Decreasing Time to Broad Spectrum Antibiotics for Septic Patients in the Emergency Department

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Background
- Infection
  - Typical host response
  - Dysregulated host response
- Sepsis
- Severe Sepsis
- Septic Shock

Antibiotics and Sepsis
- Literature has suggested that every hour in delay to broad spectrum antibiotics is associated with a 7.6% increase in mortality
  - Surviving Sepsis Campaign recommends antibiotics as soon as possible and within one hour of sepsis identification
  - SEP-1 CMS measure includes antibiotics within three hours of sepsis recognition

Emergency Department (ED) Pharmacists and care of Septic patients
- Retrospective chart review over two year period
- 83% Consults for antimicrobials – most often appropriate dose or selection of empiric antimicrobial agents for septic patients

Objective
To decrease time to broad spectrum antibiotic administration for septic patients in the Aurora St. Luke’s Medical Center ED.

Methods
- Create tool to identify potentially septic patients
  - Two more modified SIRS criteria plus either a lactate or blood culture ordered
  - Modified SIRS Criteria
    - Heart Rate: > 90 bpm
    - Respirations: > 20 rpm
    - Temperature: < 36°C or > 38.3°C
    - White Blood Cells: < 4,000/mm³ or > 12,000/mm³
- Implement electronic medical record (EMR) pharmacist alert
- Educate physicians, nurses, and pharmacists

Pharmacist Response to Electronic Alert
- Summarized Pharmacist Workflow
  - Review patient profile (culture history, allergies, tolerances)
  - Assess and/or recommend antibiotic agents and dose
  - Encourage efficient administration of antibiotics

Results
- Median Time from ED admission to antibiotics
  - Pre-alert: 2.8 hours (0.77 – 10.16)
  - Post-alert: 2.38 hours (0.73 – 11.20)
  - Wilcoxon two-sample test: p = 0.33

Antibiotics Within One and Three Hours of Admission
- Antibiotics (%) within 1 hour: 67.3%
- Antibiotics (%) within 3 hours: 74.3%
- Antibiotics < 1 hour Fisher’s exact test: p = 0.68
- Antibiotics < 3 hours Chi-square test: p = 0.49

Conclusions
- Electronic alerts sent to the pharmacist decreased the median time to antibiotic administration for septic patients in the ED
- Electronic alerts sent to the pharmacist increased the percentage of septic patients that received antibiotics within one hour
- Electronic alerts sent to the pharmacist increased the percentage of septic patients that received antibiotics within three hours
- None of the findings were statically significant

Future Direction
- Evaluate alert criteria to improve positive predictive value
- Consider creation of EMR workflow to easily track care of septic patients
- Evaluate mortality benefit of implementing this intervention
- Consider creation of similar alerts for other goal driven disease states with recommended treatment algorithms

Limitations
- Small sample size may have limited ability to find statistical significance
- Alert fired frequently on patients that were not determined to have severe sepsis or septic shock
- CMS criteria for determining severe sepsis and septic shock are based on the definitions prior to 2016

References