study was performed with the aim of estimating the failure rate of MV weaning of patients hospitalized in the CUC. The results confirmed the necessity of improving the method then employed by the multidisciplinary team. Hence, 36 patients, who utilized MV for a period greater than 24 hours and were ready for weaning, were prospectively included in the study. The average age of the patients was 59.5 ± 16.4 years. The number of patients needed to include in the study was determined by calculating the sample size. The patients were then randomly placed into two groups: the experimental group (EG) and the control group (CG). In the EG, extubation was standardized according to the spontaneous respiratory test (SRT) of the American guidelines for weaning and was conducted by investigator in the study. For the CG, the SRT was also performed by the same investigator but without altering the extubation procedure employed, which was determined by the multidisciplinary team.
Results The groups were matched so there were no statistically significant differences in respect to gender, age, diagnoses at admission, ventilation parameters, physiological variables and APACHE II score. The time necessary for weaning was significantly shorter in the EG (2 hours and 24 minutes vs 70 hours; $P = 0.0009$). Sixteen patients in the CG were extubated, of which 11 (69%) did not fulfill the clinical criteria of the SRT. Of these 16 cases, 12 (75%) were reintubated and four (25%) were successfully weaned with all the successful cases among patients who passed the SRT. Of the 18 patients in the EG, 11 fulfilled the criteria for SRT and were extubated. Of these, eight (73%) cases were successful and three (27%) required reintubation. The reintubation rate was significantly higher in the CG (75% vs 25%; $P = 0.0001$).
Conclusion The application of the weaning MV guidelines in heart disease patients hospitalized in the CUC reduces the time necessary to complete weaning, increases the success rate and reduces the reintubation rates.

P62

Leukocyte–endothelial interactions in mesenteric microcirculation of rats under different positive end expiratory pressure levels

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Critical Care 2007, **11(Suppl 3):**P62 (doi: 10.1186/cc5849)

Introduction Mechanical ventilation (MV) with positive end expiratory pressure (PEEP) is widely used to improve oxygenation and to treat acute respiratory failure. PEEP can affect nearly every organ system of the body due to homeostatic interactions between the lungs and other body systems. Although essential in the management of critically ill patients, many deleterious side effects of positive pressure ventilation in the lungs and hemodynamics have been reported.
Methods This study investigated the effects of different PEEP levels on leukocyte–endothelial interactions in postcapillaric venules (13–23 μm diameter) at the mesentery by intravital microscopy and lung histomorphometry. Nineteen male Wistar rats were submitted to inhaled isofluorane anesthesia and MV with a tidal volume of 10 ml/kg, a respiratory rate of 70 breaths/min and $FiO_2 = 100\%$. Animals were randomly assigned to three groups: (1) PEEP0 ($n = 6$), no PEEP; (2) PEEP5, 5 cmH_2O ($n = 6$); and (3) PEEP10, 10 cmH_2O ($n = 7$).
Results After 2 hours of MV, there were no differences between PEEP0 and PEEP5 in the number of rolling leukocytes/10 minutes (127 ± 16 and 147 ± 26, respectively), adherent leukocytes/100 μm (3 ± 1 and 4 ± 2, respectively), migrated leukocytes into the perivascular tissue/5,000 μm^2 (2 ± 1 and 2 ± 1, respectively) and total white blood cells/mm^3 (11,730 ± 2,856 and 10,200 ± 2,222, respectively). However, the PEEP10 group presented an increased number of rolling leukocytes (188 ± 15 cells/10 min, $P < 0.05$), adherent leukocytes (8 ± 1 cells/100 μm, $P < 0.05$), migrated leukocytes (12 ± 1 cells/5,000 μm^2, $P < 0.05$) at the mesentery, and an increased number of total white blood cells (18,786 ± 4,207 cells/mm^3, $P < 0.05$), basically neutrophils. Lung morphometric analysis showed some edema at the perivascular tissue with no neutrophil infiltration in the parenchyma of the PEEP10 group compared with the other groups ($P < 0.05$). There were no changes in mean arterial blood pressure in all groups along the study period.
Conclusion After 2 hours of MV, PEEP = 10 cmH_2O induced an inflammatory response in rat mesenteric microcirculation.
Acknowledgements Funded by FAPESP and PRONEX.

P63

Does the cycling-off criteria of pressure support change the respiratory parameters in intensive care unit patients?

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Critical Care 2007, **11(Suppl 3):**P63 (doi: 10.1186/cc5850)

Introduction In modern mechanical ventilators it is possible to modify the flow cycling-off criteria of pressure support ventilation. The changes in the flow cycling-off criteria of pressure support ventilation can modify the synchrony between the mechanical and neural inspiration termination.
Objective To compare the effects of two different flow cycling-off criteria of pressure support ventilation on the respiratory parameters of ICU mechanically ventilated patients.
Methods We prospectively evaluated 20 intubated and mechanically ventilated adult ICU patients recovering from acute respiratory failure that could be comfortably ventilated with pressure support of 15 cmH_2O, PEEP of 5 cmH_2O and FIO_2 of 40%. The patients were ventilated at two different cycling-off criteria of pressure support of 25% and 40% of the peak inspiratory flow. We evaluated the respiratory rate (RR), expiratory tidal volume (V_{Te}), minute ventilation (MV), VCO_2, $VTCO_2$, $ETCO_2$, SpO_2, mean arterial pressure (MAP) and heart rate (HR).
Results Comparisons between different cycling-off values did not result in any statistically significant changes for the evaluated variables. There were no significant changes in blood pressure or HR under any experimental conditions (Table 1).
Conclusion The changes in cycling of criteria from 25% to 40% of the peak flow did not affect the respiratory parameters in mechanically ventilated patients in a mixed ICU.

P64

Influence of the pressure support slope on the respiratory parameters of intensive care unit patients

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Critical Care 2007, **11(Suppl 3):**P64 (doi: 10.1186/cc5851)

Introduction The possibility of changing the pressure slope during pressure support ventilation is a characteristic of the new generation of ICU ventilators. However, the influence of the slope changes on the respiratory parameters in ICU patients is still under investigation.
Objective To analyze the effects of two different pressure slopes (150 or 300 ms) of pressure support ventilation on the respiratory parameters of ICU mechanically ventilated patients.
Methods We prospectively evaluated ICU patients recovering from acute respiratory failure that could be comfortably ventilated with pressure support of 15 cmH_2O, PEEP of 5 cmH_2O and FIO_2 of 40%. The patients were submitted to two different pressure slopes of pressure support with 150 and 300 ms delays. The respiratory rate (RR), expiratory tidal volume (V_{Te}), minute ventilation (MV), VCO_2, $VTCO_2$, $ETCO_2$, SpO_2, mean arterial pressure (MAP) and heart rate (HR) were measured in these different conditions.
Results Comparisons between different pressure slopes did not result in any statistically significant changes for the evaluated variables. There were no significant changes in blood pressure or HR under any experimental conditions (Table 1).
Conclusion The slope changes from 150 to 300 ms of pressure support ventilation did not affect the respiratory parameters of mechanically ventilated ICU patients.

Table 1 (abstract P63)

Respiratory and hemodynamic variables measured with two cycling-off criteria (25% and 40%)

Slope (ms)	Cycling-off (%)	RR (beats/min)	V_{Te} (ml)	MV (l/min)	VCO_2 (l/min)	$VTCO_2$ (l/min)	$ETCO_2$ (l/min)	SpO_2 (%)	MAP (mmHg)	HR (beats/min)
0.15	25	18.2	587.5	10.6	193.6	11.2	27.8	98.8	96.4	83.4
0.15	40	19.2	560.7	10.0	183.7	10.88	28	98.8	96.2	83.9
	P value	0.21	0.31	0.2	0.19	0.45	0.83	1	0.92	0.44
0.30	25	19.4	588.4	10.5	192.8	11.54	28	98.7	98.2	83.6
0.30	40	19.7	565.2	10.2	187.8	10.61	28.2	98.9	97.7	83.6
	P value	0.74	0.2	0.5	0.50	0.17	0.65	0.08	0.78	0.9

Table 1 (abstract P64)

Respiratory and hemodynamic variables measured with two pressure slopes

Slope (ms)	Cycling-off (%)	RR (beats/min)	V_{Te} (ml)	MV (l/min)	VCO_2 (l/min)	$VTCO_2$ (l/min)	$ETCO_2$ (l/min)	SpO_2 (%)	MAP (mmHg)	HR (beats/min)
0.15	25	18.2	587.5	10.6	193.6	11.2	27.8	98.8	96.4	83.4
0.30	25	19.4	588.4	10.5	192.8	11.5	28	98.8	98.2	83.6
	P value	0.28	0.96	0.7	0.89	0.45	0.81	1	0.54	0.79
0.15	40	19.2	560.7	10.1	183.7	10.9	28	98.8	96.2	83.9
0.30	40	19.7	565.3	10.2	187.8	10.6	28.2	98.9	97.7	83.6
	P value	0.53	0.79	0.7	0.41	0.51	0.65	0.42	0.54	0.86

Table 1 (abstract P65)

Respiratory and hemodynamic variables measured with two different trigger systems

Trigger	Cycling-off (%)	RR (beats/min)	V_{Te} (ml)	MV (l/min)	VCO_2 (l/min)	$VTCO_2$ (l/min)	$ETCO_2$ (l/min)	SpO_2 (%)	MAP (mmHg)	HR (beats/min)
2 F	25%	17.3	582	9.4	181.4	11.37	28.4	98.7	96.9	83.2
−2 P	25%	17.9	573	10.3	195.1	11.55	28.5	98.6	93.8	83.3
	P value	0.38	0.56	0.03	0.14	0.72	0.77	0.19	0.08	0.88

P65

Flow or pressure triggering during pressure support ventilation?

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Critical Care 2007, **11(Suppl 3):**P65 (doi: 10.1186/cc5852)

Introduction Pressure and flow triggering have improved greatly in the new generation of ventilators. The routine use of one or the other in adult patients in the ICU setting is not yet well established.
Objective To compare the use of two trigger systems, pressure or flow, during pressure support ventilation on the respiratory parameters of ICU mechanically ventilated patients.
Methods We prospectively evaluated 20 mechanically ventilated adult ICU patients recovering from acute respiratory failure that could be ventilated with pressure support of 15 cmH_2O, PEEP of 5 cmH_2O and FIO_2 of 40%. The patients were ventilated by two different trigger systems during pressure support ventilation: a flow trigger of 2 l/min or a pressure trigger (−2 cmH_2O) during pressure support ventilation. We measured the respiratory rate (RR), expiratory tidal volume (V_{Te}), minute ventilation (MV), VCO_2, $VTCO_2$, $ETCO_2$, SpO_2, mean arterial pressure (MAP) and heart rate (HR) after 15 minutes in each study situation.
Results The respiratory and hemodynamic variables measured with the two different trigger systems during pressure support ventilation are presented in Table 1.
Conclusion During the pressure trigger ventilation the minute ventilation was greater than that in the flow triggering ventilation without affecting the other ventilatory parameters.

P66

Unplanned extubation in the intensive care unit: what are the consequences?

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Critical Care 2007, **11(Suppl 3):**P66 (doi: 10.1186/cc5853)

Purpose Unplanned extubation occurs in approximately 1–14% of patients receiving mechanical ventilation. These extubations have widely varying effects on morbidity and mortality. Patients who experience an unplanned extubation in the ICU may experience a survival benefit, provided that they do not require reintubation. Our objective was to document the incidence of unplanned extubations, to discern possible variables predictive of occurrence and outcome, and to formulate preventive measures. These data were compared with the medical literature.
Methods A retrospective study of all adult patients intubated in a 10-bed mixed (clinical and surgical) ICU for a 24-month period. The unplanned extubations rate was analyzed. Patients admitted with previous tracheostomy were excluded. Variables examined included the ventilator settings before self-extubation, use of sedatives, the RAMSAY scale, duration of intubation, arterial blood gases after self-extubation and Acute Physiology and Chronic Health Enquiry II (APACHE II) scores.
Results Of 203 adults intubated in the 24-month period, four (2%) unplanned extubations occurred. Only one was reintubated, and a few hours later the endotracheal tube was removed safely. Three patients were male. Two patients were admitted for trauma. The mean APACHE II score was 17.75 ± 10.47. The patients studied have a RAMSAY scale of 3 (two patients) or 2 (two patients). Unplanned extubation patients were ventilated for 4 ± 0.5 days (range, 4–5 days) before their episode of unplanned extubation. Pressure support (PSV) was the main ventilatory mode in this group. All patients received sedation propofol (two patients) or dexmetedomidine (two patients) during the self-extubation day. All patients were discharged from the ICU.
Conclusion Our data suggest that self-extubation is relatively rare in our institution compared with the literature. Trauma patients and the presence of pain should alarm the ICU team for this complication. Staff vigilance and a proper weaning period were some of the factors to which we attributed this low occurrence rate.

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P67

Less fentanyl requirement by enteral methadone decreases mechanical ventilation duration and intensive care unit length of stay

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Critical Care 2007, **11(Suppl 3):**P67 (doi: 10.1186/cc5854)

Background Patients exposed to long-term infusion or a high dose of opioids may develop physiological dependence and withdrawal symptoms during its 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 enteral methadone can reduce fentanyl requirements and, thereby, decrease mechanical ventilation duration and ICU LOS.
Methods A prospective, randomized and double-blind study involving patients fulfilling criteria for 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: for the 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 in the CT group enteral placebo. 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. The Student *t* test was used to compare groups in the following criteria: (1) days under mechanical ventilation and (2) ICU LOS.
Results Sixteen patients were included, seven in the MET group and nine in the CT group. The LOS was significantly lower in the MET group (13 ± 3 vs 27 ± 13 days, $P < 0.02$). Days under mechanical ventilation were also significantly decreased in patients from the MET group (4 ± 0.8 vs 20 ± 21 days, $P < 0.05$).
Conclusion These preliminary data show that, by replacing fentanyl infusion with methadone through the enteral route, it is possible to decrease mechanical ventilation duration as well as the ICU length of stay.

