

## Report Documentation Page

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the mortality rate nearly doubles as \*net\* cumulative fluid intake strays further from an even balance in either positive or negative direction (though not statistically significant). Controlling for other factors (age, ISS, lactate, base deficit) net cumulative fluid intake narrowly misses statistical significance as a predictor of mortality ( $p=0.057$ ). Our evidence suggests that unabated fluid resuscitation in the blunt injured, critically ill trauma patient is associated with higher mortality. It also suggests that under-resuscitation is also associated with higher mortality.

## 1079

### ARE HEMOGLOBIN OXIMETRY, VITAL SIGNS AND LABORATORY VALUES ABLE TO PREDICT EMERGENCY TRANSFUSION?

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**Learning Objectives:** A non-invasive decision support tool for emergency transfusion decisions would benefit acute resuscitation. We tested whether 15 minutes of continuous pulse-oximetry-derived hemoglobin measurement [SpHb] can predict emergency blood transfusion better than conventional oximetry, vital signs, shock index(SI) or invasive laboratory testing (LAB). **Methods:** To test the hypothesis that trends of non-invasive SpHb, and conventional oximetric features predict emergency transfusion better than SI or inclusion of LAB measures, we enrolled trauma patients  $\geq 18$  years with pre-hospital SI  $> 0.61$ . We collected vital signs (VS =conventional and SpHb oximetry, heart rate, blood pressure) for 15 minutes and recorded emergency transfusion  $< 3$  hours after admission. 18 transfusion prediction models selected by stepwise logistical regression, including VS and LAB values were compared via Area Under Receiver Operating Curve (AUROC) and validated by leave-one-out methodology. **Results:** Of 677 patients, 59 were transfused. Conventional pulse oximetry, vital signs and LAB models predicted blood use with AUROC of 0.96, significantly better ( $p < 0.015$ ) than use of SpHb, vital signs and LAB testing (AUROC 0.93). Predictions of transfusion based on monitoring trends of SpHb, oximetric features and vital signs alone (AUROC 0.84) were not statistically better than trends of conventional pulse oximetry features and vital signs (AUROC 0.83,  $p = 0.43$ ). No models including SI were significantly better than those without SI. Conventional oximetry & LAB showed  $< 10\%$  difference between training and testing whereas models with SpHb had  $\sim 20\%$  difference. **Conclusions:** Models containing only features of conventional pulse oximetry were robust and no different than models including trends and absolute values of SpHb in prediction of urgent transfusion within 3 hours of patient admission. Both models containing oximetry features performed better at predicting early transfusion than pre-hospital SI, the current best non-invasive vital signs transfusion predictor. Funded by USAF 8650-11-6142

## 1080

### POSTOPERATIVE METABOLIC ACIDOSIS ASSESSMENT IN HIGH RISK SURGICAL PATIENTS: PROGNOSTIC IMPORTANCE

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**Learning Objectives:** Acidosis is a very frequent disorder in surgical patients. Therefore, it is very important to evaluate the role of acidosis in outcome for high-risk surgical patients. **Methods:** Multicenter prospective observational study. The patients who needed postoperative ICU were involved in the study consecutively. Patients with low life expectancy, hepatic failure, renal failure, and diabetic diagnosis were excluded. The patients were classified by admission from the ICU related to kind of acidosis in the immediately postoperative period. The classification evaluated metabolic acidosis by base excess  $< -4$  mmol/L and albumin-corrected anion gap and lactate, both  $> 12$  and  $> 2$  mmol/l, respectively. Acidosis patient's classifications were compared among them (hyperlactatemic, high and normal albumin-corrected anion gap) and to the non-acidosis. **Results:** The study involved 618 patients. Overall, the acidosis incidence was 59.1% on ICU admission, the most of them 148(23.9%) were normal anion gap. The normal anion gap group presented the highest chlorine level ( $P<0.05$ ) and highest administration 0.9% physiologic solution intraoperatively ( $P<0.05$ ). However, in spite of patients didn't present difference in severity and demographic profile, acidosis patients who remain after 24 hours with acidosis depend on classification group in postoperatively showed greater ICU complications, hyperlactatemia group 66%; high anion gap 48.1%; normal anion gap 47.9% and no acidosis 39.5%,

