The Sepsis Early Recognition and Response Initiative: SERRI

KINDRED HOSPITAL SAN ANTONIO
INTERDISCIPLINARY PULMONARY CARE SYMPOSIUM

FRIDAY, November 15, 2013

The project described is supported by Funding Opportunity Number CMS-1C1-12-0001 from Centers for Medicare and Medicaid Services, Center for Medicare and Medicaid Innovation. “Its contents are solely the responsibility of the authors and do not necessarily represent the official views of HHS or any of its agencies.”
Objectives

- Define SERRI
- Recognize the impact of sepsis
- Demonstrate an understanding of the early signs and symptoms of sepsis
- Understand the sepsis continuum
- Know how and when to intervene
What is SERRI?

Sepsis Early Recognition and Response Initiative

SERRI is a nurse driven sepsis screening protocol that focuses on vital signs, the white blood cell count, and mental status changes.

The values of these parameters are entered into a rigorously validated algorithm that derives a score of the likelihood that a patient has sepsis.

If the score is high enough, it triggers an evaluation by a second level responder with advanced training in the recognition of sepsis.
SERRI: Vision and Mission

• **Vision:** a health care system where patients no longer suffer the extreme morbidity and mortality that sepsis brings when it is not caught and treated early in its course.

• **Mission:** to save lives and reduce costs in patients with sepsis
The CMS Innovation Award provides funds to scale out SERRI to expand the reach of the initiative to 13 other facilities across the continuum of care.

Total Funding Amount over 3 Years: $14,365,591

Total Funding to Kindred Hospitals over 3 Years: $543,719

Estimated 3-year savings to CMS: $48,226,102

Start Date: July 1, 2012*
Texas Gulf Coast Sepsis Network

Spanning the continuum of care

Acute Care
- Houston Methodist Hospital
- St. Joseph Regional Health Center
- HCA Bayshore & East Medical
- HCA Rio Grande Valley
- Methodist Sugar Land Hospital
- San Jacinto Methodist Hospital

Long Term Acute Care
- Kindred Hospital Medical Center
- Kindred Hospital Baytown
- Select Specialty Medical Center
- Select Specialty Heights

Skilled Nursing
- Pending CMS Approval:
  - TMH-TMC
  - TMH-San Jacinto
  - St. Joseph RHC (2)

SERRI: Sepsis Early Recognition And Response Initiative
Sepsis Mortality Trend

TMH - Percent Cases with Sepsis that Died, Jan 2008 – Apr 2013

35.4%

14.3%

Jan 2008
Jan 2009
Jan 2010
Jan 2011
Jan 2012
2013 Jan
Apr (Prelim.)

Sepsis Mortality

Trend (Sepsis Mortality)

Please note that April 2013 data is preliminary; since all records are not final coded by medical records as of report date of 05/07/2013. It’s an initial snapshot of April’s outcomes. Future refreshed datasets may yield different April outcomes.
Why Screen for Sepsis?

2009 through April 2013, the concerted efforts of nursing staff, nurse practitioners and physicians at HMH have saved over:

643 lives!
## SAVING LIVES AND DOLLARS

<table>
<thead>
<tr>
<th>Year</th>
<th>Potential Lives Saved</th>
<th>Average Total Cost/Case</th>
<th>Potential Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>86</td>
<td>$28,300</td>
<td>$2,433,800</td>
</tr>
<tr>
<td>2010</td>
<td>180</td>
<td>$27,986</td>
<td>$5,037,480</td>
</tr>
<tr>
<td>2011</td>
<td>199</td>
<td>$30,653</td>
<td>$6,099,947</td>
</tr>
<tr>
<td>2012</td>
<td>143</td>
<td>$30,653</td>
<td>$4,383,379</td>
</tr>
<tr>
<td>2013</td>
<td>35</td>
<td>$30,653</td>
<td>$1,072,855</td>
</tr>
<tr>
<td>Total</td>
<td>643</td>
<td>$30,653</td>
<td>$19,027,461</td>
</tr>
</tbody>
</table>

* Average Total Cost Differential – “Focus” vs. “Other” Deaths; cases adjusted to 2008 baseline.