P68

Bilevel plus PSV and nitric oxide as an alternative ventilatory strategy in acute respiratory distress syndrome patients

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Critical Care 2007, **11(Suppl 3):**P68 (doi: 10.1186/cc5855)

The protective ventilatory strategy provided by usual ventilatory modes is a cornerstone factor to determine prognosis in acute respiratory distress syndrome (ARDS). However, there are situations where alternative strategies must be used.
We describe three patients, all females with a mean age of 76 ± 6 years, admitted to the ICU presenting ARDS related to community-acquired pneumonia (two patients) and pneumonia secondary to gastric aspiration (one patient). The mean APACHE II score was 25 ± 2. The ventilator used was the Puritan-Bennet 840. The mean static compliance (Cst), $paCO_2$ and PaO_2/FiO_2 ratio after orotracheal intubation in the VCV mode and a PEEP level of 10 cmH_2O were 24.3 ± 3.1, 48 ± 4 mmHg and 120.6 ± 46, respectively. All patients presented septic shock and were monitored with a Swan–Ganz catheter. The initial mean pulmonary artery pressure was 56 ± 4 mmHg on vasopressors to maintain a mean systemic arterial pressure above 65 mmHg. The patients were submitted to a recruitment maneuver using a pressure gradient between the PEEP and inspiratory pressure of 15 cmH_2O during 2 minutes each step to a limit of 60 cmH_2O, and after that the mean level of PEEP used was 20 ± 3 cmH_2O and the ventilatory mode was switched to Bilevel plus PSV (derived mode from APRV). The mean Vt/kg used was 5.6 ± 0.8 ml/kg, with an inspiratory pressure level of 30 ± 2 cmH_2O and I:E ratio of 1:1. The mean PaO_2/FiO_2 ratio was raised to 153 ± 25 (26.8%). Nitric oxide (NO) was started and the mean concentration used was 37 ± 3 ppm. After 4 hours, the mean pulmonary artery pressure and $PaCO_2$ decreased to 40 ± 4 mmHg (28.6%) and 42 ± 2 mmHg (12.5%), respectively, and the PaO_2/FiO_2 ratio increased to 268 ± 22 (122.2%). After 24 hours NO was decreased to 18 ± 4 ppm, and was discontinued 12 hours after. Two patients were successfully weaned from mechanical ventilation after 8 and 10 days, respectively, and discharged home afterwards. One patient died.
This series of cases was the first that depicted the Bilevel plus PSV mode wholly with NO to control pulmonary hypertension and ARDS. These interventions seems to be beneficial and feasible to support critically ill patients, mainly those who failed to respond to recruitment maneuver and conventional ventilatory modality.

P69

Evaluation of a weaning protocol in an intensive care unit

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Critical Care 2007, **11(Suppl 3):**P69 (doi: 10.1186/cc5856)

Objective Current evidence suggests that patients spend about 41% of their time in mechanical ventilation (MV) with weaning. The application of weaning protocols brings better results over the treatment based upon simple observation of the patient, reducing the time of MV and its associated complications. The goal of this study was to evaluate the results from the application of a weaning protocol executed by the Physical Therapy team, aiming to reduce the weaning length and the MV length.
Methods Fifty-eight inpatients were prospectively studied at the Clinica São Vicente ICU, from June 2005 to February 2007. These patients were ventilated through an endotracheal tube and were in MV ≥48 hours. The ventilatory status of these patients was evaluated daily and after they fitted the protocol we started the weaning program, using pressure support ventilation (PSV). Patients that tolerated one spontaneous ventilation attempt were considered eligible for extubation, considering PSV of 7 cmH_2O and PEEP of 4 cmH_2O for 30 minutes. Higher levels of PSV and PEEP were accepted for patients with chronic obstructive pulmonary disease (COPD).
Measurements and results The mean age of the patients was 66.25 years (SD ± 20.21), with 52.6% males and 47.4% females. The average time of MV was 6.44 days (SD ± 3.17) and weaning length was 1.52 days (SD ± 1.09). The indication for an artificial airway and MV was 15 postoperative patients (26.3%), 33 patients with acute respiratory distress (57.9%) and nine neurology affected patents (15.8%). At the extubation time the average PSV was 7.81 (SD ± 1.30) and the average PEEP was 4.54 (SD ± 1.00). Forty-seven patients were successful (82.5%), while 10 needed reintubation (17.5%). There was no correlation between nonsuccess and age, COPD, MV causes or the Tobin index, considered a predictive index of success in the literature. Regarding the maximal inspiratory pressure, there was a statistically significant correlation ($P = 0.01$).
Conclusion The time spent to weaning in our study was shorter than the literature description, and the reintubation rate was compatible with anterior publishing. The study showed that the institution of protocols can minimize the weaning length and the MV length in ICUs.

P70

Low tidal volume in association with low positive end expiratory pressure in acute respiratory distress syndrome: a suboptimal strategy? A computed tomography-based analysis

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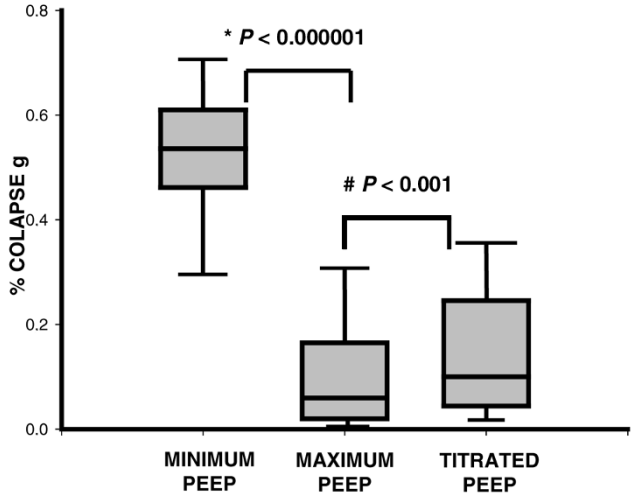
Critical Care 2007, **11(Suppl 3):**P70 (doi: 10.1186/cc5857)

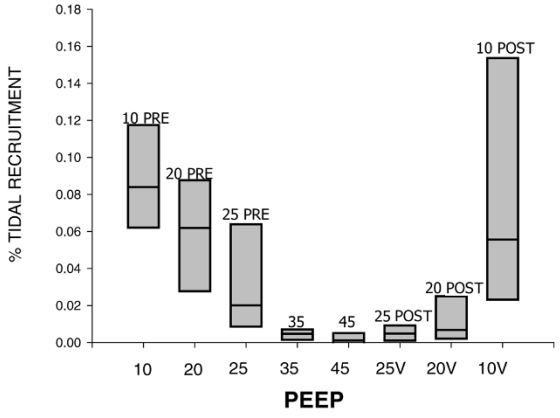
Introduction In a recent trial, ARDSNet investigators found no benefit with the association of an intermediary PEEP to a low-tidal-volume (6 ml/kg) ventilatory strategy. The goal of maximal recruitment strategy (MRS) guided by thoracic CT scan is to minimize alveolar collapse and tidal recruitment (TR).
Objectives To analyze the amount of lung collapse in ARDS patients ventilated in three situations: A – minimum PEEP (10–20 cmH_2O), B – maximum PEEP (35–50 cmH_2O) and C – titrated PEEP (15–25 cmH_2O) after maximal recruitment. To analyze the occurrence of regional tidal recruitment during the MRS and in two situations: minimum PEEP and titrated PEEP.
Methods Thirty-one ARDS patients under mechanical ventilation were transported to the CT room and sequences of CT scans at expiratory and inspiratory pause were performed during the recruitment maneuver (RM). The RM consisted of 2-minute steps of tidal ventilation with fixed $\Delta PCV = 15$ cmH_2O and progressive PEEP levels (10–50–30–10 cmH_2O), RR = 15, I:E = 1:1, and $FiO_2 = 1.0$. CT images between the carina and the diaphragm were performed in all steps of the RM. The amount of lung parenchyma collapse as well as potentially recruitable lung were calculated and compared.
The lungs were divided into four regions according to the sternum–vertebral axis (one anterior and four posterior). The amount of collapsed tissue as well as the difference of collapsed tissue between expiration and inspiration (TR) were calculated and compared during all phases of the protocol.
Results See Figures 1, 2 and 3.

Figure 1 (abstract P70)



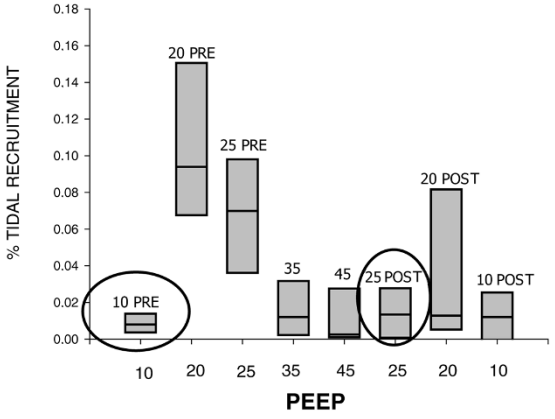
*Data expressed as the median and 25–75 percentiles.

Figure 2 (abstract P70)



Tidal recruitment region 3.

Figure 3 (abstract P70)



Tidal recruitment region 4.

Conclusion MRS and PEEP at 25 cmH_2O were able to minimize collapse and TR, while ventilation with PEEP 10 cmH_2O did not prevent TR. This finding suggests that low PEEP, even associated with low volumes and pressures, is a suboptimal protective strategy.

P71

Maximal recruitment strategy guided by thoracic computed tomography scan in acute respiratory distress syndrome patients: preliminary results of a clinical study

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Critical Care 2007, **11(Suppl 3):**P71 (doi: 10.1186/cc5858)

Introduction There is great controversy concerning protective ventilatory strategy in ARDS. Recruitment maneuvers and PEEP

titration sufficient to avoid collapse and tidal recruitment in the lung are the major goals of the maximal recruitment strategy (MRS) guided by computed tomography (CT).

Objectives To evaluate the gas exchange response before and after MRS. To describe the ventilator parameters set by CT image. To describe patient characteristics at entry and the 7-day SOFA score evolution after PEEP titration. To evaluate possible complications related to transportations and barotrauma.

Methods Forty-five patients with the diagnosis of ARDS were transported to the CT room and submitted to the MRS, which consisted of 2-min steps of tidal ventilation with a fixed ΔPCV of 15 cmH_2O and progressive PEEP levels (10–45–25–10 cmH_2O), RR = 10, I:E = 1:1, and FiO_2 = 1.0. Opening (recruitment) and closing (PEEP titration) pressures were determined according to the least amount of collapse observed at the CT image, and were used to ventilate the patients afterward. PEEP was maintained as set by CT for 48 hours.

Results Clinical and laboratory data are presented in Table 1. There were no complications due to transportation to the CT room, and no barotrauma was detected.

Table 1 (abstract P71)

Clinical and laboratory data	
Age	48.6 ± 17.2*
APACHE II score protocol day	19.9 ± 3.6*
SOFA score protocol day	9,6 ± 3,4
Maximal recruitment pressure	59.0 ± 5.2*
Titrated PEEP	24.2 ± 3.4*
Maximal plateau pressure	40.1 ± 4.8*
PaO_2/FiO_2 pre MRS	131.2 ± 43.4*,#
PaO_2/FiO_2 post MRS	315.7 ± 102.3*,#
Primary ARDS	82%
Mortality	28%

*Data expressed as the mean ± SD. #$P < 0.0001$.

Conclusion MRS was well tolerated in this series of patients, rendering the gas distribution through the lung more homogeneous, improving gas exchange and being related to low mortality. A RCT to compare MRS with the strategy proposed by the ARDSNet investigators is necessary.

Acknowledgement Funded by IEP Hospital Israelita Albert Einstein.

P72

Bi-level positive airway pressure produces an increase of sympathetic response in healthy young men

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Critical Care 2007, **11(Suppl 3):**P72 (doi: 10.1186/cc5859)

Objective To evaluate healthy young men's heart rate variability with and without noninvasive positive pressure ventilation (NPPV).

Methods Eleven healthy men (22 ± 2.2 years) were evaluated. The heart rate and R–R intervals (R-Ri) were recorded in a sitting position during spontaneous breathing and NPPV application (600 min each). The NPPV was delivered using a bi-level positive airway pressure (BiPAP) applied via a nasal mask with inspiratory and expiratory levels of 20 and 13 cmH_2O, respectively. The heart rate and its variability were analyzed in the time domain by the RMSSD (root mean square of the squares of the differences between successive R–Ri) and SDNN (standard deviation of all R–Ri) indexes of R–Ri (ms); and in the frequency domain by the low-frequency (LF) and high-frequency (HF), in normalized units (nu), and the LF/HF ratio. For statistical analysis, the paired *t* test was used with a level of significance of 5%.

Results No significant differences were observed in the time domain between two conditions. In the frequency domain, however, the LF bands presented significant higher values (0.6 ± 0.2 vs 0.8 ± 0.2) and HF bands lower values (0.4 ± 0.2 vs 0.2 ± 0.2) during NPPV compared with spontaneous breathing.

Conclusion The NPPV application produced autonomic modulation adjustments, with a parasympathetic cardiac activity reduction and a sympathetic increase in healthy male youngsters.

P73

Profile of deglutition speech evaluation in an intensive care unit

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Critical Care 2007, **11(Suppl 3):**P73 (doi: 10.1186/cc5860)

Objective To characterize critically ill patients evaluated by a speech deglutition therapist.

Methods The files of 96 patients evaluated by the speech therapy service in the ICU from July 2005 to July 2006 were analyzed, focusing on data about age, gender, main diagnosis (admission category), alternative feeding ways (presence or not), and severity of dysphagia at the moment of evaluation.

Results From July 2005 to July 2006, 96 evaluations were performed, enabling identification of cases through 89 digitalized files. In the 89 patients, 58 (65%) were male and 31 (35%) were female, with ages varying from 14 to 96 years (average 62 years). As for the main diagnosis, we found: (1%) greatly burned, one nephrologic disorder (1%), seven (7.8%) oncologic, eight (8.9%) gastroenterologic, nine (10.1%) cardiologic, 14 (15.7%) pneumologic disorder, 23 (25.8%) post-liver transplant, and 27 (30.3%) neurologic disorder. In 89 evaluations, 72 (80%) had alternative feeding ways, (nasogastric tube, gastrostomy or parenteral nutrition) and 17 (20%) did not. According to the adapted classification of O'Neil and colleagues' scale [1] (used in our service), we found that 21 (24%) patients had functional deglutition, 34 (38.2%) mild dysphagia, six (6.7%) mild/moderate dysphagia, 13 (14.6%) moderate dysphagia, seven (7.8%) moderate/severe dysphagia, and eight (8.9%) severe dysphagia.

Conclusion We observed that the major amount of patients requesting speech therapist evaluation in the ICU had neurologic or pneumologic origin diseases or were post-liver transplants patients (65% male patients and 80.8% with alternative feeding methods). In 68 (76.4%) of 89 cases, some degree of dysphagia was detected.

