The Use of Electronic Alert System for Early Sepsis Identification

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## Faculty Disclosure

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Judy Ong Ho DNP, APRN, ACNS-BC, CPHQ</th>
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<tr>
<td>Conflict of Interest</td>
<td>None</td>
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<tr>
<td>Employer</td>
<td>Memorial Hermann Hospital – Greater Heights</td>
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<td>Sponsorship or Commercial Support</td>
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Objectives

At the end of the session, the participant should be able to:

• Describe the steps needed prior to conducting a pilot study on the use of electronic alert system

• Identify the barriers encountered

• Determine next steps necessary prior to a system wide implementation
Introduction

- One of the leading causes of mortality in the United States
- Impact: ↑ Length of stay, ↑ utilization of resources
Sepsis Diagnostic Criteria

Infection, documented or suspected, and any two of the following:

- Temperature > 38°C (100.4°F) or < 36°C (96.8°F) in the past 24 hours
- Heart Rate > 90 in last 2 hours
- Respiratory Rate > 20 in last 2 hours
- PaCO2 > 32 mmHg in last 24 hours
- White Blood Count (WBC) > 12,000 or < 4,000 in last 24 hours
- Age > 13 years old
Introduction (continuation)

• Dissemination of the Surviving Sepsis Campaign International Guideline Management of Severe Sepsis and Septic Shock (SSC Guidelines) was inconsistent, incomplete and slow

• Challenges identified: knowledge deficit, failure to recognize sepsis early, and timely bundle
Purposes of Pilot Study

1. To translate the SS guidelines into practice

2. To determine the positive predictive value (PPV) of the alert

3. To determine whether clinicians implemented the three (3) hour bundle interventions once made aware of possible sepsis.
Method
Method – PDCA

- **PLAN** – design the details of the study or implementation and making predictions about the outcomes
- **DO** – conducting the plan and collecting data
- **CHECK** – comparing the predictions to the data collected
- **ACT** – taking actions based on new knowledge

Method – Plan

• Obtained approval from school’s institutional review board (IRB) and organization's quality council
• Established project charter
• Established Sepsis Project Management Team
• Developed timeline (Gantt Chart)
Method – Plan (continuation)

• Defined physiologic parameters for the Sepsis Best Practice Alert (BPA)
• Defined lock out time for the alerts
• Developed clinical algorithms and educational modules
• Developed data collection tools
Method – Do

• Implemented Sepsis BPA on pilot units for four weeks

• Collected data manually
  o PPV of sepsis BPA
  o Turn-around-time (TAT) for 3 hour bundles - blood culture draws, antibiotic administration, lactate level collection, and administration of fluid resuscitation boluses
## PPV of BPA on Non-ECs

<table>
<thead>
<tr>
<th>Inpatient Units</th>
<th>No. of charts audited</th>
<th>No. of patients diagnosed with Sepsis, Severe Sepsis &amp; Septic Shock</th>
<th>Positive Predictive Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical/Surgical Unit A</td>
<td>38</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td>Intermediate Care Unit</td>
<td>98</td>
<td>25</td>
<td>26%</td>
</tr>
<tr>
<td>Medical/Surgical Unit B</td>
<td>26</td>
<td>6</td>
<td>23%</td>
</tr>
<tr>
<td>Medical/Surgical Units C</td>
<td>18</td>
<td>11</td>
<td>61%</td>
</tr>
<tr>
<td>Geriatric Unit</td>
<td>2</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>Physical Medicine &amp; Rehabilitation</td>
<td>4</td>
<td>2</td>
<td>50%</td>
</tr>
<tr>
<td>Total</td>
<td>186</td>
<td>49</td>
<td>26%</td>
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</tbody>
</table>
# PPV of BPA on EC

<table>
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<tr>
<th>Location</th>
<th>Number of patients sampled</th>
<th>No. of patients diagnosed with Sepsis, Severe Sepsis &amp; Septic Shock</th>
<th>Patients with cause for infection documented (but not diagnosed with Sepsis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EC #1</td>
<td>116</td>
<td>8 (7%)</td>
<td>48 (41%)</td>
</tr>
<tr>
<td>EC #2</td>
<td>38</td>
<td>4 (11%)</td>
<td>27 (71%)</td>
</tr>
<tr>
<td>Total</td>
<td>154</td>
<td>12 (8%)</td>
<td>75 (49%)</td>
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Mean TAT for Interventions (All Units)

Goal: 3 hours
Mean TAT for Interventions

Goal: 3 hours

- Blood Culture
- Antibiotics
- Fluids
- Lactate
Method – Check

1. Low PPV on non-Emergency Center (EC) units

2. All interventions did not meet the three hour completion goal
Method – Check  

3. The Sepsis BPA, which used only two physiologic parameters, was too sensitive and thus, could lead to alarm fatigue.

4. The presence of the alert did not necessarily improve the providers’ compliance to the SSC guidelines.
Method - Act

Barriers
• Low Positive Predictive Value
• Manual data collection
• Data collected lack significant meaning
• Complexity of project

Recommendations
• ↑PPV by ↓ the sensitivity of the alert
• Presence and full support of Information Technology
• Re-define process and outcomes measures
• Leadership Support
Conclusion

• The study identified challenges and next step for translating SSC guidelines to practice

• Where the Rubber Meets the Road:
  ▪ Physicians buy-in
  ▪ Complexity
  ▪ Commitment of organization's top leadership

References


References

http://dx.doi.org/10.1177/08850666124553025

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References


