Conclusions: In this cohort of ED patients with pneumonia, qSOFA ≥2 was a stronger predictor of inpatient mortality and ICU utilization compared to CRB ≥2, CRB-65 ≥2, and CRB-65 plus ≥3. qSOFA may be used as a predicting tool for pneumonia patients at risk for poor outcomes.

31 Performance of a Novel Computer-Based Clinical Decision Support Alert and the Impact of Patient Partitioning and Optimization to Identify Septic Patients in an Urban Emergency Department
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Study Objectives: Sepsis is a common condition that requires expeditious recognition and management. Computer-based clinical decision support (CDS) alerts are important tools to achieve management goals; however, performance limitations and errors can create excessive noise and alert fatigue. We have an existing CDS in our electronic health record (EHR) to identify sepsis patients, but its utility is limited based on the excessive false positives, which impair its value. The objective of this study was to report the performance of a novel knowledge-based computer CDS to identify emergency department (ED) patients with sepsis.

Methods: We developed a novel computer-based tool utilizing fuzzy logic and machine learning techniques to optimize performance accuracy of our sepsis alert while minimizing false positives. Components of the model include vital signs, demographics, nursing assessments and specific laboratory variables. The model is a point-based system with variable components weighted individually. An alert was fired when the model’s logic exceeded the established threshold. One year of sepsis cases was selected based on ICD codes and was matched with a random one-year sample of non-sepsis cases admitted to the hospital from the ED of a large urban Level I tertiary care center. Each case was adjudicated individually to confirm accurate ICD coding and was categorized based on traditional sepsis definitions into sepsis, severe sepsis, septic shock or non-sepsis. Additionally, the model was then modified to partition patients into 12 separate groups based known risk factors for sepsis: age, nursing home residency (yes/no) and hemodialysis status (yes/no). The model’s accuracy was then optimized within each group individually.

Results: The performance analysis was based on one year of adult sepsis patients (n=912) and a random sample of adult non-sepsis patients all admitted to the hospital (n=975). The sensitivity (Sn), specificity (Sp) and positive predictive value (PPV) for overall performance of the model was 81.6%, 91.3% and 89.9% respectively. The Sn, Sp and PPV for identifying just [severe sepsis + septic shock] was 86.9%, 91.1% and 87.3% respectively. The Sn, Sp and PPV for identifying just [septic shock] was 97.2%, 91.1% and 82.0% respectively. After alert threshold was optimized targeting the best sensitivity based on the 12 separate patient groups, the resulting Sn, Sp and PPV was 94.4%, 73.4% and 76.8% respectively. For 9 of the 12 patient groups including 467 patients (24.7%), the sensitivity achieved 100%. The remaining three groups had sensitivities of 88.8% (n=730; 38.7%), 97.1% (n=189; 10%) and 92.5% (n=501; 26.6%).

Conclusions: Our novel computer-based CDS alert resulted in acceptable sensitivity while minimizing resulting false positives. Partitioning patients into groups based on demographic features may improve performance characteristics. Further analysis on a larger prospective sample and with additional optimization in the live EMR environment is required.

32 Predictors of Mortality Among Head Trauma Patients Reaching ICU
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Study Objectives: Traumatic brain injury is a leading cause of morbidity and mortality worldwide. Ninety percent occurs in low and middle income countries. We construct a predictive model for mortality in head injury patients on the basis of easily available parameters.

Methods: Prospective randomized study that included 100 head trauma patients admitted to the ICU in a period of 15 months. Demographic data, diabetes, hypertension and cardiac history were recorded. Admission blood samples were obtained for CBC, coagulation profile, kidney and liver functions tests and lactate level and random blood glucose level. Receiver operating curve (ROC) analysis including the area under the ROC and multivariable logistic regression were used to identify independent mortality predictors of admission parameters to create a prognostic model.