We would like to emphasize that speech deglutition evaluation contributed to identifying dysphagia and consequently was indicated to begin the rehabilitation process or to reintroduce oral feeding with safety. More findings of this analysis will be discussed further.

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P74

Epidemiology of patients admitted to a chronic ventilatory care unit

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Critical Care 2007, **11(Suppl 3):**P74 (doi: 10.1186/cc5861)

Introduction The evolution of intensive care and its results related to the survival of very critically ill patients produce a group of survivors characterized by complex co-morbidities and prolonged dependence on mechanical ventilation (more than 21 days). These survivors require specialized intensive care support for improved results and better resource allocation.
Objective To describe the epidemiologic profile of patients admitted to a tertiary care hospital's chronic ventilatory care unit.
Materials and methods In this retrospective study we evaluated each patient's admission form during the period between January 2006 and February 2007 in a seven-bed chronic ventilatory care unit. The collected data consist of: sex, age, APACHE II score, diagnosis, frequency and type of infection, antibiotic utilization, frequency of hemodialysis, ventilatory parameters, length of stay (LOS), frequency of transference to the ICU and mortality. Results are presented as the mean ± SD and percentage.
Results Sixty-eight patients were enrolled in the study. There were 35 females and 33 males. The mean age and APACHE II score were 74.99 ± 13.97 years and 14.46 ± 5.16, respectively. The main diagnosis was chronic obstructive pulmonary disease (COPD) (42.64%). Pneumonia associated with mechanical ventilation (PAV) was the main source of infection (38.2%), followed by urinary tract infection (2.9%) and bloodstream infection (2.9%). A total of 57.4% of patients were using intravenous antibiotics; 67.64% of patients were colonized with multidrug-resistant bacteria; and 20.58% of patients were on hemodialysis. Noninvasive mechanical ventilation was used in 7.4% of patients. In total, 86.76% of patients were tracheotomized. The most frequent ventilatory mode used was continuous positive airway pressure + pressure support ventilation in 88.2% of patients. The mean inspiratory pressure and PEEP used were 21 ± 3.41 cmH_2O and 8.41 ± 2.03 cmH_2O, respectively. A total 29.41% of patients needed to be transferred to the ICU. The mean LOS was 27.76 ± 25.39 days. The mortality rate was 16.17%.
Conclusion COPD on prolonged mechanical ventilation was the most frequent cause of admission. PAV was the most frequent source of infection. More than one-half of patients were using antibiotics. There was a high prevalence of multidrug-resistant bacteria colonizing patients. Hemodialysis was used in one-fifth of patients. The majority of patients were ventilated invasively and by spontaneous mode. Almost one-third of patients had to be transferred to the ICU. There was a high LOS, explained by the chronicity of disease. The mortality was less than expected from the APACHE II score.

Neurology

P75

Applicability of four sedation/agitation scales in Portuguese

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Critical Care 2007, **11(Suppl 3):**P75 (doi: 10.1186/cc5862)

Introduction Sedation scales are widely used to guide sedation protocols in the ICU. However, no scale in Portuguese has ever been evaluated.
Methods Four sedation/agitation scales (RASS, Glasgow Coma Score, Ramsay and SAS) were translated into Portuguese and were applied to 29 patients by four different members of the critical care team (a nurse, a physiotherapist, a physician and a resident). Interobserver agreement was evaluated by weighted kappa.
Results See Table 1.
Conclusion All scales had a substantial agreement, but the RASS and SAS had the best agreement. We believe that the Portuguese version of these two scales can be used in the ICU to evaluate patients' sedation and agitation.

P76

Hemicraniectomy for large middle cerebral artery territory infarction: outcome and clinical variables in 10 patients

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Critical Care 2007, **11(Suppl 3):**P76 (doi: 10.1186/cc5863)

Background Historically, large space-occupying middle cerebral artery (MCA) infarction carries a mortality of 50–80%. Several studies have shown that decompressive hemicraniectomy can decrease mortality, morbidity and improve functional outcome, especially in younger patients. Other important variables are the time of decompressive hemicraniectomy and the severity of neurologic damage.
Methods A retrospective review of clinical variables of 10 patients who underwent decompressive craniectomy for space-occupying MCA infarction, from July 2002 to October 2003. Clinical outcome was evaluated using the Glasgow Outcome Scale (GOS). Statistical analysis was performed by chi-square and proportion analysis.
Results There were seven males and three females with a mean age of 56.6 years (range 38–73 years). The time between hospital admission and craniectomy was 4 days (range 1–13 days). The duration of orotracheal intubation was 8 days (range 5–12 days). The length of stay in the ICU was 14 days (range 8–22 days). Five patients were submitted to hypothermia and four used thiopental. GOS scores at 6 months were: one patient with GOS 1; three

Table 1 (abstract P75)

Comparison/weighted kappa	RASS (95% confidence interval)	Glasgow (95% confidence interval)	Ramsay (95% confidence interval)	SAS (95% confidence interval)
Nurse vs physiotherapist	0.86 (0.77–0.94)	0.81 (0.67–0.94)	0.83 (0.71–0.94)	0.83 (0.67–0.97)
Nurse vs physician	0.89 (0.81–0.97)	0.72 (0.56–0.89)	0.82 (0.69–0.96)	0.89 (0.77–0.99)
Nurse vs resident	0.85 (0.77–0.94)	0.86 (0.74–0.98)	0.75 (0.61–0.89)	0.86 (0.73–0.99)
Physiotherapist vs physician	0.87 (0.79–0.96)	0.82 (0.68–0.95)	0.68 (0.50–0.87)	0.87 (0.74–0.99)
Physiotherapist vs resident	0.86 (0.78–0.94)	0.86 (0.76–0.95)	0.78 (0.64–0.92)	0.90 (0.80–0.99)
Physician vs resident	0.82 (0.73–0.92)	0.73 (0.56–0.89)	0.82 (0.70–0.94)	0.90 (0.78–0.99)

Table 1 (abstract P76)

Clinical variables

	GOS 4–5	GOS 1–3	Total	*P*
Patients	6 (60%)	4 (40%)	10	0.97
Age (average)	47 (8.3)	70.75 (3.2)		<0.006
Male	5	2	7	
Female	1	2	3	
Glasgow at admission	9 to 12	6 to 11		0.22
Herniation	1	1	2	
Absence of herniation	5	3	8	
Territory (right MCA)	4	1	5	0.78
Territory (left MCA)	1	3	4	
Craniectomy performed <48 hours	4	2	3	0.52
Craniectomy performed >48 hours	2	2	4	
Hypothermia	4	1	5	0.52
Normothermia	2	3	5	
Thiopental (+)	3	1		0.50
Thiopental (+)	3	3		
Noradrenaline (+)	5	3		1.0
Noradrenaline (–)	1	1		

patients with GOS 3; four patients with GOS 4; and two patients with GOS 5.

Conclusion This small group showed low mortality and good functional outcome. Age was the unique variable associated with a good outcome.

P77

Implementation of the Protocol of Early Treatment of Acute Ischemic Stroke established for the first time at a public hospital in Rio de Janeiro

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Critical Care 2007, **11(Suppl 3):**P77 (doi: 10.1186/cc5864)

Introduction Cerebrovascular diseases constitute an important chapter in medicine, and amongst them acute ischemic stroke (AIS) deserves special attention since it possesses few therapeutic options, which effectively reduce the high mortality and morbidity rates. Thrombolytic therapy appears an important option, despite the narrow therapeutic window, and its use is reinforced by the World Health Organization and Brazilian Society of Cerebrovascular diseases (2001) and by extensive scientific evidence. However, there are still few Brazilian public health units that have looked to adjusting their structure for the accomplishment of treatment.

Objective To analyze the cases from the first 12 months after implementation of the protocol for early treatment of AIS at a large public hospital in Rio de Janeiro.

Methods An observational series study was conducted including cases of all patients admitted to an ICU with signs of stroke in an interval of up to 3 hours after the start of the symptoms, with a multidisciplinary team specially trained at Albert Einstein Hospital and Mãe de Deus Hospital.

Results During the period of study, 24 patients were admitted with signs of stroke inside the 3-hour period. Amongst them, four presented with signs of hemorrhagic stroke at computerized tomography, while the remaining 17 did not possess evidence of bleeding, suggesting AIS. Thrombolytic therapy, in accordance with the protocol, was implemented in 17 of the cases, leaving three excluded from the thrombolytic protocol – one of these three due to the family's refusal to go through with the protocol, another one for possessing a history of AIS in less than 3 months and the last one due to reversion of the symptoms. Amongst the patients that underwent thrombolysis, the mean Glasgow Coma Scale was 10.4 ± 1.5 and mean National Institute of Health Stroke Scale (NIHSS) was 12.6 ± 5. There were two casualties, including a patient that presented with hemorrhagic transformation. Three did not show significant clinical improvement; however, 12 presented with important improvement, with force restoration and aphasia involution according to the NIHSS, modified Ranking, and Barthel's Index.

Conclusion Implementation of the protocol for early treatment of the AIS in a large public emergency hospital assumes a series of challenges, but constitutes the main entrance to patient who are victims of acute stroke. During implementation and training there was a need for greater consciousness and involvement of all sectors in order to make the process effective: starting at prehospital until ICU admittance, with an exclusive bed reserved for AIS. Facing the impressive number of stroke victims, there are few patients who could benefit from treatment. In spite of this small sample size, among the deceased patients one presented with an AIS located in the brainstem and the other suffered nonsurgical bleeding with complications due to severe prior coronary artery disease. With the consolidation and divulging of the protocol, the number of beneficiaries might be greater.

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P78

Delirium impact in a chronic ventilatory care unit

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Critical Care 2007, **11(Suppl 3):**P78 (doi: 10.1186/cc5865)

Background Delirium has been associated with poor hospital outcomes, including increased morbidity and mortality, prolonged length of stay and functional decline. Recently published clinical practice guidelines from the Society of Critical Care Medicine recommended monitoring for the presence of delirium in all ICU patients, but it has never before been assessed in a group of chronically ventilated patients.

Objectives To compare the usual clinical assessment for delirium and the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU), to describe its characteristics in chronically ventilated patients and to evaluate the incidence, associated clinical conditions, length of stay and late mortality.

Patients and methods A prospective observational study. Delirium was evaluated on a daily basis and followed by a group of previously trained nurses. Twenty-one tracheotomized, mechanically ventilated, awake and cooperative subjects admitted to the

ventilatory care unit (VCU) during a period of 12 months were included in the study protocol. The CAM-ICU tool was applied 5 days a week at same time in the afternoon and its data were compared with intensivist and psychiatric evaluations. The results are expressed as the mean ± standard deviation. The chi-square test was used to evaluate differences in proportions; $P < 0.05$ was considered statistically significant.

Results Seven females and 14 males were studied. Delirium occurred in 10 (47%) patients during the VCU stay, and the CAM-ICU tool detected 65.38% of it. The mean onset was 14.22 ± 17.27 days and the mean duration was 1.74 ± 0.92 days. There was no difference related to age and APACHE II score between patients with and without delirium: 75.10 vs 67.36 ($P = 0.082$) and 16.40 vs 16.36 ($P = 0.81$), respectively. There was a strong association between new infection and delirium diagnosed with the CAM-ICU in spite of a significant difference between the mean titulated C reactive protein level and insulin dose used during the study with delirium patients (D group) and patients with no delirium (ND group): 9.09 ± 5.30 vs 7.10 ± 3.9 and 61.96 ± 77.7 vs 57.69 ± 73.89, respectively. All patients with sensorial deficit presented delirium. The hospital mortality and length of stay did not show any statistically significant difference between both groups.

Conclusion The incidence of delirium in this study was less than expected. The CAM-ICU demonstrated inferior sensibility to that described in the literature. The presence of delirium was related to early onset of new infection despite normal inflammatory markers. The main limitation of this study was the low number of patients enrolled.

P79

Cerebral salt-wasting syndrome in children: a case report

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Hyponatremia is an electrolyte disturbance presenting the potential for morbidity and mortality in patients with neurological complications secondary to brain injury, trauma-related or not. In such patients, hyponatremia is frequently accompanied by the syndrome of inappropriate secretion of antidiuretic hormone (SIADH). However, in rare cases, hyponatremia can be accompanied by a controversial pathology known as cerebral salt-wasting syndrome (CSWS), which is generally associated with subarachnoid hemorrhage in adults. In this report, we describe the clinical evolution and treatment of a 47-month-old male patient with ventriculo-peritoneal shunt resulting from congenital hydrocephalus. The patient had developed severe hyponatremia (121 mEq/l) accompanied by signs of dehydration, intracranial hypertension and hypouricemia, as well as elevated urinary sodium and osmolality. In addition to intravenous fluid replacement and infusion of 3% saline, high levels of sodium replacement (up to 25 mEq/kg/day), together with fluorocortisone administration, were required in order to maintain appropriate serum levels of sodium. The diagnosis of CSWS was confirmed on the basis of the high serum level of atrial natriuretic peptide. The patient showed progressive improvement and resolution of the condition after confirmation of intracranial hypertension and clearance of the ventriculo-peritoneal shunt obstruction. We emphasize the importance of recognizing CSWS in patients with hyponatremia accompanied by central nervous system disturbances, as well as the differential diagnosis with SSIADH.

Nutrition/metabolism

P80

Mortality-associated factors in elderly patients with septic shock and severe sepsis

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Critical Care 2007, **11(Suppl 3):**P80 (doi: 10.1186/cc5867)

Background Some beneficial effects of early enteral feeding (EF) have been reported for the immune response, the infectious complications rate, multiple organ failure and antibiotic usage and the length of hospital stay.

Objective To determine the relationship among early feeding practice, mortality and multiple organ failure, considering the prognostic indices such as APACHE II score, SOFA score, and plasma concentration of albumin, CRP, glucose and lactate.

Design A cohort study in a general ICU using 65 medical patients requiring intensive care after diagnosis of septic shock or severe sepsis were studied during 18 consecutive months.

Methods Enteral tube feeding was initiated as soon as possible, considering the absence of abdominal distention, gastric stasis, hyperglycemia >300 mg or clinical signs of severe hypoxia. Over the first day in the ICU, blood levels of albumin, CRP, glucose and lactate were evaluated and the APACHE and SOFA scores were performed.