$P=0.03$ . Cardiovascular, neurologic and renal dysfunctions were the main complications and hyperlactatemia group showed the highest in all of them. In related to hospital mortality rate were 30.1 % (HR 1.61, 95%CI 1.02–2.53) hyperlactatemic; 24.3% (HR 1.37, 95%CI 0.76–2.46) high anion gap; 18.4% (HR 1.55, 95%CI 0.90–2.67) normal anion gap and 14.8% (HR 0.62, 95%CI 0.39–0.98) no acidosis group,  $P<0.001$  **Conclusions:** Metabolic acidosis in surgical patients is an important complication, mainly normal anion gap. Patients who developed metabolic acidosis postoperatively depend on classification group presented worst outcomes

## 1081

### SCHEDULED 23.4% SODIUM CHLORIDE FOR INTRACRANIAL PRESSURE CONTROL IN TRAUMATIC BRAIN INJURY

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**Learning Objectives:** Controlling intracranial pressure (ICP) below 20 mmHg is regarded as optimal for maintaining cerebral perfusion and oxygenation. Hyperosmolar therapy, with either mannitol or hypertonic saline is a common method of controlling ICP in patients with severe traumatic brain injury (TBI). Currently there is no published data examining the effect of scheduled 23.4% sodium chloride on ICP control. We report two cases of the use of scheduled 23.4% sodium chloride for ICP control in TBI patients. **Methods:** This case series reports on two patients with severe TBI who were placed on the institution's TBI protocol in addition to having an ICP monitor placed. Patients were treated with scheduled 23.4% sodium chloride at a dose and frequency at the discretion of the attending physician. We report on outcomes including, but not limited to: number of ICP elevations  $\geq 20$  mmHg, brain oxygen saturation (PbtO<sub>2</sub>), instances of serum osmolality  $\geq 320$  mOsm/L, instances of serum sodium  $\geq 160$  mEq/L, number of doses of 23.4% sodium chloride, and ancillary methods used to control ICP. **Results:** Instances of ICP elevations  $\geq 20$  mmHg were approximately 6% and 8% of recorded measurements. Scheduled 23.4% sodium chloride was continued for 12 and 15 days respectively. Both patients survived until hospital discharge; one patient was transferred to a skilled nursing facility, while the other was discharged home. Only one of the patients had a PbtO<sub>2</sub> monitor placed, however the number of instances of PbtO<sub>2</sub> of  $< 20$  mmHg were limited to 4% of measurements. Neither patient had serum sodium of  $> 159$  mEq/L. Serum osmolality was  $\geq 320$  mOsm/L in 10% of measurements in one of the patients and never elevated in the other. There were no instances of acute kidney injury in either patient. **Conclusions:** The use of scheduled 23.4% sodium chloride may be safe and effective in preventing ICP elevations in severe TBI patients, however further research is needed.

## 1082

### PREVALENCE OF KIDNEY INJURY IN BURN PATIENTS REQUIRING FLUID RESUSCITATION

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**Learning Objectives:** Optimal fluid resuscitation during the first 48 hours in patients with large burns is critical for improving outcomes and avoiding burn shock. However, it is unclear what the effect of fluid management is on kidney function during the resuscitation phase of care. The purpose of this study was to examine the prevalence of acute kidney injury (AKI) during resuscitation. We hypothesized that AKI is common during burn resuscitation and correlates with extent of the burn injury. **Methods:** We performed a retrospective review of consecutive patients admitted to our burn intensive care unit from December 2007 to April 2013 who were resuscitated using a computerized decision support system (CDSS) designed to optimize resuscitation. AKI was defined by the Acute Kidney Injury Network (AKIN) criteria and was assessed during the resuscitation period. Rates of AKIN were stratified by burn size. **Results:** The cohort was composed of 241 subjects. Mean total body surface area (TBSA) burn was  $40 \pm 20\%$ , weight was  $84 \pm 19$ kg, and age was  $46 \pm 19$  years. AKI occurred in 54% ( $n=131$ ) of patients with 43%, 20%, and 1% meeting criteria for AKIN 1, 2, and 3, respectively. There was a significant increase in overall AKIN rates for TBSA  $> 30\%$  (43% vs. 63%,  $p<0.01$ ) with AKIN 1 differing significantly from 31% to 53% ( $p<0.01$ ). Development of AKI was significantly correlated with increased resuscitation volume (ml/kg,  $p<0.001$ ) and mortality ( $p<0.01$ ). Increases in serum creatinine of  $> 0.3$  mg/dl in the last 48 hours was the leading cause of potential AKIN classification (79%,

n=104) of cases followed by low urinary output of 12 hours (19%, n=25) and low urinary output of 24 hours (2%, n=2). **Conclusions:** Based on the AKIN criteria, patients undergoing burn fluid resuscitation appear to be at risk of AKI.

