Pharmacist-Driven Sepsis Program

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Quick Facts - Severe Sepsis

- One of the leading causes of death in the ICU
- Over 18 million cases worldwide each year
  - Equivalent to the entire population of Denmark, Finland, Ireland and Norway added together each year
- Mortality rates from severe sepsis are on a similar scale to lung, breast, and colon cancer
- 28-day mortality rate in sepsis comparable to the 1960s hospital mortality rate for patients of acute myocardial infarction
  - Management of AMI improved → mortality decline, while sepsis remains an unacknowledged killer
- Sepsis places a significant burden on healthcare resources:
  - 40% of total ICU expenditure
Challenges

- Sepsis is considered to be one of the most challenging and difficult conditions to manage
- The course of sepsis varies widely from patient to patient
- It can develop as a result of a variety of circumstances

Definition and Diagnosis

- Sepsis: range of clinical conditions caused by the body’s systemic response to an infection
- Severe sepsis: a condition in which sepsis is accompanied by organ dysfunction or failure
- No clear clinical definition that can be easily communicated and adopted globally
  - Diagnosis and management of sepsis remains a clinical challenge
  - General symptoms: fever, rapid pulse, and respiratory difficulty
  - Misdiagnosed: 87% of physicians felt that the symptoms of sepsis can easily be attributed to other conditions
Systemic Inflammatory Response Syndrome (SIRS)

- Fever or Hypothermia: (>38°C or <36°C)
- Tachycardia: Heart rate > 90 beats per minute
- Tachypnea: Respiratory rate > than 20 breaths per minute
- Systolic Blood Pressure: <90 or >40 below baseline
- Abnormal white blood cell count: (>12,000/μL or <4,000/μL or >10% bands)

SIRS is nonspecific and can be caused by ischemia, inflammation, trauma, infection, or a combination of several insults.

SIRS is not always related to infection.

**SIRS**

**Sepsis**

**Severe Sepsis**

**Septic Shock**

- Sepsis = SIRS + infection
- Severe Sepsis = Sepsis + End organ damage
- Septic shock = severe sepsis not responsive to fluids (requiring vasopressors)

Management

- Rapid diagnosis and management of sepsis is critical to successful treatment
- Patient usually already critically ill and requires immediate attention to avoid rapid deterioration
- It is necessary to treat the patient at the same time as confirming the diagnosis
- Cornerstone of treatment is rapid resuscitation
Early Attempts at Sepsis Management at RCRMC

- Order form created
- ICU physician champion - assisted by an ED physician
- Intended to follow the patient from ED to ICU through the critical care process
- Full physician support and compliance has still been a struggle

Pharmacist-Driven Sepsis Program

- Multidisciplinary Planning
  - Medicine
  - Surgery
  - Pharmacy services
  - Nursing
  - Respiratory therapy
  - Education services
  - Medical records
  - Administration
- Pharmacist-facilitated process, through the already successful rapid response team (RRT)

Patient Identification

- Program covers all adult patients
- Responds to patients in the ED, ICU and adult inpatient areas
- Slightly different criteria for ED:
  - A lactate level greater than 4
  - Systolic blood pressure less than 90 after fluid bolus
Who is the RRT Team at RCRMC?
- Critical Care Nurse
- Respiratory therapist
- House supervisor
- Physician
- Pharmacist

Training of the Pharmacist
- Only one critical-care pharmacist
- Training checklist created
  - Must be ACLS/BLS certified
  - Familiar with policy
  - Competent in chart review (verified by visual observation)
  - Comfortable with medications and preparation for Code Blue or RRT activations (verified by visual observation)
  - Visual observation in Code Blue and RRT activations
  - Completed Sepsis CE and test
- Undergo extensive one-on-one training with critical-care pharmacist
- Competency-based

Created Sepsis/RRT Book
- Carry to RRTs
- Sample sheets to find oxygenation parameters
- Sepsis policy
- Sepsis guidelines
- Renal dosing guidelines
- ACLS algorithms
- Pressor information
- Daily workflow guide
- Useful forms
Code Blue Box

- Almost all medications needed for an emergency
- Created "Cheat sheets" for use

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RRT Triggers

- Staff is worried about the patient
- Auto change in heart rate >10 bpm
- Auto change in systolic BP >5 mmHg
- Auto change in O2 saturation >10%
- All triggers that apply in first box

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RRT Triggers Added

- Staff is worried about the patient
- Auto change in heart rate >10 bpm
- Auto change in systolic BP >5 mmHg
- Auto change in O2 saturation >10%
- All triggers that apply in first box
### First Hour

<table>
<thead>
<tr>
<th>Time (Minutes)</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>00</td>
<td>Initial Setup</td>
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<tr>
<td>05</td>
<td>Blood Pressure</td>
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<tr>
<td>10</td>
<td>Blood Pressure</td>
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<td>15</td>
<td>Blood Pressure</td>
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<td>40</td>
<td>Blood Pressure</td>
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<tr>
<td>45</td>
<td>Blood Pressure</td>
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<tr>
<td>50</td>
<td>Blood Pressure</td>
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</table>