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*Slide produced by Sepsis CMPI Committee  Data Source: TMH – Datamart as of 08/22/2012  Performance Improvement Dept (BRA)*
Kindred - Houston Medical Center

- Sepsis data from July 1, 2011 – June 30, 2012
- Encounters by stage of sepsis
  - Sepsis 103, severe sepsis 30, septic shock 16
  - 149 total encounters resulting in 35 deaths
- 91 Present on admission, 58 hospital acquired
- ALOS w/mortality by stage of sepsis (35)
  - sepsis 41.3, severe sepsis 41, septic shock 40.3
- ALOS w/o mortality by stage of sepsis (114)
  - sepsis 34, severe sepsis 32.8, septic shock 53.1
Kindred – Bay Area

• Sepsis data from July 1, 2011 – June 30, 2012
• Encounters by stage of sepsis
  – Sepsis 354, severe sepsis 18, septic shock 13
  – **385 total** encounters resulting in 49 deaths
• 300 Present on admission, 85 hospital acquired
• ALOS w/mortality by stage of sepsis (49)
  – sepsis 19.7, severe sepsis 31.5, septic shock 34.8
• ALOS w/o mortality by stage of sepsis (336)
  – sepsis 28.7, severe sepsis 37, septic shock 21.8
Why are we screening our patients for the early signs of sepsis?

Because it is:

- Simple
- Safe
- Effective

And

- It Saves Lives!
B. Screening for Sepsis and Performance Improvement

1. 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 (grade 1C).

**Rationale.** The early identification of sepsis and implementation of early evidence-based therapies have been documented to improve outcomes and decrease sepsis-related mortality (15). Reducing the time to diagnosis of severe sepsis is thought to be a critical component of reducing mortality from sepsis-related multiple organ dysfunction (35). Lack of early recognition is a major obstacle to sepsis bundle initiation. Sepsis screening tools have been developed to monitor ICU patients (37–41), and their implementation has been associated with decreased sepsis-related mortality (15).
Sepsis is a BIG PROBLEM

• Sepsis is the leading cause of death in non coronary ICUs

• There were 1.1 million cases of sepsis in 2008 and this number is projected to increase.

• 11th leading cause of death in the United States overall

• Nearly 1 out of every 23 patients in the hospital has septicemia
The rate of hospitalizations for septicemia or sepsis has more than doubled from 2000 through 2008.
• Septic patients spent 75% more time in the hospital and were eight times as likely to die in the hospital as patients with other diagnoses.  

• Associated mortality rate of greater than 30%.  

7
Sepsis in real life

- **Currently**, more Americans die from severe sepsis than from breast cancer, lung cancer and stroke combined.

- **Despite advances** in monitoring technology, antibiotics, and our knowledge of sepsis pathophysiology, the **mortality rate for sepsis** has not **changed significantly** in over **4 decades**.
Who Gets Sepsis?
Who gets sepsis?

Sepsis can affect anyone at any age

12 year old boy scrapes his arm playing basketball. ~132 hrs later, he dies from septic shock.

Christopher Reeve was 52 when he died from sepsis.

Jim Henson was 53 years old when he died from sepsis. He thought it was a chest cold.
12 year old boy scrapes his arm playing basketball, ~132 hours later, he dies from septic shock (NYT, June 12, 2012)

Sepsis Impact

Is your patient at risk?

Does your patient have:

- A central line
- A Foley catheter
- A dialysis catheter
- A drain
- Pressure ulcers or diabetic ulcers
- A history of heart valve replacement
- A history of sepsis
- Immunosuppression

Has your patient:

- Been on dialysis
- Recently had abdominal surgery
- Been in the hospital for a long time
- Been in a nursing home
- Been malnourished
- Been in the ICU
- Had a transplant
- Been/is on chemotherapy
Epidemiology

- African-American males have a higher incidence rate of sepsis
- Incidence is greatest during the winter
  - Respiratory source
- Patients over the age of 65 years account for almost 60% of severe sepsis cases
- Severity is increasing
- Urinary tract is the most common source of nosocomial infection
- GI or pulmonary infections have the highest mortality rate
## Common Surgical Cases associated with Sepsis

<table>
<thead>
<tr>
<th>Top Ten</th>
<th>(%)</th>
<th>Case Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PARTIAL REMOVAL OF COLON</td>
<td>12.09%</td>
<td>407</td>
</tr>
<tr>
<td>2. REMOVAL OF SMALL INTESTINE</td>
<td>5.52%</td>
<td>196</td>
</tr>
<tr>
<td>3. PARTIAL REMOVAL OF PANCREAS</td>
<td>5.08%</td>
<td>171</td>
</tr>
<tr>
<td>4. ARTERY BYPASS GRAFT</td>
<td>4.72%</td>
<td>159</td>
</tr>
<tr>
<td>5. EXPLORATION OF ABDOMEN</td>
<td>4.37%</td>
<td>147</td>
</tr>
<tr>
<td>6. REMOVAL OF COLON</td>
<td>4.04%</td>
<td>136</td>
</tr>
<tr>
<td>7. REPAIR BOWEL OPENING</td>
<td>3.59%</td>
<td>121</td>
</tr>
<tr>
<td>8. APPENDECTOMY</td>
<td>2.73%</td>
<td>92</td>
</tr>
<tr>
<td>9. REMOVAL OF GALLBLADDER</td>
<td>2.58%</td>
<td>87</td>
</tr>
<tr>
<td>10. LAPAROSCOPIC CHOLECYSTECTOM</td>
<td>2.55%</td>
<td>86</td>
</tr>
</tbody>
</table>
# Common Surgical Cases associated with Septic Shock

