Objectives

- Discuss MUSC SWAT Process
- Discuss Process Improvement Data
- Discuss Most Recent Data
- Discuss Continuous Improvement
Sepsis definitions

From Surviving Sepsis Campaign

Sepsis:

- Infection (probable)
- Plus 2 or more systemic inflammatory response syndrome (SIRS) criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>&lt;36 or &gt;38 °C</td>
</tr>
<tr>
<td>Heart Rate</td>
<td>&gt;90</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>&gt;20</td>
</tr>
<tr>
<td>WBC</td>
<td>&lt;4000 or &gt;12000</td>
</tr>
</tbody>
</table>
Sepsis definitions

Severe Sepsis:
- Sepsis
- Plus sepsis-induced organ dysfunction or hypoperfusion

Septic Shock:
- Sepsis-induced hypotension despite fluid resuscitation
Impact of Sepsis

◆ Sepsis is 11\textsuperscript{th} leading cause of death (second in non-cardiac ICU)

◆ Current annual cost- $17 billion
Benefit of SSC

Historical group in-hospital mortality 57.3%

SSC guideline bundles

Treatment group in-hospital mortality 37.5%


- Improved mortality
- Decreased ICU LOS (by avg. 3 days)
- Decreased hospital LOS (by avg. 5 days)
# CMS SEP-1

<table>
<thead>
<tr>
<th>Required Action</th>
<th>Severe Sepsis</th>
<th>Septic Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 hour Bundle</td>
<td>6 hour Bundle</td>
</tr>
<tr>
<td><strong>Initial Lactate Collection</strong></td>
<td>Yes</td>
<td><strong>Must be completed within 3 hours of</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Severe Sepsis Presentation</strong></td>
</tr>
<tr>
<td><strong>Blood Culture Collection</strong></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Initial Antibiotic Started</strong></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Repeat Lactate Collection</strong></td>
<td>Yes</td>
<td><strong>Must be completed within 6 hours of</strong></td>
</tr>
<tr>
<td>(if Initial Lactate &gt; 2)</td>
<td></td>
<td><strong>Severe Sepsis presentation</strong></td>
</tr>
<tr>
<td><strong>30mL/kg Crystalloid Fluids Started</strong></td>
<td>N/A</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Must be completed within 3 hrs of</strong></td>
</tr>
<tr>
<td><strong>Vasopressor Given</strong></td>
<td>N/A</td>
<td><strong>Septic Shock</strong></td>
</tr>
<tr>
<td>(if ↓ BP persists)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repeat Volume Status/ Tissue</strong></td>
<td>N/A</td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td><strong>Perfusion Assessment</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“We recommend routine screening of potentially infected seriously ill patients for severe sepsis to increase the early identification of sepsis and allow implementation of early sepsis therapy”
MUSC Protocol

SWAT
SWAT Protocol

Based on BAT alert (Brain Attack), STEMI alert, and Trauma alert (trauma A, Trauma B)

Improved recognition of stroke, MI, and trauma

Better outcomes
Sepsis screen:
1) HR > 90?
2) RR > 20?
3) Temp > 38 or < 36?
4) SBP < 90?
5) Suspected/known infection?

SWAT A “pop-up” if:
1) SBP < 90
2) Suspected/known infection

SWAT B “pop-up” if:
1) 2+ SIRS + Known or suspected infection
2) Not a SWAT A
**SWAT A "pop-up"**

- Triage RN notifies ED attending

**SWAT A paged out at discretion of ED attending**

- RN actions:
  - Insert IV, CBC/diff, CMP, PT/PTT, point-of-care lactate, pro-calcitonin, blood culture X 2, urinalysis and culture
  - Start normal saline 30cc/kg bolus via pressure bag

- Charge RN actions:
  - Assign extra ED technician to the bedside
  - Assign extra RN to the bedside as needed
  - Move the patient to the resuscitation bay as needed

- Unit secretary to page a SWAT A:
  - Page to Pulmonary fellow
  - Page to Radiology technician
  - Page to Pharmacist

- MD actions:
  - Conversation between Pulmonary fellow and either ED attending or 3rd year ED resident
  - Pulmonary fellow to directly evaluate the patient at the bedside
  - MD to order broad-spectrum antibiotics

**SWAT B "pop-up"**

- Triage RN notifies ED attending

**SWAT B paged out at discretion of ED attending**

- RN actions:
  - Insert IV, CBC/diff, CMP, PT/PTT, point-of-care lactate, pro-calcitonin, blood culture X 2, urinalysis and culture
  - NS bolus at the discretion of treating MD

- Charge RN actions:
  - Assign extra ED technician to the bedside
  - Assign extra RN to the bedside as needed

- Unit secretary to page a SWAT B:
  - Page to Radiology technician
  - Page to Pharmacist

- MD actions:
  - Call or consult Pulmonary fellow as needed
  - Determine the need to move the patient to a resuscitation bay
Original Contribution

