

## Report Documentation Page

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follows: 661 for BG < 80, 631 for 80–120, 803 for 121–150, 838 for 151–200, and 898 for BG > 201. Analysis revealed a statistical significant difference among groups ( $P < 0.04$ ). **Conclusions:** Our results demonstrate a significant and early association between MMP-9 levels and BG levels in severe sepsis and septic shock patients. This observation provides further elucidation regarding the control of blood glucose and inflammation in sepsis. Furthermore, if an independent antagonism of MMP-9 is considered as therapeutic intervention, it must occur early in the course of severe sepsis and septic shock as this association is established in the most proximal phase of hospital presentation for maximal benefit.

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## SHOCK INDEX AS A PREDICTOR OF OUTCOMES IN PATIENTS WITH SEPTIC SHOCK

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**Learning Objectives:** Severe sepsis and septic shock are major causes of death in hospitals across the United States. The shock index (SI), calculated as heart rate divided by systolic blood pressure, has been studied as a risk stratifying tool in patients presenting to the emergency department with severe sepsis and has been shown to predict disease escalation. However, it has not been studied in intensive care unit (ICU) patients. In this study, we evaluated if a sustained SI can be used to predict outcomes in patients admitted to the ICU with septic shock who had been initially successfully resuscitated. **Methods:** Patients admitted to the ICU with severe sepsis or septic shock requiring vasopressor support within 48 hours and successfully resuscitated were retrospectively identified. The shock index was calculated for each set of vital signs from the time of withdrawal of vasopressor support for a total of 96 hours or until an outcome measure was met. **Results:** A total of 46 patients were identified with mean age of  $61 \pm 13$  years. Fifty two percent were male and 80% were African Americans. Sustained SI elevation was present in 29 (63%) patients. There were a total 18 (39%) ICU deaths. ICU mortality was significantly higher in those with sustained SI elevation; 15 (52%) compared to 3 (18%) without a sustained SI elevation ( $p=0.022$ ). Patients with sustained SI elevation had significantly higher lactate levels ( $3.3 \pm 2.3$  vs  $1.9 \pm 1.3$ ;  $p=0.034$ ). There was no difference in the MPM 11 score between the 2 groups ( $62.3 \pm 26.1$  vs  $63.0 \pm 20.4$ ;  $p=0.711$ ). ICU length of stay was  $16 \pm 11$  days in the sustained SI elevation group compared to  $10 \pm 9$  in the non-sustained group ( $p=0.087$ ). **Conclusions:** Our findings indicate a sustained SI elevation was associated with worse outcomes in ICU patients who were initially successfully resuscitated for septic shock. Further studies with larger sample sizes are needed to confirm these findings in order to determine whether the SI can be used to risk stratify patients in the ICU.

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## PRACTICES AND PERCEPTIONS OF ED AND ICU RNS REGARDING INITIAL IV ANTIBIOTIC THERAPY FOR SEPTIC SHOCK

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**Learning Objectives:** The rapidity by which adequate IV antibiotic (ABX) therapy is initiated in septic shock (SS) affects mortality. While nurses (RNs) can influence the speed by which IV ABX are initiated in SS, their practices and perceptions surrounding ABX timing and sequencing remains unclear. **Methods:** A validated and anonymous written survey was distributed to 115 full-time critical care RNs (both ED and ICU) at a 320-bed medical center with a well-established sepsis protocol advocating that first-dose IV ABX therapy be initiated within 1 hr of SS recognition. **Results:** Among 100 (87%) RNs responding, most worked in a medical ICU (67%), had at least 5 yr of ICU/ED experience (68%), had managed  $\geq 2$  pts with SS in the prior 4 weeks (57%) and were aware that an institutional sepsis protocol existed (80%). The stated preferred initial therapeutic interventions for SS, that were found to be independent of central venous catheter availability, included: fluid only (40%), concomitant fluid and ABX (40%); concomitant fluid, ABX and vasopressor(s) (14%). Although 99% (either strongly or moderately) agreed that early ABX administration is associated with better survival and 98% agreed that RNs strive to initiate ABX therapy within 1 hr of SS recognition, 30% agreed that fluid status should be optimized before ABX were initiated. Barriers to rapid ABX administration (frequently or always) reported were: excessive patient workload (74%), no notification from MD of new ABX order(s) (57%), inadequate IV access because of multiple non-ABX medications (54%), no IV access (51%), a lack of availability of ABX on the unit (50%), and a patient off unit for an urgent procedure/test (47%). Factors (frequently or always) reported to influence the sequence by which two different ABX should be initiated included ABX availability (75%), infusion time (71%), and the number of potential IV compatibility issues (25%). **Conclusions:** Multiple factors that influence the rapidity and sequence by which ABX are initiated

by ED and ICU RNs for patients with SS should be considered when SS quality improvement efforts are being formulated.