<table>
<thead>
<tr>
<th>Top Ten</th>
<th>(%)</th>
<th>Case Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PARTIAL REMOVAL OF COLON</td>
<td>15.73%</td>
<td>361</td>
</tr>
<tr>
<td>2. REMOVAL OF SMALL INTESTINE</td>
<td>8.02%</td>
<td>184</td>
</tr>
<tr>
<td>3. ARTERY BYPASS GRAFT</td>
<td>5.05%</td>
<td>116</td>
</tr>
<tr>
<td>4. REMOVAL OF COLON</td>
<td>4.97%</td>
<td>114</td>
</tr>
<tr>
<td>5. EXPLORATION OF ABDOMEN</td>
<td>4.44%</td>
<td>102</td>
</tr>
<tr>
<td>6. REPAIR DEFECT OF ARTERY</td>
<td>4.01%</td>
<td>92</td>
</tr>
<tr>
<td>7. PARTIAL REMOVAL OF PANCREAS</td>
<td>2.79%</td>
<td>64</td>
</tr>
<tr>
<td>8. REMOVAL OF GALLBLADDER</td>
<td>2.05%</td>
<td>47</td>
</tr>
<tr>
<td>9. LAPAROSCOPIC CHOLECYSTECTOMY</td>
<td>2.00%</td>
<td>46</td>
</tr>
<tr>
<td>10. FREEING OF BOWEL ADHESION</td>
<td>1.87%</td>
<td>43</td>
</tr>
</tbody>
</table>

SERRI: Sepsis Early Recognition And Response Initiative
Definitions

- **INFECTION (SIRS)** – pathological process caused by microorganism

- **SEPSIS** – suspected or diagnosed infection AND clinical manifestation of inflammatory response (General Sign/Symptoms & Inflammatory Signs)

- **SEVERE SEPSIS** – sepsis with organ dysfunction, hypoperfusion and hypotension

- **SEPTIC SHOCK** – sepsis with ↓ BP after fluid resuscitation along with perfusion abnormalities (inotropes/pressors required)
General Signs/Symptoms

- Temperature
  - >100.9°F (38.3°C) (hyperthermia)
  - or <96.8°F (36°C) (hypothermia)
- Heart Rate - >90 bpm (tachycardia)
- Respiration - Rate > 20 (tachypnea)
- Altered Mental Status
- Hyperglycemia
- Significant edema
Early Signs of Sepsis

Inflammatory Signs

• WBC
  • > 12,000 μ/L (leukocytosis)
  • or < 4,000 μ/L (leukopenia)

• Normal WBC count with > 10% bands
Signs of Severe Sepsis

- The General Signs/Symptoms
- Inflammatory Signs
- Fever/Chills/Rigors
- Hypoxemia
- Sepsis-induced hypotension
  - SBP < 90 mmHg; MAP < 70 mmHg; or SBP decrease > 40 mmHg from baseline
- Mottled skin or decreased capillary refill
- Low urine output
  - < 0.5 mL/kg/hr for 2 hours despite fluid resuscitation
Signs of Severe Sepsis

- Elevated lactate > 3 mmol/L
  (you can have severe sepsis without elevated lactate)
- Creatinine > 2.0 ml/dL or increase > 0.5 mg/dL
- INR > 1.5 or a PTT > 60 seconds
- Platelets < 100k µL
- Total bilirubin > 4 mg/dL
Signs of Severe Sepsis

• **Tachypnea**
  • Compensatory mechanism due to metabolic acidosis
  • May be an early or first sign
  • May be sign of impending respiratory failure

• **Tachycardia**
  • HR increases to maintain normal BP
  • Suggests hemodynamic compromise

• **Altered Mental Status**
  • Decrease in level of consciousness, increase in agitation, confusion, or psychosis
  • Can be from infection, particularly if elderly
  • Hypotension and hypoxia
Clinical Signs of *Septic Shock*

- Patient remains hypotensive even after adequate fluid resuscitation
- Inotropes and vasopressors required to maintain BP
- Multi-organ failure
- May be on ventilator support

- 25-30% patients die with hypotension that can not be stabilized with fluids or pharmacological therapy
Mortality Escalates along the Sepsis Continuum: A Clear Trend Exists

The Best Opportunity for Safe, and Effective Intervention is Here!

