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wide discrepancy between the predicted and observed percentages. The differences were statistically significant. The equation for our geographical area had similar discrepancies: H=36.47 (p<0.001). **Conclusions:**The patients admitted to our ICU for intoxication presented a high gravity according to SAPS-3, but observed mortality was well below that predicted, these discrepancies being very high. SAPS-3 is not useful for evaluating

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THE HANDOFF CONTINUITY SCORE (HCS) CORRELATES WITH ROUNDING EFFICIENCY

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Learning Objectives: The Handoff Continuity Score (HCS) is a mathematical model that objectively measures MD continuity with different physician scheduling models (Critical Care 2011, 15:R246). HCS is subjectively associated with increased efficiency based on physician surveys. Objective evidence of improved handoff efficiency and effectiveness is lacking. The hypothesis of this study is that increased HCS will be associated with improved rounding efficiency. **Methods:** The study was performed in a 30 bed medical-surgical pediatric intensive care unit, and was approved as non-human subject research by the institutional review board. Human factors techniques (e.g. shadowing) were used to track and observe physician-rounding events on select dates between 2008–2013. Total rounding time was divided by number of patients seen to determine rounding time per patient (to correct for census). HCS for each attending on the specific rounding events were calculated. Rounding time per patient was charted against HCS. **Results:** There were 41 individual rounding events shadowed during the study period. HCS ranged from 0–1. Total rounding time per patient ranged from 6.5 - 18.1 min. The mean rounding time at an HCS of 0 was 12.4 ± 2.2 and at 1 was 11.1 ± 0.7. Across the entire range there is a statistically significant decrease in rounding time with increasing HCS (p<0.05 calculated using Pearson's correlation coefficient r). **Conclusions:** Higher continuity as assessed by HCS is associated with improved rounding efficiency. Utilizing the HCS in schedule generation for physician staffing may be an effective tool to enhance rounding efficiency.

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PERIPHERALLY INSERTED CENTRAL CATHETER INSERTION USING VASCULAR POSITIONING SYSTEMS IN CRITICAL CARE

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Learning Objectives: The American Board of Internal Medicine does not require competent performance of central line procedures for residents creating a skills gap in providers. Peripherally inserted central catheter (PICC) placements have increased to meet this need. PICCs placed at the bedside by vascular access teams are used for monitoring and resuscitation but insertion times are unknown using vascular positioning systems (VPS). We hypothesize that PICCs placed in critically ill patients (pts) for hemodynamic monitoring using novel VPS's can be performed efficiently and safely. **Methods:** In an adult academic medical center, an existing PICC database was retrospectively reviewed. A convenience sample of 25 consecutive critically ill pts requiring PICC placement for hemodynamic monitoring was selected. Open ended PICCs were inserted using a novel Doppler and intravascular EKG positioning system and CXR was used to confirm catheter position. All results expressed as median and ranges. Statistical comparison was made between sepsis and non-sepsis pts using Mann–Whitney U test for continuous variables and Fisher's exact test for categorical variables. **Results:** Patients median age was 65 (28–82) and APACHE IVa score 56 (33–111). Sepsis was diagnosed in 44% of pts with an APACHE IVa score of 85 (38–111) versus non–septic pts 44 (33–93) (p=0.03). Bedside PICCs were successfully inserted in 96% of pts with a procedure time (PT=puncture to use) of 14(3–45)mins and insertion time (IT=request to use) of 60(23–213)mins. VPS confirmed location in 68% of pts and failure did not delay PT or IT. There was no significant difference in IT or PT regardless of BMI, severity of illness or diagnosis. Complications included catheter repositioning (8%,n=2) and local hematoma (4%,n=1). No other insertion related mechanical complications were noted. **Conclusions:** In critically ill pts, it may possible to rapidly, successfully and safely secure central venous access using PICCs inserted by specialized vascular access teams using VPS's. Additional research is necessary to further improve efficiency vascular access teams and effectiveness VPS's.