The majority of patients with a TBSA greater than 30% will develop AKI based on increases to serum creatinine during resuscitation. In this study, AKI was rarely diagnosed by urine output criteria in the setting of burn resuscitation.

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### PREHOSPITAL MANAGEMENT AS A PREDICTOR OF MORTALITY IN TRAUMATIC BRAIN INJURY

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**Learning Objectives:** Objective: to determine the importance of intubation and sedation and others factors on mortality after traumatic brain injury.

**Methods:** Methods: a retrospective observational analytical study (TBI) in a intensive care unit of a reference Spain hospital. We study all patients admitted after severe traumatic brain injury associated with multiple trauma or just isolated TBI admitted between 2011 and 2012. The following variables were studied on admission: APACHE II, AIS severity scale, GCS score, Data Bank score, sex, age, sedation and intubation before admission. Others variables: prolonged stay, infectious complications, raised intracranial pressure at any time during the evolution, hospital mortality. **Results:** Results: we study 147 patients, mean age of 39 ± 18 years, APACHE II 18.1, ISS 16.3, Data Bank score 2.6, GCS 7.9 on admission. Hospital mortality was 30%. The univariate analysis showed that patients who died were older, had worse scores and were less likely to be intubated and sedated before admission, 72 vs 28%. There were significant differences, P < 0.005, when the initial CT severity according to the Data Bank score was ≥ 3 (40% mortality versus 10%, P:0.001), age more than 65 years, and when patients were not sedated or intubated before admission. No significant differences were found concerning mortality when the APACHE II was more than 15 or When the GCS score on admission was less than 8. The multivariate analysis showed that Data Bank score more than 3 and age more than 65 years were an independent risk factor for death (OR 1.9, P 0.001, CI 95% 1.3–1.9). **Conclusions:**Conclusions: Trauma severity score assessed by Data Bank score had more influence on mortality than sedation and intubation prior to hospital admission.

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### SURGERY DOES NOT MEAN STARVATION: THE SAFETY OF EARLY AND FULL TUBE FEEDINGS FOLLOWING PEG PLACEMENT

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**Learning Objectives:** Enteral nutrition plays an essential role in caring for the critically ill trauma patient. Malnutrition is present in up to 40% of intensive care unit (ICU) patients and is associated with an increased mortality. A recent study found that interruption of feeding in the ICU is associated with under-feeding, prolonged hospitalization, and ICU length of stay. One way to provide adequate and timely administration of nutrition is early enteral feeding at goal rate following PEG placement. **Methods:** We performed a retrospective study of all critically ill trauma patients that required PEG placement between February 2013 and April 2014. The patients were placed in two groups: those fed early (≤4hrs) and those fed late (>4hrs). The two groups were similar in regards to age, gender, ISS, and mechanism. A second analysis was then performed by dividing the patients into those with enteral feeds started at goal rate and those that were slowly increased to their goal. **Results:** There were a total of 73 critically ill trauma patients that required PEG tube placement. 28 were excluded due to insufficient data, leaving 45 total patients to be analyzed. 15/45 (33%) of patients were fed early and had no associated complications. The early group reached their goal rate significantly faster (14 hrs vs 32 hrs, p-value 0.001). Of all patients who had a PEG placed, 8/45 (18%) had their tube feeds restarted post-procedure at goal, and 5 of these were in the group that had their feeding started early after PEG placement. None of the patients that had post-procedure enteral feeding started early and initiated at goal rate had complications. **Conclusions:** It has been shown that ICU patients are highly susceptible to malnutrition, and the interruption of enteral feeding can have associated morbid consequences. Our study not only reinforces that it is safe to start enteral feeding early after PEG placement, but that it is also safe to start the feeding at the patients' goal rate. The utilization of this strategy will provide severely injured trauma patients with the critical calories needed for faster rehabilitation.