SIRS  SEPSIS  SEVERE SEPSIS  SEPTIC SHOCK

Sepsis Mortality Continuum

The (%) Mortality

SERRI: Sepsis Early Recognition And Response Initiative
Expense Escalates along the Sepsis Continuum: A Clear Trend Exists

The Best Opportunity for Safe, and Cost-Effective Intervention is Here!

Sepsis Expense Continuum

Sepsis Category

($) Thousands (per case)

SIRS
SEPSIS
SEVERE SEPSIS
SEPTIC SHOCK

$5,000
$10,000
$25,000
$60,000

SERRI: Sepsis Early Recognition And Response Initiative
Sepsis on a Continuum

CLINICAL SIGNS

SEPSIS
- Tachycardia
- Tachypnea
- Confusion
- Fever

SEVERE SEPSIS
- Decreased UOP
- Hypotension
- Elevated lactate

SEPTIC SHOCK
- Refractory hypotension
- On vasopressors
- On inotropes
- Mechanical ventilation

DEATH

NURSES’ ROLE
- Recognition/Assessment
- Call!
- Oxygen
- Fluid bolus
- Obtain cultures
- Obtain other labs
- Antibiotic administration
- VS Monitoring
- I&O Monitoring

SERRI: Sepsis Early Recognition And Response Initiative
What are the early signs of sepsis?

ELEVATED HEART RATE
FEVER
ELEVATED WBC COUNT
ELEVATED RESPIRATORY RATE

These vital signs may seem easy to spot – but are often overlooked!

- Early recognition by nursing staff is the key to successful treatment and outcomes!
If you have any suspicion at all, please take note of whether or not your patient is tachypneic!

When a patient is in the early stages of sepsis, they often become acidotic.

The body compensates for acidosis by attempting to expel CO₂ via an increased Respiratory Rate.

An increased Respiratory Rate is among the First Signs that something is wrong!

Respiratory Rate is Important!
Sepsis scoring algorithm

<table>
<thead>
<tr>
<th>Bedside Nurse SIRS Score Sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient label</td>
</tr>
<tr>
<td>current heart rate</td>
</tr>
<tr>
<td>T min</td>
</tr>
<tr>
<td>T max</td>
</tr>
<tr>
<td>current resp rate</td>
</tr>
<tr>
<td>latest WBC count</td>
</tr>
<tr>
<td>date, time</td>
</tr>
<tr>
<td>Points</td>
</tr>
<tr>
<td>heart rate (BPM)</td>
</tr>
<tr>
<td>0-199</td>
</tr>
<tr>
<td>20-29</td>
</tr>
<tr>
<td>30-39</td>
</tr>
<tr>
<td>40-49</td>
</tr>
<tr>
<td>50+</td>
</tr>
<tr>
<td>T (°C) min</td>
</tr>
<tr>
<td>36.0 - 38.4</td>
</tr>
<tr>
<td>38.5 - 39.9</td>
</tr>
<tr>
<td>40.0 - 40.4</td>
</tr>
<tr>
<td>40.5 - 41.0</td>
</tr>
<tr>
<td>41.0 - 41.5</td>
</tr>
<tr>
<td>T (°C) max</td>
</tr>
<tr>
<td>96.8 - 101.1</td>
</tr>
<tr>
<td>101.2 - 102.6</td>
</tr>
<tr>
<td>102.1 - 103.0</td>
</tr>
<tr>
<td>103.1 - 104.0</td>
</tr>
<tr>
<td>104.1 - 105.6</td>
</tr>
<tr>
<td>resp rate (breaths/minute)</td>
</tr>
<tr>
<td>10-24</td>
</tr>
<tr>
<td>25-34</td>
</tr>
<tr>
<td>35-49</td>
</tr>
<tr>
<td>&gt;50</td>
</tr>
<tr>
<td>latest WBC count (10^3/μL)</td>
</tr>
<tr>
<td>3-14.0</td>
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<tr>
<td>15-30.0</td>
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<tr>
<td>30.1-50.0</td>
</tr>
<tr>
<td>&gt;50</td>
</tr>
<tr>
<td>In Mental Status: Altered*</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Circles in Column:</td>
</tr>
<tr>
<td>X 1</td>
</tr>
<tr>
<td>X 2</td>
</tr>
<tr>
<td>X 3</td>
</tr>
<tr>
<td>X 4</td>
</tr>
<tr>
<td>Subtotal:</td>
</tr>
<tr>
<td>score (total points)</td>
</tr>
</tbody>
</table>

If SIRS score ≥ 4, then notify ICU Nurse Practitioner to complete sepsis screening form.