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DOES IT MATTER WHO INTUBATES PATIENTS? A COMPARISON OF ENDOTRACHEAL INTUBATION PRACTICE PATTERNS.

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Learning Objectives: Endotracheal intubation (ETI) practiced outside the operating room is mainly performed by Intensivists (IC), Anesthesiologists (AN) and Emergency Department (ED) physicians. We hypothesized that there will be a difference in practice patterns of ETI between providers based on the different clinical settings they encounter and the longer term management goals that Intensivists are faced with. We aim to highlight the differences in practice patterns that may effect patient safety and outcomes. **Methods:** A retrospective chart review was performed on all endotracheal intubations over a five year period (n=215). Parameters compared between IC, ED and AN intubations were the use of a) videolaryngoscopy, b) paralytic agents, c) waveform capnography and d) endotracheal tube (ET) size. Pairwise comparisons was used to assess differences in between groups. **Results:** Intensivists used videolaryngoscopy more than ED or AN physicians (67% (IC) vs. 47% (ED) vs. 43% (AN) p=0.018). Confirmation of correct ET placement by waveform capnography was also performed more by IC physicians (99% (IC) vs. 86% (ED) vs. 86%(AN) p=0.003). IC physicians also tended to use a larger size ET tube size ≥ 8mm (95% (IC) vs. 60% (ED) vs. 71% (AN) p=<0.001). Intensivists also used paralytics less frequently (12% (IC) vs. 50% (ED) vs. 36% (AN) p=<0.001). There was no significant statistical difference in esophageal intubations, post intubation hypotension or cardiac arrest. **Conclusions:** Intensivists used videolaryngoscopy, larger ET tubes, and waveform capnography more often than ED or AN, and used less paralytic agents. Videolaryngoscopy and waveform capnography are instrumental tools that increase the safety of the ETI process. The use of paralytics such as succinylcholine does come with the added risk of prolonged paralysis and cardiac arrhythmias. Larger ET tubes also facilitate the management of mechanically ventilated patients. In our study there was no significant difference in adverse outcomes, however based on the difference in these patterns noted we believe that larger scale studies are needed to unveil such outcomes.

Poster Session: Quality and Safety 8

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DEVELOPING A COOPERATIVE COMMUNICATION SYSTEM FOR SAFE, EFFECTIVE, AND EFFICIENT PATIENT CARE

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Learning Objectives: Developing ecologically valid information technologies (IT) for the intensive care unit (ICU) is challenging. Traditional, quantitative research designs do not sufficiently account for the complexities of individual and team decision making in this work domain. Using a mixed methods Cognitive Systems Engineering (CSE) approach offers a means to go beyond surface descriptions (phenotypes) of the ICU work domain and to reveal underlying patterns (genotypes) of systemic factors that impact decision making. The model of cognitive work it produces supports IT solutions that support clinical work, making decisions more accurate, reliable, and efficient. **Methods:** A mixed methods CSE approach including observations, interviews, surveys and artifact analysis was conducted over one year during five week-long visits to a 16 bed regional referral Burn ICU in a 450 bed academic military medical center. **Results:** We discovered 21 barriers to effective patient care including: synchronization of care; awareness of coupled activities; communicating change in patient status across disciplines; availability of current information; delayed, missing, or replaced orders; reliance on verbal orders; coordination between shifts; documentation time; IT process requirements frequently require

redundant information capture; data trends not readily available; human data integration; knowledge of resource availability (e.g. who is on the unit); coordination between the BICU and OR; rounds checklist not available to all team members; tracking of dropped tasks; unclear responsibility for task completion; time spent tracking down in-process items like meds and labs; reliance on nurses to track and fix information gaps/resolve conflicts; matching resources to needs; errors (e.g. wrong orders) require unit members to rectify. **Conclusions:** These barriers affect the cognitive work of Burn ICU clinicians and introduce risk to accurate, reliable, and efficient decision making. An ecologically valid IT system such as the one this project is developing can reduce these barriers by improving decision making in the Burn ICU.