Results The mean age was 83 ± 8.2 years, the APACHE score was 19.4 ± 6.2, the SOFA score was 9.31 ± 2.9 and the period of time to initiate EF (tEF) was 0.97 ± 1.1 days. The seriousness of clinical conditions was demonstrated by a death rate of 50.7% and this was not reduced either by tEF nor the use of EF itself. However, it was related to the APACHE II score ($P = 0.17$), the SOFA score over the first day ($P = 0.04$), the length of stay in the ICU (5.1 ± 8.9 days) ($P = 0.002$), the initial diagnosis of septic shock ($P = 0.01$) and number of organ failures. The difficulty of initiating EF was not associated with the APACHE or SOFA scores over the first day, blood lactate levels, CRP, albumin or number of organ failures. However, hyperglycemia was a factor that retarded the initiation of EF ($P = 0.02$). It was not possible to initiate EF in 46.1% of patients due to several factors. Pulmonary sepsis was associated with the number of organ failures. Urinary sepsis was not associated with such failures.

Conclusion Septic shock has a high mortality associated with multiple organ failure. EF, even when early tolerated in patients with severe sepsis or septic shock, was not able to reduce mortality or the number of organ failures. Hyperglycemia was a retarding factor in the initiation of enteral nutrition.

P81

Impact of early enteral nutrition on the morbi-mortality of patients with severe acute pancreatitis

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Critical Care 2007, **11(Suppl 3):**P81 (doi: 10.1186/cc5868)

Background and objective For many years total parenteral nutrition was considered the mainstay of nutritional support in patients with severe acute pancreatitis [1]. Recent studies with a limited number of cases have shown that early enteral nutrition is feasible and associated with a reduction of morbidity in these patients [2,3]. The objective of this study was to evaluate the

impact of early enteral nutrition on the morbi-mortality of patients with severe acute pancreatitis.

Methods We compared two groups of patients with acute severe pancreatitis admitted to a general ICU in the period from 1994 to 2004. Patients admitted between 1994 and August 1999 systematically received total parenteral nutrition (TPN), while those admitted from September 1999 to December 2004 received enteral nutrition through a nasojejunal tube. All other aspects of treatment were similar between the two groups.

Results Forty-four patients were included in the study. Eighteen of them, admitted between 1994 and 1999, received parenteral nutrition (TPN group), and 26 patients admitted between 1999 and 2004 received enteral nutrition (EN group). The two groups were comparable regarding age, gender, etiology of pancreatitis and APACHE III score. Thirteen patients were qualified as 'C' of Balthazar (seven in the TPN group and six in the EN group). Twenty-seven patients were qualified as 'D' or 'E' (eight in the TPN group and 19 in the EN group). Severe pancreatic necrosis was seen in 14 patients (three in the TPN group and 11 in the EN group). Morbidity and mortality data are presented in Table 1.

Table 1 (abstract P81)

Morbidity and mortality

	EN group ($n = 26$)	TPN group ($n = 18$)	*P* value
ICU stay (days), median (interquartile range)	11.5 (9.7–20.5)	15.5 (12–25)	0.07
Surgical interventions	1	2	
Acute respiratory failure	1	4	0.07 (RR = 0.17; 95% CI = 0.021–1.42)
Hemodynamic dysfunction	1	4	0.07 (RR = 0.17; 95% CI = 0.021–1.42)
Pancreatic abscess	0	2	0.6
Pseudocyst	3	1	0.6 (RR = 2.07; 95% CI = 0.23–18.40)
Sepsis	6	9	0.06 (RR = 0.46; 95% CI = 0.19–1.06)
Mortality	0	3	0.06

Conclusion This study contributes to reinforcing the conclusions from other authors that have shown a trend towards the reduction of morbi-mortality of patients with acute pancreatitis that received early enteral nutrition.

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P82

Intensive insulin therapy versus glycemic control in critically ill patients: a prospective controlled trial

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Critical Care 2007, **11(Suppl 3):**P82 (doi: 10.1186/cc5869)

Background and objective Intensive insulin therapy significantly reduced morbi-mortality in a population of critically ill surgical patients [1]. The results in medical ICU patients were less clear [2]. The objective of this study was to determine whether intensive insulin therapy is more safe and efficient than a glycemic control strategy without the use of high doses of insulin in a heterogeneous population of critically ill adult patients.

Methods Included in the study were all adult patients admitted from 1 July 2004 to 31 December 2006 to a 20-bed multidisciplinary ICU of a general hospital and to an 11-bed trauma center ICU that had at least two blood glucose levels above 150 mg/dl from three measurements obtained in the first 12 hours after admission. Patients were randomly assigned to strict normalization of blood glucose levels (80–120 mg/dl) with the use of insulin infusion or to glycemic control through glucose-free venous hydration, hypoglycidic nutritional formula and subcutaneous insulin if the blood glucose level was higher than 180 mg/dl in the measurements taken every 6 hours.

Results Three hundred and thirty-seven patients were enrolled in the study. At admission the two groups were comparable regarding age, sex, APACHE III score, prevalence of diabetes mellitus and nosologies. Patients in group 1 ($n = 168$) received 52 (35–74.5) units regular insulin per day, while group 2 ($n = 169$) received 2 (0–6.5) units insulin/day ($P < 0.001$). The median glucose level during treatment was 133.6 (119.7–153.3) mg/dl in group 1 and was 144 (123–174.2) mg/dl in group 2 ($P = 0.003$). ICU mortality was 22.6% in group 1 and 25.0% in group 2 ($P = 0.6$). There was no difference between the two groups regarding length of ICU stay, infectious complications and organ dysfunctions. Hypoglycemia occurred in 27 patients (16%) in group 1 and six patients (3.5%) in group 2 ($P < 0.001$). No permanent cognitive defects were recorded in patients with hypoglycemia. When a subgroup of patients who stayed in the ICU for more than 5 days was analyzed, although a small trend toward mortality reduction was noted (25.5% in group 1 and 30.3% in group 2; relative reduction of 16%), this difference did not reach statistical significance.

Conclusion This study demonstrates the need to use protocols to control hyperglycemia that allows a less strict blood glucose control. With this approach it is possible to limit the hazards of hypoglycemia and, at the same time, to maintain the benefits of glycemic control. With such an approach it would be possible to extend the benefits of blood glucose control to ward patients.

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P83

Intensive insulin therapy versus conventional glycemic control in patients with acute neurological injury: a prospective controlled trial

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Critical Care 2007, **11(Suppl 3):**P83 (doi: 10.1186/cc5870)

Objective To compare intensive insulin therapy with conventional glycemic control in patients with acute neurological injury, evaluating neurological outcome and morbi-mortality.

Methods Patients with two glycemias above 150 mg/dl 12 hours after admission were randomized to receive intensive insulin therapy (G1) or conventional treatment (G2). We evaluated a

subgroup of patients with acute brain injury from July 2004 to June 2006.
Results G1 patients ($n = 31$) received 70.5 (45.1–87.5) units insulin/day while G2 patients ($n = 19$) received 2 (0.6–14.1) units/day ($P < 0.0001$). The median glycemia was comparable in both groups ($P = 0.16$). Hypoglycemia occurred in two patients (6.4%) in G1 and in one patient (5.8%) in G2 ($P = 1.0$). Mortality in G1 was 25.8%, and it was 35.2% in G2 (relative reduction of 27%). Neurological outcome was similar in both groups.
Conclusion A less strict intensive insulin therapy can reduce hypoglycemia and still maintain its benefits.

P84

A computer-guided insulin protocol causes less hypoglycemia than a strict glycemic control protocol: a randomized controlled trial

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Critical Care 2007, **11(Suppl 3):**P84 (doi: 10.1186/cc5871)

Introduction Strict glycemic control has been recommended for critically ill patients. However, its implementation may face difficulties with increased nursing workload, inadequate glucose control and higher risk of hypoglycemia.
Objective We report the results of a randomized controlled trial to evaluate the efficacy and safety of three insulin algorithms in medical ICU (MICU) patients.
Methods MICU patients with at least one blood glucose ≥150 mg/dl and who were on mechanical ventilation, or had SIRS, or were admitted because of trauma or burn were randomized to one of the following treatments: algorithm A – continuous insulin infusion with adjustments guided by a handheld device or desktop software targeting glucose levels between 100 and 130 mg/dl; algorithm B – continuous insulin aiming at glucose levels between 80 and 110 mg/dl; algorithm C – conventional treatment of intermittent subcutaneous administration of insulin if blood glucose levels exceeded 150 mg/dl. Efficacy was measured by the mean of patients' median blood glucose and safety was measured by the incidence of hypoglycemia (≤40 mg/dl).
Results One hundred and nine patients were included. The APACHE II score was similar in the groups (20.5 ± 7.9). The efficacy and safety of the algorithms to attain glucose control are presented in Table 1.
Conclusion A computer-guided insulin infusion protocol causes less episodes of hypoglycemia than, and is as efficacious as, the standard strict glycemic control protocol for controlling glucose at normal nonfasting levels (80–140 mg/dl) in MICU patients.

Table 1 (abstract P84)

	Algorithm A ($n = 36$)	Algorithm B ($n = 36$)	Algorithm C ($n = 37$)	P all groups	P A vs B
Glucose median (mg/dl)	124.8	128.5	161.3	<0.001	0.45
Hypoglycemia (n (%))	8 (22.2)	17 (47.2)	0 (0.0)	<0.001	0.03
MICU death (n (%))	18 (51.4)	19 (54.3)	15 (40.5)	0.47	0.81

P85

Reliability of arterial, capillary and venous point-of-care glucose measurements in the intensive care unit setting: evaluation of two glucometers

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Critical Care 2007, **11(Suppl 3):**P85 (doi: 10.1186/cc5872)

Introduction Increased risk of hypoglycemia is the major drawback of strict glycemic control, which has been extensively used in critically ill patients. Fast and precise glucose measurements are therefore mandatory. Our aim was to evaluate the accuracy of two methods of bedside point-of-care testing for glucose measurements using arterial, capillary and venous blood samples in ICU patients.
Methods A cross-sectional study with prospective data collection, including 86 patients admitted to a 40-bed clinical–surgical ICU of a tertiary care hospital. Results from two different methods of glucose measurement were compared with central laboratory arterial blood measurements: (1) AccuChek Advantage® (Roche), arterial, venous and capillary samples; (2) Precision PCx® (Abbott), arterial sample. All samples were collected simultaneously. Agreement between measurements was tested with the Bland–Altman method.
Results Comparisons between pairs of measurements are presented in Table 1.

Table 1 (abstract P85)

Arterial central laboratory measurement minus	Mean difference (mg/dl)	95% limits of agreement (mg/dl)
Precision PCx® (arterial)	–17.8	–50.0 and 14.2
AccuCheck® (arterial)	–6.7	–35.3 and 22.0
AccuCheck® (fingerstick)	–6.4	–44.1 and 31.2
AccuCheck® (venous)	–8.2	–56.4 and 41.0

Conclusion The two glucose meters evaluated might not be sufficiently reliable to be used in the ICU setting, especially for patients under strict blood glucose control. Moreover, there are marked differences between equipments and a decrease in precision if capillary or venous samples are used.

P86

Clinical pharmacist intervention in reviewing prescriptions of drugs administered by an enteral feeding tube in adult and pediatric intensive care units

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Critical Care 2007, **11(Suppl 3):**P86 (doi: 10.1186/cc5873)

Introduction Administration of drugs by an enteral feeding tube is a common practice in critically ill patients, since it provides an easy access for those unable to swallow.

By monitoring the administration of drugs by an enteral feeding tube in the adult and pediatric ICUs, we have found several factors that could lead to an unsuccessful practice. Since most patients are given continuous enteral feeding, problems such as drug–nutrient interactions, tube obstruction, changes in drug bioavailability, and biological risk for the nursing team may occur.
In a survey conducted from April to June 2006 in the ICU, 83 pharmacist interventions relating to problems with drugs administered by feeding tube were found. Of these 83 interventions, 23 were associated with absorption problems, 44 with obstruction problems, 15 with drug–nutrient interactions, and one with a biological risk for the nursing team.
Objective To implement a procedure to increase clinical pharmacist interventions for drug administration by feeding tube in order to avoid problems with this mode of administration.
Materials and methods A patient follow-up form was prepared in June 2006. As of this date, all medical prescriptions containing drugs to be administered by feeding tube were reviewed. A new survey from July to September was carried out to assess the results of the new procedure.
Results After the implementation of the follow-up procedure, clinical pharmacist interventions were increased by 100%.
Conclusion Complete follow-up of prescriptions containing drugs to be administered by feeding tube by the clinical pharmacist reduces the possible risks related to this practice.

P87

Enteral nutrition therapy in intensive care units: a comparative study between prescribed and administered diet

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Critical Care 2007, **11(Suppl 3):**P87 (doi: 10.1186/cc5874)

Enteral nutritional therapy (ENT) has a solid and important role in the treatment of severely ill patients in ICUs. The multidisciplinary team therefore has to assure a safe nutritional therapy free from failures. The objectives of this study were to compare the prescribed and administrated volume of enteral diet; to compare daily caloric needs (DCN) with the prescribed calories (PC) and the administrated calories (AC); and to identify the factors associated with failures in the administration of enteral therapy. This is a descriptive, comparative and prospective study carried out in two general ICUs of a private hospital in the city of São Paulo, Brazil, in 2005. The data were collected daily based on information from medical records. Descriptive statistics as well as the Student *t* test, kappa rate and logistic regression model (stepwise forward) were used to analyze the data. $P < 0.05$ was considered statistically significant. The sample was composed of 61 patients (636 enteral diet daily administration). The time between the admission to the ICU and ENT was, on average, 2.5 days; most diets (57.6%) were special and were administered through an enteral catheter placed into the stomach (56.9%). The volume of diet administered was usually smaller than the prescribed one, respectively 1,111.8 ± 400.4 ml and 1,257.2 ± 306.9 ml ($P = 0.000$). Concerning calories, PC (1,302.6 ± 481.9) as well as AC (1,164.8 ± 508.2) were statistically smaller than the DCN (1,797.1 ± 292.7). The comparison between volume and calories according to the intervals showed a moderate concordance between the prescribed and administered volumes (kappa = 0.614) and low concordance between the DCN and PC (kappa = 0.191) and between the DCN and AC (kappa = 0.100). From a total of 308 reasons for failure while administering the prescribed volume, the wrong calculus of the infusion speed by the nursing team was predominant (20.8%) followed by diagnostic or therapeutic examinations and surgical procedures (14.9%); 70.6% of the reasons were avoidable. The factors associated with failure in volume administration were age, infusion speed and DCN. The results indicate the importance of further studies that look into adverse events related to the administration of enteral therapy aiming to guarantee the actual nutritional needs of severely ill patients in ICUs.