### Hour 3 and Hour 6

<table>
<thead>
<tr>
<th>Time (Minutes)</th>
<th>Event Description</th>
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<tr>
<td>05</td>
<td>Blood Pressure</td>
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**Note:** The above table represents key events and measurements taken during the specified hours, focusing on blood pressure monitoring and other relevant health parameters.
Staffing Requirements

- **No additional staff**
  - RRT team already in place
  - Adding services to pharmacists already staffing
- Clinical pharmacists received additional training
- 24/7 pharmacist coverage of RRTs and Code Blue calls currently in place
- Large overall quality improvement effort

### Severe Sepsis Quality Indicator

<table>
<thead>
<tr>
<th>Severe Sepsis Quality Indicator</th>
<th>Internal Goal</th>
<th>YTD (2/11–9/11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOAL 1: Blood cultures collected before broad-spectrum antibiotic administration for severe sepsis and/or septic shock over the first 6 hrs following the time of presentation</td>
<td>100%</td>
<td>88%</td>
</tr>
<tr>
<td>GOAL 2: Median time in minutes to broad-spectrum antibiotic administration for severe sepsis and/or septic shock following the time of presentation</td>
<td>&lt;60 minutes</td>
<td>148</td>
</tr>
<tr>
<td>GOAL 3: Central venous pressure (CVP) of ≥8mmHg achieved for septic shock or severe sepsis with lactate &gt;4mmol/L over the first 6 hours following the time of presentation</td>
<td>N/A</td>
<td>43%</td>
</tr>
<tr>
<td>GOAL 3A: Patients w/ septic shock or severe sepsis w/ lactate &gt;4mmol/L over the first 6 hrs following the time of presentation that had central line placed</td>
<td>N/A</td>
<td>35</td>
</tr>
<tr>
<td>GOAL 3B: Patients w/ septic shock or severe sepsis w/ lactate &gt;4mmol/L over the first 6 hours following the time of presentation that had central line placed achieved CVP of ≥8mmHg</td>
<td>N/A</td>
<td>23</td>
</tr>
<tr>
<td>GOAL 3C: Patients w/ septic shock or severe sepsis w/ lactate &gt;4mmol/L over the first 6 hrs following the time of presentation that had central line placed achieved CVP of ≥8mmHg</td>
<td>100%</td>
<td>65%</td>
</tr>
</tbody>
</table>
### Severe Sepsis Quality Indicators

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<th>Goal</th>
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</tr>
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<tr>
<td>GOAL 4</td>
<td>Central venous oxygen saturation (ScvO2) ≥70% achieved for septic shock or severe sepsis w/ lactate &gt;4 mmol/L, over the first 6 hrs. following the time of presentation</td>
<td>YTD (2/11–9/11)</td>
<td>N/A 26%</td>
</tr>
<tr>
<td>GOAL 4A</td>
<td>Patients w/ septic shock or severe sepsis w/ lactate &gt;4 mmol/L, over the first 6 hrs following the time of presentation</td>
<td>N/A 35%</td>
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<tr>
<td>GOAL 4B</td>
<td>Patients w/ septic shock or severe sepsis w/ lactate &gt;4 mmol/L, over the first 6 hours following the time of presentation that had central line placed</td>
<td>N/A 21%</td>
<td></td>
</tr>
<tr>
<td>GOAL 4C</td>
<td>Central venous oxygen saturation (ScvO2) ≥70% achieved for septic shock or severe sepsis w/ lactate &gt;4 mmol/L, over the first 6 hrs. following the time of presentation</td>
<td>100% 32%</td>
<td></td>
</tr>
<tr>
<td>GOAL 5</td>
<td>Administration of low dose glucocorticoids for septic shock determined in accordance with a standardized ICU policy over the first 24 hrs following the time of presentation</td>
<td>N/A 84%</td>
<td></td>
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<tr>
<td>GOAL 7</td>
<td>Glucose values maintained greater than the lower limit of normal and with a median value&lt;150 mg/dl for severe sepsis and/or septic shock over the period 6 hrs to 24 hrs following the time of presentation</td>
<td>100% 58%</td>
<td></td>
</tr>
</tbody>
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### RCRMC Severe Sepsis Mortality Rate

- **Absolute Risk Reduction** = 15.4%
- **Relative Risk Reduction** = 41%
- **NNT** = 6.5
Limitations of the Program

- Depend on staff identification
- Limited number of activations
- Have not had a devoted "sepsis person"
Future Directions
- Utilizing baseline data to identify points of weakness
- Nurse partially devoted to assist in sepsis project
- Plan to create tools for nursing staff
- Plan for further identification for floor patients
- Further education of ED staff

Questions?