Saving Lives: Focusing on Severe Sepsis and Septic Shock

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Objectives
1. Define severe sepsis and septic shock as a true medical emergency just like acute myocardial infarction and stroke.
2. Identify one rapid cycle test of change that you can do in your organization.
3. Identify the cost effect from a clinical quality outcome project.
4. Know the quote—"Every system is perfectly designed to achieve the results that it achieves". (Don Berwick)

Providence Little Company of Mary Medical Center San Pedro
• one of 29 hospitals in the Providence Health & Services System
• located in the harbor area of Los Angeles
• 231 licensed beds (158 general acute)
• 115 average daily census
• 12-bed medical-surgical ICU
• associated with long-term vent facility
• Joint Commission accredited with stroke certification
Severe sepsis burning platform

<table>
<thead>
<tr>
<th>Condition</th>
<th>US incidence</th>
<th>No. of Deaths</th>
<th>Mortality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI in 2004-05</td>
<td>920,000</td>
<td>156,800</td>
<td>17%</td>
</tr>
<tr>
<td>Stroke in 2004-05</td>
<td>780,000</td>
<td>150,100</td>
<td>19%</td>
</tr>
<tr>
<td>Severe sepsis in 1995</td>
<td>751,000</td>
<td>215,000</td>
<td>29%</td>
</tr>
</tbody>
</table>

Our team framework

• Sepsis Coordinator grant (1 day/week)

• 2 physician champions (ED Chief & ICU Medical Director)

• weekly steering committee meetings

• multi-disciplinary educational offerings

• population definition = 995.92 & 785.52

Every PI/Quality person’s fantasy
Our story in a graph

Percent Severe Sepsis and Septic Shock Mortality

Pearson Chi-Square = 7.807, DF = 1, P-Value = 0.005
Fisher's exact test: P-Value = 0.0069256

Comparing pre & post protocol time periods:
All mortality effect of severe sepsis program

1.19
0.93
0.7
0.5
0.3
0.1
0

Observed/expected mortality

Pre-project; 8/06-3/08
Post-project; 4/08-9/10

Key Rapid Cycle Tests of Change
• Implement protocol/pre-printed order set
• Lactate/ScvO2 measurement systems
• Sepsis program integration with RRT
• Sepsis simulation manikins/drills
• ED physician data feedback loop
Severe Sepsis Resuscitation Bundle

1. Serum lactate measured.
2. Blood cultures obtained prior to antibiotic administration.
3. From the time of presentation, broad-spectrum antibiotics administered within 3 hours for ED admissions and 1 hour for non-ED ICU admissions.
4. In the event of hypotension and/or lactate > 4 mmol/L (36 mg/dL):
   a) Deliver an initial minimum of 20 ml/kg of crystalloid (or colloid equivalent).
   b) Apply vasopressors for hypotension not responding to initial fluid resuscitation to maintain mean arterial pressure (MAP) > 65 mm Hg.
5. In the event of persistent hypotension despite fluid resuscitation (septic shock) and/or lactate > 4 mmol/L (36 mg/dL):
   a) Achieve central venous pressure (CVP) of > 8 mm Hg.
   b) Achieve central venous oxygen saturation (ScvO2) of > 70%.*

Achieving a mixed venous oxygen saturation (SvO2) of 65% is an acceptable alternative.

Severe Sepsis Management Bundle

1. Low-dose steroids administered for septic shock in accordance with a standardized ICU policy.
2. Recombinant Activated Protein C administered in accordance with a standardized ICU policy.
3. Glucose control maintained > lower limit of normal, but < 150 mg/dL (8.3 mmol/L).
4. Inspiratory plateau pressures maintained < 30 cm H2O for mechanically ventilated patients.
Overall severe sepsis program results

• 24% decrease severe sepsis mortality  
  (Aug 2006 to Nov 2010)

• 61 additional lives saved (2Q08 to 4Q09)

• $7,643 reduction per case or ~$1.5 million/yr  
  (2007 vs. first 21-months of project)

• 2 day reduction in ALOS (2007 vs. 21 month severe sepsis project)

Our story benchmarked

Percent Severe Sepsis and Septic Shock Mortality

"Every system is perfectly designed to achieve the results that it achieves."
— Don Berwick

Our story on video...

2010 Providence Health & Services President’s Award for Excellence

http://ln.providence.org/sss/about/LG/ex/Pages/2010Excellence.aspx
What's next?

Next step #1: automated early warning system

Pharmacy One Source: Sentri-7 severe sepsis early warning
Pharmacy One Source: Sentri-7 severe sepsis early warning

Next step #2: severe sepsis timely antibiotics
Review of objectives

1. Severe sepsis and septic shock are just as much medical emergencies as stroke and heart attack.

   Code Sepsis ???

Review of objectives

2. Sample rapid cycle tests of change:
   - Sepsis Coordinator role implementation
   - severe sepsis pre-printed order set
   - sepsis program integration with RRT
   - sepsis simulation manikins or drills
   - ED physician data feedback loop
   - Pre-mixed antibiotics in the ED
   - Mark the chart or room in dramatic ways: "abx NOT given"
   - Stat page to pharmacy / satellite pharmacy
   - Adopt a screening tool
   - Start with the resuscitation bundle first
   - Broker an agreement for line placement -- ICU bed for ED line swap
   - Consider ultrasound guidance
   - ED training for CVP – leave ScvO2 to ICU?
   - Fluid Bolus Protocol
   - Work patient safety angle
Review of objectives

3. Quality is cost effective!

Review of objectives

4. "Every system is perfectly designed to achieve the results that it achieves".
   -- Don Berwick

What will you re-design to benefit severe sepsis patients?

Our thanks to...

- Providence Health & Services
- Sean Townsend, MD, Surviving Sepsis Campaign
- Davis Balestracci, author *Data Sanity: A Quantum Leap to Unprecedented Results*
- Pharmacy One Source/Sentri 7
- the Team at Providence San Pedro…
... the Team

We welcome your questions...