Epidemiology/quality of life/administration

P88

Prognostic evaluation of critically ill patients from the intensive care unit of the Hospital Beneficence Portuguese of Ribeirão Preto

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Critical Care 2007, **11(Suppl 3):**P88 (doi: 10.1186/cc5875)

Introduction A prognostic evaluation system was developed to measure the clinical severity of patients and to evaluate assistance quality, among other objectives. The APACHE II score (APII) analyses 12 clinical, physiological and laboratorial variables, through which the risk of death can be obtained, translating the patient severity into numerical values. The evaluation of the patient prognosis and the prediction of the risk of death for seriously ill patients are of great importance, requiring adequate intensive assistance.
Objectives To characterize the severity of patients, comparing the observed versus expected mortality, and to evaluate the ICU performance regarding assistance.
Method A prospective study in which the APII was calculated and the outcome of the patients admitted to our ICU from 24 June 2006 to 19 October 2006 was studied. For such calculation, the largest discrepancy from the reference values was considered in the first 24 hours in the ICU. The study included 202 patients, 116 men (57.4%) and 86 women (42.6%), with age varying between 22 and 94 years (mean age: 63.9 years). The most prevalent diseases were: postoperative cardiac care (14.8%), congestive heart failure (13.4%), acute arterial insufficiency (11.9%) and pneumonia (9.4%). The length of stay in the ICU varied from 0 to 63 days (average = 5.7 days). The cutoff value of the APII was 25 and the results of RO were 36.8%.
Results According to the ROC curve, a sensitivity of 87.5% and a specificity of 77% was observed for an APII cutoff value of 25; thus, 87% of the patients who died had APII ≥25 and 77% of the patients classified as high severity presented APII <25. The curve also showed that 88% of the patients who died presented RO ≥36.8% and 74% of patients classified as high severity had a RO <36.8%. When correlating the cutoff value of 25 from the APII with 36.8% for the RO, it was noticed that 96.9% of patients with APII ≥25 and RO ≥36.8% evolved to death and that 93.7% of patients with APII <25 and RO <36.8% were classified as high severity; there was only 4.95% of inconsistency. The global expected mortality was 44% while the observed mortality was 37%. APII <12 excluded death, and APII ≥45 confirmed death.
Conclusion The population studied included patients of higher severity when compared with those described in the general literature. The observed mortality was less than the expected mortality, suggesting adequate assistance. The APII is a good prognostic index, and when used in the first 24 hours of internment presents high specificity and sensitivity to calculate the death risk.

P89

Clinical pharmacy in the intensive care unit of a private hospital in Brazil

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Critical Care 2007, **11(Suppl 3):**P89 (doi: 10.1186/cc5876)

Introduction Patient safety is one of the major concerns of healthcare professionals, especially in an intensive care setting. For identifying risk factors for adverse events and drug-related problems (DRPs), a clinical pharmacy (CP) service in the adult and pediatric ICUs of the Albert Einstein Jewish Hospital (HIAE) was created to work directly with medical prescriptions. This service, started in 2001, assesses factors such as: the route and frequency of administration, dose, compatibility, dilution, drug interaction, adverse drug reactions, allergy, infusion time, and indication. After the acceptance of a pharmacist in this team, in 2005, the clinical pharmacy has been expanded, with one pharmacist in each ICU, and in 2006 the clinical pharmacist has also started to act in procedures managed by the institution.
Objective To show progressively the role of a clinical pharmacist in the hospital ICU, and to identify and classify DRPs in these units.
Materials and methods A prospective study from 2004 to 2006 of the daily follow-up of patient prescriptions and medical charts at ICUs, identifying and intervening with DRPs.
Results A total of 583 interventions were recorded in 2004, 1,970 in 2005, and 5,800 in 2006. We have seen an increase in interventions during this period of 994%, especially in compatibility studies (4,017%), drug interactions (2,150%), and adverse drug reactions (1,000%).
Conclusion The clinical pharmacy program that was implemented, besides providing a direct addition to the quality of the critical patient's care, enables the identification of the DRP profile and make the prevention of adverse events feasible. We concluded that the program was successful, well accepted, and further expanded, evidencing the pharmacist's role as a member of a team.

P90

Evaluation of the nurse care given to critically ill patients through quality indicators

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Critical Care 2007, **11(Suppl 3):**P90 (doi: 10.1186/cc5877)

Objective To improve nurse care given to patients in the ICU through the systematic collection of data from six previously defined quality indicators.
Methods Retrospective analysis of six quality indicators (phlebitis, falls out of the bed, accidental extubation, drug-related complications, pressure ulcer and accidental nasoenteral catheter displacement) from a 10-bed medical ICU in a private hospital, which were collected daily by nurses from the data found in the patient's medical register. A monthly critical and statistic evaluation of these data was accomplished in order to develop an action plan.
Results According to the goal established by the institution, some indicators such as phlebitis and fall out of the bed were found within the expected rates. The accidental extubation and development of pressure ulcers were very close to the expected numbers. According to Souza and colleagues [1] the daily evaluation and systematic intervention in order to prevent and treat pressure ulcers is a nurse's task. There is a proven relation between assistance quality and pressure ulcer care. The drug-related complications and nasoenteral catheter displacement were above the established limits, requiring specific actions from the ICU team to reduce these problems.
Conclusion The rates presented through the analyses of the quality indicators shows specific failures in nurse care. The action plan to correct these failures consists of continued education with close monitoring of the quality indicators to assure better results, regarding increased patient safety.
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P91

Elderly patients and nursing workload in intensive care units

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Critical Care 2007, **11(Suppl 3):**P91 (doi: 10.1186/cc5878)

As the population ages, the number of diseases related to the elderly increases, having as a consequence an acute complication status that requires ICU admission. Considering that these units are complex and costly, admission of the elderly to ICUs is controversial and is presumed to have a high nursing workload. Based on that, the aims of this study were to compare the nursing workload (Nursing Activities Score (NAS)) and the severity of illness (SAPS II) among elderly patients and to identify predictors of the nursing workload in ICUs. In a prospective study, data were collected from 71 elderly patients (≥60 years) admitted to ICUs in three hospitals in the city of São Paulo, Brazil, in 2004. The sample was divided according to age into three groups: 60–69 years, 70–79 years and ≥80 years. Statistic analyses were carried out to verify the relation among the variables. The Student *t* test and ANOVA tests, with Bonferroni correction, and multiple logistic forward regression were used. The level of significance was $P < 0.05$. Most of the patients ($n = 71$) were males (53.5%), and their mean age was 75.8 years (range: 60–97 years). Medical treatment (74%) and admissions from the emergency room (40.8%) were predominant. The mean length of stay in the ICU was 13.9 days (range: 1–53 days) and the mortality rate was 17.0%. The mean NAS according to the groups (that is, 60–69 years, 70–79 years and ≥80 years) were, respectively, 72.4%, 74.3% and 71.9%, and the mean risks of mortality were 15.8%, 24.8% and 35.6%. The NAS major average was found among patients aged 70–79 years, but was not statistically significant ($P = 0.842$). Among the nursing workload predictors were found age, type of admission and severity. It was observed that the severity and risk of mortality increased as patients aged. This was not the same for nursing workload. Surgical treatment and the least LOS increased the workload for the elderly in the ICU. The results indicate the need for discussing intensive treatment of the elderly so that age is not a discriminating factor.

P92

Comparison between the SAPS 3 and APACHE II score in a general intensive care unit in Brazil

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Objective Specific features of different populations may influence prognostic index results. The literature shows differences in the

standardized mortality rate (SMR), calibration, and discrimination of such indexes. This study intends to evaluate the capacity of SAPS 3 on predicting ICU patient outcome, using two of its equations – global and Central/South American – and to compare it with the APACHE II score in a general ICU in Brazil.

Methods We analyzed prospectively collected data from 1 January to 31 August 2006. From the 544 admitted patients, 42 (7.72%) were excluded due to readmission. In the remaining 502 patients we analyzed the SMR, calibration through the Hosmer–Lemeshow C test, and discrimination through the area under the ROC curve (aROC). The evaluated endpoint was death or hospital discharge. We also evaluated the index performance through the SMR for subgroups of patients – clinical, surgical and according to APACHE II diagnostic categories. Calculation was performed using EXCEL 2000 software (Microsoft Corporation) and MedCalc Version 7.0.0.4 (Frank Schoonjans).

Results The SMR approached one when calculated through the global SAPS 3 equation and the APACHE II score (1.0644 and 1.0765, respectively). The SAPS 3 Central/South American equation overestimated mortality (SMR = 0.8182). Calibration was adequate for the SAPS 3 global and Central/South American equations (13.02, $P = 0.1110$ and 15.07, $P = 0.0578$) and was inadequate for the APACHE II score (19.53, $P = 0.0123$). Both indexes showed excellent discrimination (aROC > 0.8). In the evaluated subgroups there was great SMR variation (0.5419–1.5754).

Conclusion The global SAPS 3 equation showed the best performance in this group of patients.

P93

APACHE II and SOFA scores for intensive care and hospital outcome prediction in oncologic patients

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Critical Care 2007, **11(Suppl 3):**P93 (doi: 10.1186/cc5880)

Introduction The number of acute organ failures has been shown to be an important determinant of prognosis in critically ill cancer patients admitted to an ICU [1]. Although the SOFA score is useful in analyzing the number and the severity of acute organ failures related to ICU mortality, it is not validated to predict outcomes in the ICU. On the other hand, general prognostic models have failed to accurately predict outcomes in the oncologic population [2,3]. Given this, we propose to analyze the ability of the SOFA score compared with the APACHE II score in predicting ICU and inhospital mortality in oncologic patients.

Methods ICU data from a tertiary university hospital were prospectively collected from March 2003 to November 2005. Oncologic patients with an ICU admission longer than 24 hours were selected. The SOFA and APACHE II scores were retrieved from our prospectively acquired database. The accuracy of the APACHE II, first-day SOFA (SOFA1) and maximum SOFA during the entire ICU admission (mSOFA) scores were analyzed through the area under the ROC curve (AUC).

Results Seventy out of 793 patients had an oncologic diagnosis. Eleven patients were excluded due to an ICU length of stay less than 24 hours. One patient had missing SOFA data. Of the 58 analyzed patients, the mean age was 52 ± 18 years, male gender 53%, medical admission 74%, hematological malignancies 50% and mean APACHE II score 20 ± 8. The ICU mortality was 43% and the inhospital mortality was 65%. The accuracy of the scores for mortality prediction is presented in Table 1.

Table 1 (abstract P93)

	ICU		Hospital	
Score	AUC	95% confidence interval	AUC	95% confidence interval
APACHE II	0.710	0.578–0.843	0.655	0.491–0.819
SOFAm	0.779	0.656–0.901	0.721	0.588–0.854
SOFA1	0.925	0.859–0.991	0.835	0.734–0.934

Conclusion The accuracy of the APACHE II score to predict ICU and inhospital mortality in critically ill cancer patients was modest and similar to the described in the literature. The severity of multiple organ failure evaluated through the SOFA score on day 1 and the maximum SOFA score reached a better accuracy to predict both ICU and hospital mortality in an oncologic population.

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P94

Intensive care unit bed shortage leading to a delay in patient admission to public intensive care units

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Critical Care 2007, **11(Suppl 3):**P94 (doi: 10.1186/cc5881)

Introduction ICU bed shortage is a daily problem that leads to delayed ICU treatment for those with an extended waiting time. This population is thought to have a bad prognosis, mainly those from wards. The objective of this study is to identify whether the delay between reference and ICU admissions caused by an ICU bed shortage could lead to a higher mortality rate in ER patients.

Materials and methods All referrals consecutively made to the ICU of a public university hospital and not immediately admitted in the period June–December 2005 were included. Patients were evaluated prospectively to the final outcome regarded as admittance/nonadmittance. Each patient was described by demographic data, origin sector and waiting time. The vacancy reservation criterion adopted was hierarchy through a request order. Data from external requests to the hospital were not collected. For statistical analysis the Epi Info version 3.3.2 program was used.

Results Throughout the observation period, 629 referrals to the ICU were made, 42.4% of patients being immediately admitted. Out of 362 clinical referrals initially refused because of bed shortage, the male sex was more frequent (58.6%), and the mean age was 57.9 ± 19.0 years. Of all patients initially refused, 20.2% were cancelled due to patients' clinical recovery within 36 hours and 15.2% died before an available bed in a mean waiting time of 23.4 hours. Only 21 patients (5.8%) were transferred to another hospital, in a mean time of 17.9 hours. Of clinical patients later admitted to the ICU, the median waiting time was 24 hours (9–26.5 hours). Their mean age was no different from those who died before admission (57.8 ± 18.33 years). The origin sector was

the ER in 62.5% of the requests. There was no difference between mortality of requests from the ER and from the ward ($P = 0.17$).
Conclusion In this population, 57.6% of the demand for ICU beds was not admitted immediately. The waiting time for clinical admissions was very high, suggesting that time-sensitive diseases like sepsis had a worst prognosis. The mortality among ER patients waiting for ICU beds was no higher then ward patients. We suggest a study to evaluate the impact of delay on the prognosis of admitted patients.

P95

Burnout syndrome and quality of life in intensivists

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Critical Care 2007, **11(Suppl 3):**P95 (doi: 10.1186/cc5882)

Introduction Burnout is a prolonged response to chronic emotional and interpersonal stressors on the job, and is defined by three dimensions: exhaustion, cynism (depersonalization), and inefficacy [1]. ICU physicians are exposed to several stress factors and are particularly predisposed to this syndrome [2].
Objective To describe the prevalence of burnout syndrome among intensivists and its relation to their quality of life.
Methods An epidemiological cross-sectional survey conducted to evaluate all adult ICU physicians in Salvador, BA (Brazil), from October to December 2006. The quality of life and burnout syndrome were evaluated respectively by the WHOQOL-Bref instrument [3] and the Maslach Burnout Inventory (MBI) [1]. Burnout was classified into low, moderate and high levels for the three studied dimensions, according the MBI classification, and it was defined by the presence of a high level in at least one dimension. The quality of life was evaluated in four domains: physical, psychological, social relationships and environment, graduated from 0 to 100, with higher scores denoting higher quality-of-life.
Results A total of 297 intensivists were enrolled (88.4% of the eligible population). The mean age was 34.2 ± 6.9 years and 71.7% were male. The mean time since graduation was 10.0 ± 6.7 years. Burnout syndrome was observed in 63.3% ($n = 188$) of intensivists. A high burnout level was observed in 7.4%, 22.2% and 33.7%, for three, two and one dimensions, respectively. Moderate to high levels of exhaustion, depersonalization and inefficacy were found in 79.9%, 51.0% and 54.8%, respectively. The mean score found in the four domains of quality of life were: physical, 68.0 ± 15.6; psychological, 64.5 ± 14.5; social relationships, 62.0 ± 19.6; environment, 60.0 ± 13.7. Intensivists with burnout syndrome had lower mean scores of quality of life in the physical (75.8 ± 13.8 vs 63.5 ± 14.7), psychological (72.3 ± 11.3 vs 59.9 ± 14.0), social relationships (70.6 ± 16.9 vs 57.0 ± 19.4) and environment (66.4 ± 12.7 vs 56.3 ± 12.8) domains ($P < 0.001$).
Conclusion Intensivists presented high prevalence of burnout syndrome, which was related to lower quality of life. These data indicate that strategies must be discussed to prevent this syndrome in this population.