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IMPROVING PEDIATRIC SEPSIS CARE THROUGH COLLABORATION

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Learning Objectives: Sepsis is a major cause of hospitalization with an increasing incidence. Pediatric intensivists have spearheaded the establishment of guidelines for the identification and management of sepsis and severe sepsis. The use of sepsis screens on pediatric inpatient units has not been widely reported. As of April 2014, NYS has mandated that hospitals have in place systems to identify and manage patients with severe sepsis. We describe our experience with the development and early application of a pediatric sepsis identification tool. This tool represents intensivist, multi-specialty and mulit-disciplinary collaboration to recognize and manage children with sepsis and severe sepsis in a timely and evidence-based fashion regardless of their location in the hospital. **Methods:** A sepsis identification tool and severe sepsis protocol were developed based on a literature review. Stakeholders meetings were held to further refine the tool and protocol. End-user education was conducted in a multidisciplinary fashion. Implementation consisted of ongoing education, mock cases and PDSA cycles. Data were reviewed at regular intervals to allow for tool and protocol modification. **Results:** Health care provider response to sepsis alerts improved from 50% to >80% since tool institution. There was an average rate of 40 positive sepsis identification tool (SIT) triggers per 1000 patient days. In a 6 month period 28% of patients with a positive SIT had sepsis and 6% had severe sepsis. Interim review showed 67% received first fluid bolus within 20 minutes of identification of severe sepsis and 83% received a 20ml/kg bolus. All had blood cultures drawn prior to antibiotics. The majority were already on antibiotics at the time of sepsis trigger but 16% had a delay in receiving antibiotics. All patients went to the ICU. **Conclusions:**Sepsis and severe sepsis occur in children admitted to the pediatric inpatient unit. This can be identified early with the use of inpatient ward sepsis identification tools. Collaboration across specialties and disciplines, including involvement of the pediatric intensivist, is necessary for success.

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CHARACTERISTICS OF CHILDREN WITH HOSPITAL ACQUIRED PRESSURE ULCERS IN AN INTENSIVE CARE UNIT

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Learning Objectives: Although the quantitative rate of hospital-acquired pressure ulcers (HAPUs) in the pediatric intensive care unit (PICU) is reported regularly for quality purposes, the qualitative characteristics describing PICU patients with HAPUs have yet to be analyzed. PICU patients who develop HAPUs will frequently possess certain characteristics, including but not limited to prolonged PICU length of stay (LOS), need for mechanical ventilation, reliance on intravenous nutrition, and steroid usage. **Methods:** Potential HAPUs within a 34 bed PICU at a large urban academic children's hospital were identified by bedside nurses daily and subsequently assessed by a wound nurse specialist. Using this demographic data, a database spanning a 24 month period, from January 2012 to December 2013, was created by retrospective chart review. **Results:** In 2012 and 2013, 54 total HAPUs (2.4 HAPUs/1000 patient days) were identified. 81.5% of HAPUs were classified as either Stage I or II, and 18.5% were classified as Stage III, IV, or unstageable. The most common locations for ulcers were sacral (37%), occipital (20.4%) and ear (11%). The mean modified Baden Q Score at diagnosis of HAPUs was 15. The median age of patients with HAPUs was 9.5 years, with a median PICU LOS (prior to developing HAPUs) of 10 days, and mortality during their hospitalization of 24%. 48% of the patients who developed HAPUs developed multiple HAPUs during their hospitalization. Factors present during the 7 days immediately prior to developing HAPUs included: mechanical ventilation (87%), vasoactive medication (56%), sedation infusion (70%), paralytic infusion (30%), total parenteral nutrition (39%) and steroid usage (28%). **Conclusions:** This study identifies the frequency of high-risk characteristics of patients who developed HAPUs in our PICU over a two-year period. Awareness about potential HAPU risk factors helps identify targets for ulcer prevention, including changing the practice of positioning mechanically ventilated and sedated patients, rethinking the use of extended electroencephalography, and the introduction of sedation holidays.