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### ACUTE RESPIRATORY DISTRESS SYNDROME AFTER TRAUMATIC HEMORRHAGIC SHOCK: MORE THAN JUST VENT SETTINGS!

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**Learning Objectives:** The cornerstone of management of acute respiratory distress syndrome (ARDS) is ventilator support. We hypothesize that in blunt trauma patients with hemorrhagic shock who develop ARDS, multiple factors serve as a "lethal double hit" and increase mortality risk **Methods:** The Glue Grant database was analyzed. All patients who developed ARDS were included in the analysis and all further analyses were performed in this subset only. Survivors and non-survivors were compared. Univariate and multivariate analysis were used to determine predictors of mortality **Results:** Out of 1976 patients, 465 (24%) developed ARDS. The mean age of the ARDS group was 46 years, 72% were males and 89% were Whites. Overall mortality in ARDS was 19.4% compared to 15.0% in those without ARDS (P=0.025). Compared to non-survivors, survivors were slightly younger (45 ± 17 vs. 50 ± 22, p=0.027), had lower multiple organ dysfunction score (7 ± 2 vs. 10 ± 3, p<0.0001), higher ER systolic BP (116 ± 31 vs. 108 ± 31, p=0.02), lower ER lactate (4.7 ± 2.6 vs. 5.7 ± 3.0, p=0.001), and received less blood (2677 ± 2343 vs. 4745 ± 5050, p<0.001), crystalloids (12773 ± 6641 vs. 14639 ± 8675, p<0.025) and fresh frozen plasma (915 ± 1124 vs. 1480 ± 1505, p<0.001). Non-survivors were more likely to develop abdominal compartment syndrome (p=0.008), cardiac arrest (p<0.001), DVT (p=0.002) and MI (p=0.12). Predictors of mortality include multiple organ dysfunction score (OR: 1.86, CI: 1.54–2.25, p<0.001), cardiac arrest (OR: 32.41, CI: 8.89–118.07, p<0.001) and angiographic embolization (OR: 4.14, CI: 1.74–9.85, p=0.001). Open non-femoral fixation was associated with decreased mortality (OR: 0.276, CI: 0.12–0.64, p=0.002) **Conclusions:** Open non-femoral fixation specifically reduce mortality risk in this patient population. Identifying and addressing the potential differences between survivors and non-survivors and addressing them may improve outcome

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### INTENSIVE CARE UTILIZATION OF PEDIATRIC PATIENTS UNDERGOING LAPAROTOMY AFTER ABDOMINAL TRAUMA

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**Learning Objectives:** Trauma remains the leading cause of death in children. Despite abdominal injuries accounting for a significant portion of pediatric trauma, our experience has shown that few pediatric patients require operative intervention. Little data is available to describe the course of illness after major abdominal injury in the pediatric population. We hypothesize that abdominal exploration in pediatric trauma patients is rare, but requires significant utilization of intensive care resources. **Methods:** We retrospectively surveyed the pediatric trauma registry at the Rady Children's Hospital of San Diego to identify trauma admissions between July 2006 and December 2013. Patients < 14 years of age presenting to the pediatric trauma bay for evaluation of traumatic were included for analysis. Data collected included demographics, mechanism of injury, operative interventions, pre- and post-operative laboratory values, length of stay, ventilator days, vasopressor requirements, and positive bacterial cultures. **Results:** Of 8499 trauma admissions, we identified 55 pediatric patients (0.6%) who underwent laparotomy or laparoscopy after traumatic injury. Common etiologies of trauma requiring abdominal intervention were motor vehicle accident (33%), bicycle accidents (20%) and stabbings (15%). Average time to laparotomy was 19h36m(+/-53h56m). Average ISS of patients requiring surgical intervention was 18.69(+/-17.43). Six laparoscopies were performed, of which 4 required laparotomy. Re-exploration was required in 14.5%, 63% of which were planned after damage control laparotomy. 42% of patients required transfusion, 44% of patients required mechanical ventilation for 7.5(+/-7.8) days, and 26% of patients required vasopressors for 6.1(+/-7.0) days. Intra-abdominal bacterial contamination was found via positive culture in 19% of patients, with