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## EVALUATION OF BURN SEPSIS AUTOMATED ALERTS IN AN INTENSIVE CARE UNIT

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**Learning Objectives:** In spring 2013 the burn unit initiated Sepsis Alert software. Continuous electronic medical record (EMR) screening used novel predictors of burn sepsis (Burn6 Criteria): heart rate (HR) >130 bpm, mean arterial pressure (MAP) <60 mmHg, base deficit (BD) <-6 mEq/L, temperature (T) <36°C, use of vasoactive medications (VM), or glucose >150 mg/dl. We hypothesize sepsis alerts will be both accurate and meaningful to the provider to avoid "alert fatigue" prior to expanding the number of clinical staff receiving the alerts. **Methods:** Prospective observational study of alert performance was conducted. An automated email was sent to identified personnel. Simple rules included:  $\geq 2$  of the parameters are out of range; patient  $\geq 48$  hours post admission;  $\geq 12$  hours post-operative; and admitted to the intensive care unit. EMR was reviewed for clinical applicability for each alert. Descriptive and non-parametric statistics were used to describe variables when alert triggered vs not triggered. **Results:** From 8/2013–7/2013 149 alerts were generated on 47 patients ( $3.7 \pm 3.6$ ; range 1–16 alerts/patient) with  $24 \pm 16\%$  total burn surface area. Frequencies of variables in alerts, with value mean  $\pm$  SD for triggered vs not triggered respectively, were: glucose 67%,  $181 \pm 32$  vs  $117 \pm 20$ ; MAP 67%,  $56 \pm 4$  vs  $81 \pm 14$ ; VM 48%,  $1.4 \pm 0.6$  vs  $0 \pm 0$ ; HR 27%,  $139 \pm 14$  vs  $97 \pm 18$ ; T 15%,  $35.6 \pm 0.4$  vs  $38 \pm 0.9$ ; and BD 4%,  $-8.2 \pm 3$  vs  $3.7 \pm 4$  (all p values within groups <0.0001). Each alert contained 2.1  $\pm$  0.31 (range 2–4) variables. Patients were receiving antibiotics and antifungals concurrent with 50/71 and 21/70 alerts, respectively. Cultures were obtained after 7/65 alerts, and prior to 27/65 alerts. Lactate was  $\geq 2$  mEq in 15/55 instances. **Conclusions:** BD and T appear to be poorly correlated with burn sepsis alerts. Most patients were receiving antimicrobial therapy when alert was triggered; a small number of alerts preceded culture acquisition. Current alerts appear inaccurate and lack sensitivity to avoid becoming a nuisance to providers. Additional parameters such as lactate or procalcitonin may improve automated alert usefulness.

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## SEPTIC SHOCK - STEROID TREATMENT DECREASES A MARKER OF MICRO VASCULAR LEAKAGE

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**Learning Objectives:** Hypotension in septic shock (SS) is often due to a combination vasodilatation and increased vascular permeability. This combination of physiologic responses has been associated with dysfunction of the hypothalamic pituitary adrenal axis caused by inflammatory mediators. Micro vascular leakage leading to tissue edema and decreased intravascular volume has been associated with changes in cortisol levels and Vascular Endothelial Growth Factor (VEGF). VEGF is a proteomic marker which is seen with increased vascular leakage. This project attempted to describe VEGF at the time of SS diagnosis (ENR), at 72 hrs (T72) and 7 days (D7) after SS onset and the influence of steroid treatment on VEGF levels. **Methods:** We prospectively analyzed data of 141 vasopressor dependent (VP) SS pt admitted to medical and surgical intensive care units (ICU) who received a complete cosyntropin stimulation test (CST) after volume resuscitation (Oct 2010–Jan 2013). Steroid use was determined by the treating clinician's discretion. VEGF levels were measured at enrollment, 72hrs and 7days by independent laboratory without access to the clinical data. Combined clinical and VEGF data was analyzed using univariate analyses  $X^2$  or Fisher's exact tests as appropriate. with p-value <0.05 considered statistically significant. **Results:** Data was grouped according to maximal Cortisol peak ( $30 \mu\text{g/mL}$ ) after the CST. Patients who had Cortisol peaks (CoP) >30 had similar VEGF levels at ENR for patients later treated or not treated with steroids ( $284.8$  vs  $292.0 \mu\text{g/mL}$ ), however the patients treated with steroids showed a trend for decreasing VEGF levels at T72 ( $265.6$  vs  $370.8 \mu\text{g/mL}$ ), with significant decreases in VEGF levels at D7 ( $327.8$  vs  $564.4 \mu\text{g/mL}$ ,  $p 0.001$ ). Similar trends for VEGF were observed of patients with CoP < 30 when treated with steroids: ENR:  $385.2$  vs  $342.0 \mu\text{g/mL}$ ; T72:  $381.1$  vs  $359.7 \mu\text{g/mL}$ ; D7:  $275.7$  vs  $639.5 \mu\text{g/mL}$ . **Conclusions:** All SS pts may benefit from steroid treatment based on the fact that the marker of vascular leakage such as VEGF is reduced in pts who receive steroid treatment compared to not steroid treated pts.