Triage sepsis alert and sepsis protocol lower times to fluids and antibiotics in the ED

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d 135 Cannon St, Department of Public Health Sciences, Medical University of South Carolina, Charleston, SC, 29425
Door to Antibiotics

(in minutes)

SWAT A Given
SWAT B Given
Combined Given
Antibiotic Order Combined

Pre-SWAT
Post-SWAT
Door to Fluids

(in minutes)

Pre-SWAT

Post-SWAT

SWAT A

SWAT B

Combined
Average Door to Antibiotic Time

SWAT A

overall average 51 minutes
Continuous Quality Improvement

- EMR BPA update
  - Remove Known or suspected infection
  - Replace with temperature parameter

- Epic EMR Evidence-Based Sepsis Order Set

- RN Evidence-Based Sepsis Order Set now allows for standing orders for protocol
**MUSC ED MD ADULT SEPSIS AND SEVERE SEPSIS (EVIDENCE BASED)**

This order set underwent an evidence review by the Value Institute at MUSC. Primary research articles and guidelines were critically appraised and summarized, and practice recommendations were developed by an interprofessional content expert team.

Eligibility: > 18 years old

Adult Sepsis Evidence Summary

URL: http://mcintranet.musc.edu/know/edgebase/Adult%20Sepsis%20Evidence%20Summary%20FINAL.pdf

Adult Sepsis ED Management Algorithm

URL: https://mcintranet.musc.edu/knowledgebase/Sepsis%20Management%20Algorithm_ED.pdf

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**LABS**

**Labs**

Measuring serum lactate within 3 hours of diagnosis of severe sepsis is recommended, and should be repeated within 4 hours of diagnosis only if initial lactate levels were elevated (lactate >2mmol/L). Patients with an initial lactate >4mmol/L require additional re-assessment within 6 hours.

Cultures of urine, wounds, respiratory secretions and other body fluids that may be the source of the infection should be obtained before antimicrobial therapy begins, if obtaining the cultures does not cause a significant delay (>45 minutes) in antimicrobial administration.

If patient has an initial lactate > 4mmol/L, use the Septic Shock Vasopressors & Reassessment order set.

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>CG4 (BESIDEX)</td>
<td>STAT, Once, Starting today For 1 Occurrences</td>
</tr>
<tr>
<td>I-STAT VENOUS BLOOD GAS w LACTIC ACID (BESIDEX)</td>
<td>STAT, Once, Starting today For 1 Occurrences</td>
</tr>
<tr>
<td>CBC AND DIFFERENTIAL</td>
<td>Select Panel Type: STAT, Starting today For 1 Occurrences, Whole Blood-Venous, Blood</td>
</tr>
<tr>
<td>COMPREHENSIVE METABOLIC PANEL</td>
<td>STAT, Starting today For 1 Occurrences, Whole Blood-Venous</td>
</tr>
<tr>
<td>PROTIME-INR</td>
<td>STAT, Starting today For 1 Occurrences, Whole Blood-Venous</td>
</tr>
<tr>
<td>APTT</td>
<td>STAT, Starting today For 1 Occurrences, Whole Blood-Venous</td>
</tr>
<tr>
<td>CORTISOL</td>
<td>STAT, Starting today For 1 Occurrences, Whole Blood-Venous</td>
</tr>
<tr>
<td>PROCALCITONIN</td>
<td>STAT, Starting today For 1 Occurrences, Whole Blood-Venous</td>
</tr>
<tr>
<td>BLOOD CULTURE #1 (ANAEROBIC)</td>
<td>STAT, Starting today For 1 Occurrences, Blood</td>
</tr>
<tr>
<td>BLOOD CULTURE #1 (AEROBIC)</td>
<td>STAT, Starting today For 1 Occurrences, Blood</td>
</tr>
<tr>
<td>BLOOD CULTURE #2 (ANAEROBIC)</td>
<td>STAT, Starting today For 1 Occurrences, Blood</td>
</tr>
<tr>
<td>BLOOD CULTURE #2 (AEROBIC)</td>
<td>STAT, Starting today For 1 Occurrences, Blood</td>
</tr>
<tr>
<td>URINALYSIS W/MICROSCOPIC</td>
<td>Once, Starting today For 1 Occurrences, Urine</td>
</tr>
<tr>
<td>URINE CULTURE</td>
<td>STAT, Starting today For 1 Occurrences, Collect urine sample from the collection port of the newly inserted UC, intermittent catheterization, or clean catch specimen.</td>
</tr>
<tr>
<td>RESPIRATORY BACTERIAL CULTURE (INCLUDES GRAM STAIN)</td>
<td>STAT, Starting today For 1 Occurrences</td>
</tr>
</tbody>
</table>
ED to Hospital

MUSC now implementing SWAT for the entire hospital

- Goal to decrease time to recognition of sepsis patient
- More data to come...
Questions?