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P96

SOFA-derived variables and sepsis survival in a Brazilian university hospital intensive care unit

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Critical Care 2007, **11(Suppl 3):**P96 (doi: 10.1186/cc5883)

Introduction Organ dysfunction is a major determinant of morbidity and mortality in the critically ill septic patient. We tried to establish the mortality prediction accuracy of SOFA-derived variables (maximum SOFA, 48-hour ΔSOFA and highest SOFA) in a Brazilian sample of ICU patients.
Methods Patients with severe sepsis or septic shock admitted for at least 5 days to a seven-bed medicosurgical ICU from a Brazilian university hospital were studied. The daily SOFA score for each patient was calculated during the first 5 days of admission. Relevant data were prospectively acquired from March 2003 to May 2006, the latter retrieved from an electronic database. Medians and interquartile ranges (IQR) were used to describe the sample. The accuracy of each SOFA-derived variable to predict ICU mortality was calculated as the area under the receiver operator characteristics curve (AUROC). Noncollinear SOFA-derived variables were entered into a logistic regression model. $P < 0.05$ was defined as the significance limit.
Results One hundred and seventy-six patients were studied: 71 male (56%), median age 51 years (IQR 36–67 years), 78 with severe sepsis (44%), median length of ICU stay 10 days (IQR 7–16 days), median admission SOFA score 6 (IQR 4–9), median APACHE II score 19 (IQR 13–26), ICU mortality 27.84%. The highest SOFA score had the largest AUROC (0.79; SE = 0.04, 95% CI = 0.72–0.87) followed closely by the maximum SOFA and the admission SOFA. The 48-hour ΔSOFA had an AUROC not different from 0.5 ($P = 0.09$). The 48-hour ΔSOFA score was not correlated with the other SOFA-derived variables. The high correlation found among the admission SOFA, the maximum SOFA and the highest SOFA scores suggests collinearity (R^2 above 0.9 for each comparison). The logistic regression model displayed similar mortality likelihood for all the variables studied.
Conclusion Some SOFA-derived variables attained during the first 5 days of admission have a reasonable accuracy to predict mortality in a Brazilian sample of ICU patients. It seems that organ dysfunction acquired during the first days of sepsis is a determinant factor in the evolution of these patients.

P97

Clinical characteristics, evolution and prognosis of elderly patients admitted to a medical intensive care unit

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Background The elderly currently represent up to 52% of patients admitted to ICUs, and have poorer prognosis when compared with

younger patients. The clinical characteristics, evolution and prognosis of elder patients admitted to the ICU have not been studied in a recent national series of patients.

Patients and methods We selected 112 (29.5%) patients older than 65 years out of 380 patients admitted to an ICU. We compared their clinical characteristics, evolution and prognosis with that of younger patients. The Acute Physiologic and Chronic Health Evaluation (APACHE II) and Sequential Organ Failure Assessment (SOFA) were used as prognostic indexes.

Results Fifty-four (48.1%) patients were women and 58 (51.8%) were men, and the mean age was 73.8 ± 5.9 years. The average ICU stay was 15.8 ± 19.2 days and 56 (50%) patients died. Compared with younger patients, elderly patients had a higher APACHE II score (21.9 ± 9.0 vs 15.9 ± 8.7, $P < 0.001$) and mean SOFA score (7.1 ± 4.56 vs 4.5 ± 4.80, $P < 0.001$). Moreover, urinary catheters were used more frequently (75% vs 63.7%, $P = 0.002$), as well as central venous catheters (74.1% vs 63.7%, $P = 0.004$), mechanical ventilation (63.4% vs 47.6%, $P < 0,001$), and pulmonary artery catheters (21.4% vs 13.7%, $P = 0.012$). Elder patients had a lower rate of pneumonias (5.4% vs 10.0%, $P = 0.025$) and a higher rate of urinary infections (18.8% vs 12.1%, $P = 0.023$). The mortality of elderly patients was higher (50% vs 31.3%, $P < 0.001$). Among elder patients, the APACHE II score (26.1 ± 9.5 vs 17.7 ± 6.0, $P = 0.000$), mean SOFA score (10.55 ± 3.41 vs 3.52 ± 2.29, $P < 0.001$), use of a central catheter (87.5% vs 60.7%, $P = 0.001$), dialysis (21.4% vs 5.4%, $P = 0.013$), mechanical ventilation (91.1% vs 35.7%, $P < 0.001$) and presence of septic shock (32.1% vs 8.9%, $P = 0.002$) were associated with worse prognosis.

Conclusion Elder patients admitted to the ICU are more severely ill and have a higher number of organ dysfunctions as compared with younger patients. They have a worse prognosis despite the increased number of medical interventions.

P98

Morbidity and mortality of the old and oldest-old patients in the intensive care unit

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Introduction Demographic changes, new drugs and interventions increase population survival. Elderly patients make up over 25% of patients in the ICU. However, the mortality of elderly ICU patients is controversial. The survival of elderly patients admitted to an ICU in Brazil has not been studied.

Methods A retrospective study was conducted in a six-bed medical ICU in a tertiary university hospital. We reviewed all patients admitted from August 2003 to January 2007; 1,179 patients were included in the study. The APACHE II score and preview mortality were assessed at the first 24 hours in the ICU. Demographic data, previous medical history, reasons for admission to the ICU, length of stay in the ICU, survival rate and standardized mortality ratio (SMR) were also researched.

Results The mean age was 54.0 ± 19.8 years, 52.3% were female and most of patients originated from hospital (51.8%). The APACHE II score was 18.3 ± 8.3 points. The length of stay in the ICU was 6.6 ± 7.4 days and mortality was 34.9%, 3.9% before 48 hours. The SMR was 1.04. In the group of old patients (≥65 years old, $n = 416$), the mean APACHE II score was 19.5 ± 7.6 points. Respiratory insufficiency, sepsis and acute coronary syndrome were the most frequent reasons for admission (18%, 16.8% and 14.4%, respectively). Mortality in this group was 37.0% (chi-square test; $P = 0.2506$), 4.3% at the first 48 hours, and the SMR was 1.06. Length of stay in the ICU was 6.6 ± 5.8 days ($P > 0.05$). In the oldest-old patient group (≥85 years old, $n = 37$), the mean APACHE II score was 18.4 ± 4.9. Sepsis and respiratory insufficiency were the principal reasons for admission (21.6% and 13.5%, respectively), with no coronary patient admitted. Mortality was 35.1% (chi-square test; $P = 0.9803$), 5.4% in the first 48 hours, and the SMR was 1.27. The length of stay was 6.5 ± 3.9 days ($P > 0.05$).

Conclusion Old age was not associated with a high fatal outcome or length of stay in ICU. However, mortality in patients aged 85 years or more was higher than expected. The APACHE II score could allow an early identification of patients at high risk of death, even in old and oldest-old patients. A prospective assessment is mandatory to confirm these preliminary data.

P99

Study of critically ill patients with systemic lupus erythematosus in a Brazilian university hospital intensive care unit

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Objective To describe the features and outcome of patients with systemic lupus erythematosus (SLE) admitted to the ICU in a teaching hospital.

Methods From November 2003 to October 2006, 1,052 patients were admitted to the ICU. Fifty patients had SLE and were included in this retrospective study. We analyzed demography parameters, the time of diagnosis of SLE, the cause of ICU admission, the length of stay in the hospital, the complete blood count, PaO_2/FiO_2 (ratio of arterial oxygen tension to inspired oxygen concentration), the need for intensive care therapies (mechanical ventilation, dialysis, blood products, vasopressor/inotropic support), the length of stay in the ICU, outcome (survivors and nonsurvivors) and readmission to the ICU. We also evaluated the Systemic Lupus Erythematosus Disease Activity (SLEDAI) score, APACHE II (Acute Physiology and Chronic Health Evaluation II) score and standardized mortality ratio (SMR).

Results Of the 50 patients with SLE admitted to the ICU, 88.2% were female. The mean age was 30.29 ± 12.79 years. The median time of diagnosis of SLE was 67 months. The most common organ involvements were renal (70.6%), cardiologic (61.8%), respiratory (55.9%) and neurologic (55.9%). The main reasons for admission to the ICU were respiratory (38.2%), cardiologic (29.4%) and neurologic (29.4%) dysfunctions. The median length of stay in the hospital, before admission to the ICU, was 5 days. Among the intensive care therapies, 44.1% of the patients needed blood products, 41.2% vasopressor support, 35.3% mechanical ventilation, 23.5% dialysis, and 5.9% inotropic support. The median length of stay in the ICU was 3 days. The mean SLEDAI score was 15.0 ± 12.2. The mean APACHE II score was 19.29 ± 6.77, with a calculated mortality rate of 37.6%. The real mortality rate in the ICU was 29.4%, with 8.8% before 48 hours. The SMR was 0.78. Between the patients who were discharged from the ICU, 30.3% were readmitted, with 3% before 48 hours. The patients with an APACHE II score >18, more than three acute organ involvements, leucopenia (<4,000 cells/mm^3) and gastrointestinal or metabolic involvement had higher mortality in the ICU.

Conclusion Despite the severity of patients with SLE at admission to the ICU (demonstrated by APACHE II score and the acute dysfunctions), they had benefit, as expressed by the SMR.

P100

Assessment of the general knowledge of emergency physicians from hospitals of the city of Salvador (Brazil) on the care of cardiac arrest patients

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Critical Care 2007, **11(Suppl 3):**P100 (doi: 10.1186/cc5887)

Objective To identify the proportion of emergency physicians certified in immersion courses – Advanced Cardiac Life Support (ACLS), Fundamental of Critical Care Support (FCCS) and Advanced Trauma Life Support (ATLS) – correlating the variables of age, gender, medical specialty, academic title, and two types of hospital with the level of theoretical knowledge on the care of cardiac arrest (CA) patients.
Methods Emergency physicians from public and private hospitals of the city of Salvador, State of Bahia, Brazil, were consecutively evaluated from November 2003 to July 2004. The physicians volunteered to participate in the study, and responded to a questionnaire consisting of information on the following variables of interest: professional profile, participation or not in ACLS, FCCS and ATLS immersion courses, and cognitive assessment with 22 objective questions on cardiopulmonary resuscitation (CPR). A score of correct answers was calculated for each participant, and then designated as a score variable. This questionnaire was validated based on the result of the score obtained by ACLS course instructors in Salvador, BA.
Results Of the 305 physicians who responded to the questionnaire, 83 (27.2%) had attended the ACLS course and had a mean score variable of 14.9 ± 3.0, compared with the 215 physicians (70.5%) who had not attended the course and whose mean was 10.5 ± 3.5 ($P = 0.0001$). The mean score of the 65 cardiologists (21.5%) was 14.1 ± 3.3 compared with the mean of 9.7 ± 3.7 ($P = 0.0001$) for the 238 physicians (78.5%) from other specialties. The mean score of the 37 physicians who had attended the FCCS course was 14.5 ± 3.1 compared with the mean of 11.3 ± 3.8 who had not attended this course ($P = 0.0001$). The mean score of the 24 physicians who had attended the ACLS and FCCS courses was 16.1 ± 2.6, compared with the 12 physicians who had attended the FCCS course and whose mean was 12.3 ± 2.5 ($P = 0.0001$). No difference was observed in the mean scores between physicians who had attended the ATLS course or not ($P = 0.67$).
Conclusion In the sample studied, theoretical knowledge of CPR was higher among physicians who had attended the ACLS course, as opposed to those who had attended the ATLS course. Cardiologists who had attended the ACLS demonstrated a higher theoretical knowledge of the care of CA patients when compared with physicians from other specialties taken as whole – internal medicine, surgery, and orthopedics. Physicians who had attended the ACLS and FCCS courses demonstrated a higher theoretical knowledge of the care of CA patients when compared with physicians who had attended only one of those courses; continued education is therefore essential.

P101

Profile of patients admitted to the intensive care unit after exogenous intoxication at a university hospital

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Critical Care 2007, **11(Suppl 3):**P101 (doi: 10.1186/cc5888)

Introduction Patients admitted to the ICU for exogenous intoxication are normally intoxicated with medicines such as benzodiazepines, and also chemical substances such as organophosphates, requiring rapid treatment.
Objective To analyze patient profiles of those patients admitted to the ICU of HEG after exogenous intoxication between June 2005 and July 2006.
Materials and methods All patients with previous diagnosis of exogenous intoxication who were admitted to the ICU of HEG were analyzed retrospectively. A protocol was developed, including age, gender, type of intoxication agent, APACHE II score, and ICU and hospital lengths of stay, need for orotracheal intubation and complications.
Results There were 343 patients in total admitted to the ICU; 12 (2.76%) were because of exogenous intoxication. The average age was 34.6 years, and the hospital length of stay was 17.8 days. Most patients were men (seven patients or 58.3%). All required orotracheal intubation and the mean time of mechanical ventilation was 7.8 days. Organophosphate was the agent in 10 (83.3%) patients, which required atropine. There were complications in six (50%) patients: aspirative pneumonia (four patients or 33.3%) and reintubation (16.7%).
Conclusion Most intoxications were caused by organophosphates. There were no deaths, which is different from the literature where the death rate ranges from 8% to 13%. In general, patients are young and treatment must be made quickly and efficiently to be successful.