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EVALUATION OF VARIOUS VENTILATOR-ASSOCIATED INFECTION CRITERIA IN THE PEDIATRIC ICU

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Learning Objectives: Ventilator-associated pneumonia (VAP) is a common hospital-acquired infection in the PICU and accounts for increased use of healthcare resources. Other ventilator-associated infections (VAI) are described with various diagnostic criteria, including lower respiratory tract infection (LRTI), ventilator-associated tracheobronchitis (VAT), and infection-related ventilator-associated condition (IVAC). The objective of this project was to evaluate various VAI to determine their rates and outcomes. We hypothesized that different VAI rates would vary and that outcomes would differ between them. **Methods:** Over a six-month time period from January through June 2013, we evaluated all children mechanically ventilated for >48 hours in our PICU, a 28-bed medical-surgical unit in a large tertiary care children's hospital. Data were retrieved from the Virtual PICU system, including age, sex, race, PICU length of stay, duration of mechanical ventilation and mortality. Respiratory culture results and signs and symptoms of the various VAI were manually abstracted from the electronic medical record. Diagnoses of various VAI were assigned by evaluating these data. **Results:** There were 1195 ventilator days in 142 patients. 24 respiratory cultures were sent to evaluate for potential VAI. Ten patients met criteria for at least one VAI; 3 LRTI, 1 VAT, 2 VAP, 2 IVAC, 1 VAT and LRTI, and 1 VAP and IVAC. The rate of diagnosis of any VAI was 8.36/1000 ventilator days; LRTI 3.35, VAT 1.67, VAP 2.51 and IVAC 1.67. None of the demographic characteristics were associated with VAI with the exception of IVAC and older age (p=0.013). No VAI was associated with increased PICU length of stay or mortality. All were statistically significantly associated with increased duration of mechanical ventilation. **Conclusions:** Rates of individually defined VAI are low and different patients meet various criteria. The rate of having any one VAI is significantly higher than the rate of any individual VAI. All are associated with increased length of mechanical ventilation. A more inclusive definition of VAI is warranted for diagnosis and surveillance.

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OPTIMIZING CLINICAL DECISION SUPPORT USING PUSH NOTIFICATION OF SHOCK INDEX IN A PICU

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Learning Objectives: Clinical decision support (CDS) helps caregivers identify problems earlier by detecting predetermined triggers. Effective CDS notification depends on the value of message information and the delivery medium. Our quality aim was to identify the value of CDS information in an automated push of Shock Index (SI=HR/SBP) > 2 to a dedicated pager. We hypothesized that timely delivery of SI could function as a new decision trigger. **Methods:** Our IRB waived the need for informed consent. Continuously updated, near-time values for heart rate (HR) and systolic blood pressure (SBP) were extracted from our commercial EMR by a locally-developed decision support program. For calculated SI > 2, messages with bedspace and SI were sent to the pager. During the study period, the page recipient was asked to document whether or not an intervention was performed after patient evaluation. Differences in SI for Intervention (I+) and Non-intervention (I-) groups were analyzed by Mann-Whitney U test, with statistical significance at a value of p<0.05(*). **Results:** Over 30 days, 26,616 SI calculations resulted in 988 SI values > 2 (3.7% incidence). After filtering for repeat triggers under 4 hours, 219 notifications were sent and 137 responses were collected. Of those, 39 notifications (28%) were I+. Median SI was increased in the I+ group (2.28, 2.18:2.41,95% CI) as compared to the I- group (2.13, 2.09:2.19,95% **Conclusions:** Push delivery of CDS by pager is technologically feasible. For SI triggers, 28% of notifications resulted in an intervention. Higher SI values were statistically associated with a higher likelihood of intervention. Optimal CDS is based on timely information being delivered to the correct practitioner.