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

Joseph Zieminski, PharmD, Emily Bryant, PharmD, BCPS
Aurora Health Care Metro, Inc., Milwaukee, WI

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

**Methods**
- **Create tool to identify potentially septic patients**
- **Implement electronic medical record (EMR) pharmacist alert**
- **Educate physicians, nurses, and pharmacists**

**Modified SIRS Criteria**

<table>
<thead>
<tr>
<th>Modified SIRS Criteria</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>&gt; 90 bpm</td>
</tr>
<tr>
<td>Respiration</td>
<td>&gt; 20 rpm</td>
</tr>
<tr>
<td>Temperature</td>
<td>&lt; 36°C or &gt; 38.3°C</td>
</tr>
<tr>
<td>White Blood Cells</td>
<td>&lt; 4,000/mm³ or &gt; 12,000/mm³</td>
</tr>
</tbody>
</table>

**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 (n = 65)
  - Post-alert (n = 74)
- Wilcoxon two-sample test
  - p = 0.33

- **Antibiotics Within One and Three Hours of Admission**
  - Antibiotics (%) within 1 hour
  - Fisher’s exact test
    - p < 0.05
  - Antibiotics (%) within 3 hours
  - p < 0.05

**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**