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P102

Benefits of the speaking valve according to patient perceptions

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Critical Care 2007, **11(Suppl 3):**P102 (doi: 10.1186/cc5889)

Introduction The speaking valve is one of the options for oral communication for tracheostomized patients, especially in ICUs. It is a one-way device that is placed onto the tracheotomy tube. Its fine membrane opens during inspiration, allowing air to enter the tracheotomy tube, and closes during expiration, so that air is directed to trachea and vocal folds producing a voice.
According to the literature, placement of a speaking valve provides many benefits to the patient: facilitation of voicing, even in ventilator-dependent patients, facilitation of deglutition, use of the upper airway, which improves the ability to cough and manage secretions, improvement of olfaction and taste, and others.

Objective To verify patient perception of the speaking-valve benefits and compare it with available literature data.
Methods A questionnaire was given to a group of 20 inpatients at the Intensive Therapy Unit of Hospital Albert Einstein who had been using the speaking valve for at least 2 weeks, introduced by the speech and language pathologist. A list of possible benefits described in the literature was presented and patients could fill a column choosing one of three possibilities: *better/worse/same* after the introduction of the speaking valve.
Results The primary results show that the restoration of oral communication is the primary benefit of the one-way valve for these patients (70%), followed by improvement of deglutition (60%) and even anxiety control (60%). Better quality of life was reported by 90% of the patients. The other findings are being collected and will be discussed further.
Conclusion The speaking valve was shown to be a well-acceptable device for patients in the ITU who used it, and assisted in improving patient quality of life, according to the patient perspective.

Surgery/trauma

P103

Posteriorly ruptured abdominal aortic aneurism causing vertebral erosions

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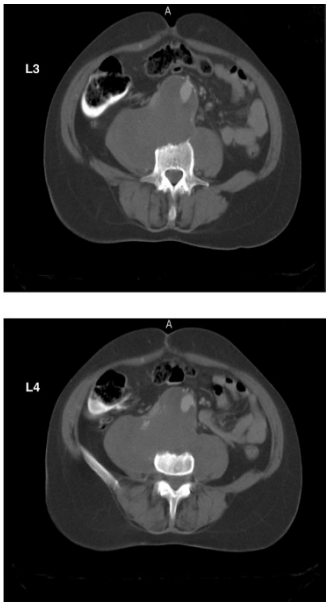
Critical Care 2007, **11(Suppl 3):**P103 (doi: 10.1186/cc5890)

A 52-year-old black woman presented to the emergency department with a complaint of worsening lumbar pain during the last month. A report of untreated severe arterial hypertension was provided. She had been suffering from chronic lumbar pain for the previous 2 years. During the investigation of lumbar pain she had been diagnosed as having an abdominal aortic aneurism, but she declined treatment and follow-up. At presentation she was hemodynamically stable and had no signs of peritoneal irritation on physical examination. An abdominal computed tomography was performed and revealed a ruptured posteriorly blocked aortic aneurism, which caused severe erosions on the anterior vertebral bodies of L3 and L4. The patient was operated on the next day after admission, and an aneurysmal repair was performed. She was admitted to the ICU and evolved with shock, acute renal failure, mesenteric ischemia and multiple organ dysfunction. She died on the third day after hospital admission.

Figure 1 (abstract P103)



P104

Lone tension pneumoperitoneum associated to mechanical ventilation with hemodynamic instability

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Critical Care 2007, **11(Suppl 3):**P104 (doi: 10.1186/cc5891)

Case report A woman, 65 years old, hypertense, obese, presented with pulmonary edema, respiratory distress, and BP 250/150 mmHg. After orotracheal intubation and mechanical ventilation she started showing abdominal distension (AD) and hemodynamic instability (HI). An X-ray scan did not show pneumothorax, pneumomediastinum or subcutaneous enphysema. An abdominal CT showed a huge pneumoperitoneum. As it was impossible to rule out perforation of a viscus she underwent a laparotomy, which was 'white'. After a while, in the critical care unit, the patient started again to present AD and HI. A tiny abdominal tube drainage system was placed to try to control the progressive AD and HI. After that procedure the patient's HI got better but she developed a sudden cardiac arrest and died.
Discussion Lone tension pneumoperitoneum is extremely rare. Macklin and Macklin [1] related the possibility of perivascular sheath air dissection from the mediastinum to the abdominal cavity when someone is under mechanical ventilation. Needless to say, exploratory laparotomy is very common in these cases [2]. Some tests could have been done to rule out a perforation of a viscus [3]. The patient probably died from a pulmonary air embolism.
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P105

The epidural influence on gastric tonometry indicators in pigs submitted to intestinal manipulation

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Critical Care 2007, **11(Suppl 3):**P105 (doi: 10.1186/cc5892)

Background and objectives The intestinal hypoperfusion occurring during surgeries decreases the gastric pH (pHi), induces acidosis and increases mortality [1]. The epidural improves gastric mucosal perfusion, increases the pHi and stimulates intestinal motility [2]. The present study was undertaken to investigate

epidural effects on tonometric indicators in pigs submitted to exploratory laparotomy and to compare the effects of analgesic and anesthetic solutions.
Methods Twenty-seven pigs (weight: 26 ± 2.33 kg) were anesthetized and monitored. The epidural catheter positioning was confirmed by radioscopy (T10–T11). The animals were randomized into a control group (saline solution), a 0.5 group (levobupivicaine S75-R25 0.5%, $n = 9$), and a 0.05 group (levobupivicaine S75-R25 0.05% + 4 μg/ml fentanyl, $n = 9$). Fifteen minutes after epidural injection, the animals were submitted to exploratory laparotomy and intestinal manipulation during 45 minutes. The tonometric, hemodynamic and laboratory parameters were collected before the epidural injection (T0), and 60 and 120 minutes after the injection (T1 and T2).
Results The 0.5 group demonstrated a tendency to improve tonometric indicators: increased the pHi and decreased the gap CO_2, but reached no statistically significance. The IRVS decreased in T1 in the 0.5 and 0.05 groups ($P < 0.05$), remaining reduced at T2 in the 0.5 group ($P < 0.05$).
Conclusion The epidural with levobupivicaine 0.5 or 0.05 in pigs submitted to intestinal manipulation had no statistically significant alterations in the tonometric indicators compared with the control group. The pHi and gap CO_2 had a tendency to a better performance in the 0.5 group associated with better hemodynamic parameters.

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P106

Upper gastrointestinal bleeding prophylaxis: gap between guidelines and clinical practice

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Critical Care 2007, **11(Suppl 3):**P106 (doi: 10.1186/cc5893)

Background Upper gastrointestinal bleeding (UGIB) is a common diagnosis in ICUs, especially when hemodynamic instability, mechanical ventilation and blood disorder are present. UGIB in these patients, besides prolonging the hospitalization time, significantly increases mortality. Routine prophylaxis for UGIB is therefore highly recommended.
Objective To evaluate UGIB prophylaxis prescription in ICUs of a university hospital.
Methods A 5-month retrospective analysis of UGIB episodes was performed, including 104 patients admitted to the ICU from 2005 September to 2006 February. Independent of what causes the hospitalization, all patients with UGIB (melena occurrence, hematemesis, gastric contents >50 ml or hemoglobin decrease >2 g/dl in 24 hours) were identified. UGIB prophylaxis prescription was also recorded and, when it occurred, the medication(s) used and the UGIB risk factors associated.
Results The patients' median age was 62.6 years (median >71 years), and males were prevalent (60.1%). Eleven patients (10.5%) had UGIB – 10 died – and 91 (87.5%) received some prophylaxis. The major prophylaxis was ranitidine, oral management (150 mg 12/12 hours) or endovenous (50 mg 8/8 hours). Among all 104 patients, 89 (85.6%) had indication for prophylaxis, but just 78 (87.6%) of them actually received it.
In multivariable evaluation, previous bleeding, coagulation problems and hepatopathy were risk factors for UGIB ($P = 0.01$, $P = 0.03$ and $P = 0.11$, respectively), while prophylaxis gives protection ($P = 0.034$). The univariable analysis identifies heparin as a potential risk factor for bleeding (+4.9 and $P = 0.026$), which was not confirmed in multivariable analysis.
Conclusion Although UGIB had high prevalence and potential severe prognosis, about 12% of all patients with a strong indication for prophylaxis do not take it in a suitable way, showing the gap between guidelines and clinical practice.

P107

Rapid sequence intubation in a prehospital environment

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Critical Care 2007, **11(Suppl 3):**P107 (doi: 10.1186/cc5894)

Background Rapid sequence intubation (RSI) is the gold standard procedure for performing orotracheal intubation in emergency situations. Trying to intubate without RSI can be deleterious because of the hemodynamic and central nervous system reflexes that it causes. RSI may facilitate the establishment of a definitive airway and increase the success rate. Hypoxemia is a major contributor to poor outcomes in head-injury patients, and prehospital intubation can improve survival. Trauma patients who are managed using early intubation have been shown to have improved outcome. RSI in a prehospital environment is still little reported and used because of concern for respiratory paralysis and the possibility of nonintubation situations with a nonanesthetist and paramedics.
Objective To analyze the efficiency, safety and complications of RSI, in a protocol-driven study, in a prehospital environment.
Methods A retrospective, observational, protocol-driven study, which included all RSIs from 1998 to 2003. RSI was defined when at least one sedative followed by a neuromuscular blocking agent were administered together before orotracheal intubation. Intubations with sedative or neuromuscular blocking agents alone were excluded.
Results A total of 696 patients were enrolled. Five patients were excluded because of incomplete data. In 621 patients, trauma was

Table 1 (abstract P107)

Variable comparison from RSI in trauma versus nontrauma patients ($n = 691$)

Variable	Trauma patients	Nontrauma patients
Number of patients	621	70
Successful orotracheal intubation rate (%)	99.1	100
Failed orotracheal intubation (%)	0.9 ($n = 6$)	0
Surgical airway (%)	0.64 ($n = 4$)	0
Prehospital cardiorespiratory arrest (%)	1.93 ($n = 12$)	2.85 ($n = 2$)
Revised trauma score mean value in prehospital cardiorespiratory arrest	4.03	7.5
Prehospital deaths	1.61($n = 10$)	1.42 ($n = 1$)

Table 2 (abstract P107)

Variable comparison from RSI in successful intubation versus failed intubation groups ($n = 621$)

Variable	Successful intubation group	Failed intubation group
Number of patients	615	6
Surgical airway (%)	0	66.66 ($n = 4$)
Prehospital cardiorespiratory arrest (%)	1.78 ($n = 11$)	16.66 ($n = 1$)
Revised trauma score mean value in prehospital cardiorespiratory arrest	4.03	8
Prehospital deaths (%)	1.46 ($n = 9$)	16.66 ($n = 1$)

the leading indication for the procedure, with a success rate of 99.1%. In 0.9% (six patients) orotracheal intubation was not possible: two cases were treated by bag–valve–mask-assisted ventilatory support and four with surgical cricotiroidostomy (all of them with facial trauma; one dead). In the remaining 70 patients with nontraumatic indications, the success rate was 100%. In 364 patients from 1998 to 2001 the RSI was performed by nonanaesthetist doctors in 95.9%. In 588 patients (except 2002), the leading sedative used was ethomidate in 68.7% whereas the neuromuscular blocking agent was succinilcholine in 74.5%. Table 1 presents a data variable comparison from RSI in trauma versus nontrauma patients. Table 2 presents a data variable comparison from RSI in successful intubation versus failed intubation groups.

Conclusion RSI is efficient, safe and with lower incidence of complications in achieving orotracheal intubation during the prehospital environment, in a protocol-driven series, and could be performed by nonanaesthetist doctors. In cases of trauma, mainly facial, and failure of orotracheal intubation, a surgical airway should be promptly available as a rescue technique.

P108

Nonoperative treatment of civilian gunshot wound of the liver: a prospective series of cases

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Critical Care 2007, **11(Suppl 3):**P108 (doi: 10.1186/cc5895)

Background The conservative approach of blunt hepatic trauma and low-energy (stab) penetrating injuries is well established. Routine surgical exploration remains the standard practice for all penetrating solid organ injuries. Nonoperative treatment of patients who suffered civilian (medium-energy) gunshot wound (GSW) of the torso, including the liver, although controversial, could be conducted without surgery in selected patients presenting to the emergency room hemodynamically stable and without evidence of peritonism. The physical examination and abdominal computed tomography (CT) are essential to guide the initial therapy. The nonoperative management is attractive once it avoids the morbidity of a nontherapeutic laparotomy, reported to be as high as 41.3%.

Objective To analyse the feasibility, safety and acute complications of nonoperative, protocol-driven treatment of GSW of the liver.

Methods A prospective, observational, protocol-driven study with patients who suffered civilian GSW of the liver, admitted to the emergency room between 1998 and 2006. All patients had a single, right thoracoabdominal GSW. All patients had one initial abdominal CT scan and were observed in a semi-ICU (emergency room), with noninvasive monitoring and serial physical examination, for at least 24 hours.

Results Twenty-four consecutive patients (mean age 24.3 (range 16–47) years) were enrolled and treated initially without surgery, and 22 were hemodynamically stable (Table 1). Twenty patients were maintained with conservative treatment. Sixteen of these patients (78.94%), had minor liver injuries (grade I/II/III – American Association for the Surgery of Trauma (AAST)), whereas four patients sustained major grade IV/V injuries. Two patients with major liver injuries were hemodynamically unstable with rapid response to saline infusion and were maintained in the protocol (Tables 2 and 3). The aspartate aminotransferase (AST) and alanine aminotransferase (ALT) mean values were proportionally higher according to the grade of the liver injury (Table 4). Chest injuries were noted in 10 patients (47.36%) and pleural drainage under water seal was necessary in nine of them. Two patients sustained an associated renal injury with microscopic hematuria. Laparotomy was performed in four patients because of two main indications: persistent right hippocondrius pain ($n = 2$) and a projectile inside the pelvis on CT ($n = 2$). In this group, two laparotomies were nontherapeutic and two revealed small diaphragmatic injuries. All four liver injuries were minor and without active bleeding.

Table 1 (abstract P108)

Hemodynamic stability according to the grade of injury in all 24 patients

Grade of liver injury (AAST)	Hemodynamically stable (%)	Hemodynamically unstable (%)
Major – IV/V ($n = 4$)	50 ($n = 2$)	50 ($n = 2$)
Minor – I/II/III ($n = 20$)	100 ($n = 20$)	None

Table 2 (abstract P108)

Liver segments injuries on abdominal computed tomography in 20 nonsurgical patients

Segment injuries	Liver location	$n = 36$	%
Segments 6 and 7	Lateral	29	80.5
Segments 4, 5 and 8	Intermedium	7	19.5
Segments 1, 2 and 3	Medial	None	None

Segments according to Couinaud's anatomy.

Conclusion Civilian GSW of the liver can be treated without surgery in selected adult patients presenting to the emergency room as hemodynamically stable, with Glasgow Coma Scale score of 15, without evidence of peritonism, and in trauma centers with a defined protocol based on findings from an abdominal CT scan. Treatment could be done in a semi-ICU, with noninvasive monitoring and serial physical examination. The grade of liver injury and the presence of perihepatic fluid (hemoperitoneum) does not contraindicate the conservative approach. Pulmonary trauma was the most commonly associated injury and was treated with pleural drainage under water seal. Renal-associated injury could be treated without surgery. The values of AST and ALT could be correlated with the grade of liver injury. More large prospective series are warranted.

Table 3 (abstract P108)

Abdominal computed tomography findings in 20 nonsurgical patients

Finding	*n* = 20	%
Right lobe alone	19	95
Right and left lobes	1	5
Segment 4	1	5
Segment 5	3	15
Segment 6	13	65
Segment 7	16	80
Segment 8	3	15
Intrahepatic missile	3	15
Intrahepatic missile fragment	1	5
Perihepatic fluid	6	31.6
Renal injury	2	10
Contrast blush within liver parenchyma	None	0

Segments according to Couinaud's anatomy.

Table 4 (abstract P108)

AST and ALT mean admission values in surgical and nonsurgical patients

Grade of liver injury (AAST)	AST (UI/l)	ALT (UI/l)
Major – IV/V (*n* = 4)	333 (range, 217–645)	328 (range, 263–552)
Minor – I/II/III (*n* = 8)	93.95 (range, 27–175)	91.7 (range, 43–188)

P109

Dissociative anesthesia in a prehospital environment

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Critical Care 2007, **11(Suppl 3):**P109 (doi: 10.1186/cc5896)

Background Dissociative anesthesia is usually performed in a hospital setting. The advantages of ketamine are respiratory and hemodynamic stability, low price and worldwide availability. Its use in the emergency room is safe, but use in a prehospital environment is less known and less reported.
Objective To analyze the safety and complications of dissociative anesthesia guided by an institutional protocol in a prehospital environment.
Methods A retrospective, observational series, protocol-driven study with dissociative anesthesia with ketamine plus midazolan from 1998 to 2004 (excluding 2000, because no available data). All patients were attended by an urban advanced life support unit.
Results Ninety-seven patients received dissociative anesthesia in the period. In nine patients ketamine was administered for rapid sequence intubation, and these were excluded. Eighty-eight met the criteria for sedation and analgesia. Collision was the leading trauma kinematics in 50%. The main indication for dissociative anesthesia was vehicle-entrapped patients in 26.5%. The most important traumatic lesion was inferior extremity fractures in 49.25%. The complications reported in this series were four orotracheal intubations secondary to: seizure (one patient), lowered level of consciousness (two patients), and protection of the airway from orofacial hemorrhage after reduction of a mandibular fracture and dislocation (one patient). One respiratory depression was treated by bag–valve–mask-assisted ventilatory support. Neither cardiorespiratory arrest nor deaths occurred. The mean administered doses were 118.5 mg for ketamine and 4.84 mg for midazolan. The percentages of orotracheal intubations were greater in group 1 of 19 patients with Glasgow Coma Scale (GCS) less than or equal to 13 corresponding to 10.52%, versus 2.89% in group 2 of 69 patients with GCS of 14 and 15. Table 1 presents the data variable comparison between groups 1 and 2.

Table 1 (abstract P109)

Variable comparison between groups 1 and 2

Variable	Group 1	Group 2
Number of patients	19	69
Glasgow Coma Score mean score	10.83	14.07
Oxygen saturation mean values (%)	97.75	97.36
Revisited Trauma Score mean values	9.36	11.48
Revisited Trauma Score = 12 (%)	36.8 (*n* = 7)	77.5 (*n* = 53)
Revisited Trauma Score ≤ 11 (%)	63.2 (*n* = 12)	22.5 (*n* = 16)
Agitation before dissociative anesthesia (%)	31.6 (*n* = 6)	7.24 (*n* = 5)
Inferior and superior extremity fractures, open and closed (%)	26.31 (*n* = 5)	47.8 (*n* = 33)
Prehospital orotracheal intubations (%)	10.52 (*n* = 2)	2.89 (*n* = 2)
Prehospital surgical airway	0	0
Prehospital cardiorespiratory arrest	0	0
Prehospital mortality	0	0

Conclusion Dissociative anesthesia is a safe procedure even in a prehospital environment when performed in a group of patients with GCS 14 or 15 after implementation of an institutional protocol. Proficiency in definitive airway techniques is necessary. Improvement in the quality of attendance and humanization of the EMS are best performed by introducing analgesia protocols into the prehospital environment.

P110

Nonoperative treatment of civilian gunshot wound of the liver with hemodynamic instability: report of two cases

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Background The conservative approach of blunt hepatic trauma and low-energy (stab) penetrating injuries is well established. Nonoperative treatment of patients who suffered civilian (medium-energy) gunshot wound (GSW) of the torso, including the liver, although controversial, could be conducted without surgery in selected patients presenting to the emergency room hemodynamically stable and without evidence of peritonism. Physical examination and abdominal computed tomography (CT) are essential to guide the initial therapy. The nonoperative management is attractive once it avoids the morbidity of a nontherapeutic laparotomy, reported to be as high as 41.3%. In a hemo-

dynamically unstable patient with GSW of the liver, nonoperative treatment carries great controversy.
Objective To report two cases of nonoperative treatment of GSW of the liver with hemodynamic instability guided by an institutional protocol in the emergency department.
Methods Case reports.
Results *Case 1* A 37-year-old male patient became hemodynamically unstable and had systolic blood pressure of 90 mmHg 12 hours after admission on an institutional protocol to the emergency department. After infusion of 1,500 ml saline solution the patient rapidly became stable and 2 units red blood packed cells were administered. The abdominal CT scan showed injuries in segments 5, 6, 7 and 8. The control abdominal CT showed good evolution. *Case 2* An 18-year-old female patient suffered an isolated GSW in the right hippocondrius. The patient was admitted to the emergency room with hemodynamic instability, systolic blood pressure of 80 mmHg, cardiac frequency of 128, agitated and without verbal response. After infusion of saline solution the patient rapidly became stable and 2 units red blood packed cells were administered. The abdominal CT showed injuries in segments 7 and 8. A control abdominal CT was not necessary.
Conclusion Nonoperative treatment of GSW of the liver with hemodynamic instability is possible in selected young patients, who rapidly became stable after initial fluid reanimation, in the emergency room and guided by an institutional protocol.

P111

Emergency department decompressive laparostomy secondary to abdominal compartment syndrome

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Critical Care 2007, **11(Suppl 3):**P111 (doi: 10.1186/cc5898)

Background Abdominal compartment syndrome (ACS) is a multietiology disease secondary to traumatic and clinical conditions. It is defined by elevated intra-abdominal pressure, usually above 25 cmH_2O (Grades 3 and 4 intra-abdominal hypertension) associated with clinical signs of organ failure (respiratory, circulatory and renal). The measurement of intra-abdominal pressure is done through an intravesical catheter. The typical patient candidate for ACS usually has emergency abdominal surgery, shock and has received a massive amount of fluids and transfusion during initial resuscitation.
Objective To report two cases of nontraumatic ACS in the surgical emergency department.
Methods Case reports and literature review.
Results *Case 1* A 49-year-old female with an acute abdomen and chronic use of warfarin for a deep venous thrombosis of a lower extremity. The abdominal computed tomography (CT) scan showed a large pelvic hematoma with displacement of the bladder. The patient was treated initially with a conservative approach, but 12 hours after admission developed respiratory failure, shock, oliguria and abdominal distension. She was submitted to an endotracheal intubation and mechanical ventilatory support. The intra-abdominal pressure was 50 cmH_2O and a laparotomy was indicated. The hematoma was stable and was not explored. A laparostomy with two layers of a plastic bag was fixed according to an institutional protocol. In the postoperative period she was shifted to the ICU for 12 days, with gradual improvement of the condition and progressive laparostomy closure. *Case 2* A 70-year-old female was admitted to the emergency room 'in extremis', with abdominal distension, and developed cardiopulmonary arrest with important ventilatory restriction. An emergency department laparostomy with two layers of a plastic bag was fixed according to an institutional protocol. Following abdominal opening, immediate relief in restrictive ventilatory insufficiency was noted on a bag–valve–mask. A diagnosis of mesenteric ischemia was made and the patient died 24 hours later.
Conclusion Emergency department laparostomy can be a primary lifesaving procedure in patients with ACS and could be carried out, even in the emergency room, together with cardiorespiratory resuscitation.

P112

Simulation-based training on airway management: the experience with 311 trainees

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Critical Care 2007, **11(Suppl 3):**P112 (doi: 10.1186/cc5899)

Background Because ventilation and endotracheal intubation can be life saving for a patient in respiratory distress, airway management is among the key requirements of appropriate therapy in emergency and critically ill patients. Medical simulation used in combination with traditional training methods can provide a comprehensive learning opportunity that allows the clinician to safely learn, practice, and repeat the procedure until proficiency is achieved.
Objectives To address the use of medical simulation as a way for medical learners to acquire and maintain the skills needed to manage difficult airways. To evaluate the students' satisfaction with the course.
Methods The study was performed at Berkeley Training Center – Brazil, between August 2005 and February 2007, with a total number of 311 trainees. Trainees received a baseline evaluation followed by an 8-hour training session that involved an introductory lecture, a computer-enhanced mannequin simulator, clinical scenarios for training procedural skills in a difficult airway algorithm, and instructor-facilitated debriefings. After finishing the course, the trainees were retested and completed a numerical scale survey of their perceptions about our course (1 = poor, 2 = fair, 3 = good, and 4 = excellent).
Results Performance improved significantly after simulator training (48.5% vs 72.7%, $P < 0.001$). Seventy-five percent of participants scored less than 60% in the baseline evaluation, while only 25% scored less than 65% in the retest. The course was considered excellent by 70% of the participants and good by 29%.
Conclusion The extremely positive response to simulation-based training on airway management found in this pilot study suggests that this training modality may be valuable in the training of medical students and physicians. Simulation-based training is expected to become routine in many healthcare settings in the coming decade.
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P113

Survey of tracheostomy in the intensive care unit

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Critical Care 2007, **11(Suppl 3):**P113 (doi: 10.1186/cc5900)

Introduction Tracheostomy is a frequent procedure in the ICU. Two decades ago, the percutaneous technique became an option as a less invasive way of performing, and has since become the most frequently chosen technique.
Objective To describe our ICU's experience with tracheostomy.
Patients and methods Retrospective research was made of our ICU unit database, and the only patients chosen for this research were those who underwent tracheostomy in ICU I and II during 2005 and 2006. During this period, 49 patients realized tracheostomy. The assisting medical staff and the ICU routine staff worked together and decided about the indications for tracheostomy and the choice of technique. Data such as age, APACHE II score, reason for admission to the ICU, indication for the tracheotomy, type of tracheostomy, complications related to the procedure, as well as the patient's evolution, were analyzed, in retrospect, from the patients' charts. The complications were classified as minor or major, according to their severity.
Results The average age of the 49 patients submitted to the procedure was 67.7 ± 18.7 years. The APACHE II score varied from 6 to 34, with a median equal to 22 ± 6.72. The most frequent hospitalization causes were: pneumonia (28.5%), acute respiratory failure (22.4%) and stroke (18.3%). Concerning the tracheostomy indications, the most frequent was anticipation of prolonged mechanical ventilation, which occurred in 43 patients (87.8%), followed by protection of the airways, with six patients (12.2%) included in this case. The percutaneous technique was used in 32 patients (65.3%), and none of them required conversion to the conventional surgical technique. Nine complications occurred, the main one being autolimited bleeding (four cases). There was no mortality related to the procedure.
Conclusion Tracheostomy is a safe procedure that can be performed in the patient's bed, with a low complication rate. The most utilized technique was the percutaneous technique, representing a tendency of procedure choice in detriment to the conventional surgical technique.

P114

Outcome of patients submitted to orthotopic liver transplantation in a private clinic

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Critical Care 2007, **11(Suppl 3):**P114 (doi: 10.1186/cc5901)

Background Orthotopic liver transplantation (OLT) is one of the most complex surgical procedures, due to hepatic dysfunction, immunosuppression, and multiple anastomosis. Several complications are possible, making it necessary to provide an immediate, specialized, postoperatory intensive care treatment.
Objective To study the intrahospital evolution of patients submitted to OLT.
Methods A retrospective study of OLT patients from 1997 to 2007, in a private clinic of Rio de Janeiro. We collected data from comorbidities, characteristics of surgery, blood transfusions, sepsis, graft rejection, multiple organ dysfunction, APACHE II, SOFA and MELD scores, ICU and hospital length of stay, and outcome.
Results Thirty-one patients were studied; the mean (± SD) age was 49 ± 11 years; 16 male/15 female. The mean (± SD) collected scores were: MELD = 17 ± 6.7 points, SOFA = 4.3 ± 2.8 points, and APACHE II = 14.5 ± 6.2 points. The hepatic disease was: cirrhosis (77.4%), amyloidosis (6.5%), hepatitis C (54.8%), hepatitis B (6.5%), and hepatocellular carcinoma (9.7%). The main complications were: biliary fistulas (9.7%), hepatic artery thrombosis (12.9%), acute rejection (25.8%), pneumonia (29%), and acute renal failure (61.3%). Twelve patients (38.7%) were resubmitted to surgery, one of them for a retransplant. Collected scores were higher (mean ± SD) in deceased patients: MELD score – alive = 15.8 ± 5.1 points vs death = 22 ± 10.3 points, $P = 0.04$; SOFA score – alive = 3.75 ± 1.8 points vs death = 6.5 ± 3.8 points, $P = 0.03$; and APACHE II score – alive = 13.1 ± 4.8 points vs death = 20.3 ± 8.3 points, $P = 0.008$. The mean (± SD) ICU and hospitalization lengths of stay were 8.2 ± 6.3 days and 18.5 ± 8.3 days, respectively. The hospital mortality rate was 19.4%.
Conclusion The characteristics of our OLT patients were comparable with other published series. The MELD, SOFA and APACHE II scores were more elevated in deceased patients.