Completed by: [Redacted]
Date: [Redacted]
RM: [Redacted]

Start sepsis management protocol

Comments:

[Redacted]

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FIRST LEVEL RESPONDERS:

• Bedside nurses perform the nurse-driven sepsis screening
  • on admission
  • every 12 hours
  • as patient condition changes
• When a patient screens positive, the bedside nurse will notify the 2\textsuperscript{nd} level responders.
SECOND LEVEL RESPONDERS:

- House Supervisors, House MDs
- Rapid Response Team
- Their role is to perform a second level assessment and initiate sepsis intervention protocols
- Follow up on patients with positive sepsis screens
Process flowchart – first level

Clinical Liaisons provide SERRI data on PACE eval

PACE reviewed by administrator or house supervisor

Discuss in daily FLASH meeting

Bedside nurse performs Sepsis Screens:
1. at admission
2. every 12 hours
3. change in pt condition

SIRS Score < 4

SIRS Score ≥ 4

Notify house supervisor/2nd level responder to assess patient within 1 hour
Process flowchart – second level

1. Notify house supervisor/2nd level responder to assess patient within 1 hour
2. Identify possible source of infection
3. If no response from attending within 30 minutes, contact house MD
4. Notify attending physician if patient appears at risk for sepsis.
5. Notify house MD if patient appears at risk for sepsis
6. Does patient require higher level of care?
   - NO: Remain on the floor and initiate early interventions
   - YES: Transfer to ICU and initiate advanced interventions
7. Treat as appropriate & Reassess after intervention
     Screen every 12 hours
I am concerned my patient may be becoming septic, but it’s not the usual time for performing the sepsis screen when I am concerned about my patient?

A: Yes!

You can screen a patient for sepsis at any time! If you are concerned about a change in your patients condition, please consider whether or not they might be getting septic!
1st Level Screening Tool

Sepsis Early Recognition and Response Initiative Screening Hub

Willy B WebserviceXT

Sepsis Risk: 05

Please contact the Sepsis Response Team @ 713-768-0774 ASAP for a second level assessment.

Current Heart Rate: 126
T max: 101.2
T min: 99.4
Current Respiratory Rate: 25
WBC: 16.20

Mental Status Deterioration: Yes

Location: MPSE-0776-A
Completed By: 07/22/2013 15:31

Screened By Sepsis 2nd Lvl Response Team

Contact:

Please contact the Sepsis Response Team @ 713-768-0774 ASAP for a second level assessment.

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Supported in part by a grant from the National Institute of Health (NIH) for the SSRS - Sepsis Early Recognition and Response Initiative Screening Hub.
Sepsis Early Recognition and Response Initiative Screening Hub

NO PATIENT SELECTED

Clinical Assessment: The Search for an Infection Source

Suspected Source of Infection:
- Line Source: Yes No
- Abdomen: Yes No
- Drain: Yes No
- Gallbladder: Yes No
- Other Device/Implant: Yes No
- Small Bowel: Yes No
- Head/Eyes/Ears/Nose/Throat: Yes No
- Colon: Yes No
- Thorax (not pneumonia): Yes No
- Skin/Soft Tissue: Yes No
- Pneumonia: Yes No
- UTI: Yes No
- Other: Yes No

Clinical suspicion of Sepsis: Yes No
- Sepsis Staging: sepsis severe sepsis septic shock
- Start sepsis protocol: Yes No
- Started in ED Known Sepsis

Current Protocol Therapy/Orders Already in Place:
- IVF (maint/not bolus)
- CXR
- UA/UCx
- IVF (bolus)
- Blood Cx (#1)
- Blood Cx (#2)
- CBC/BMP
- Telemetry
- ABG
- Lactic Acid
- Vancomycin
- Cefepime
- Diflucan

Additional Therapy Added after Evaluation:
- IVF (maint/not bolus)
- CXR
- UA/UCx
- IVF (bolus)
- Blood Cx (#1)
- Blood Cx (#2)
- CBC/BMP
- Telemetry
- ABG
- Lactic Acid
- Vancomycin
- Cefepime
- Diflucan

03/11/2013: This is the "ANONYMIZED" DEV database. "NO PHI".
2nd Level Screening Assessment – part 2

Texas Gulf Coast Sepsis Network

SERRI: Sepsis Early Recognition And Response Initiative

Clinical Performance Measures (Follow-up):

Clinical Performance Measures:
- Time Zero (T0):
  - Now
  - Elapsed Time (minutes)
- 2nd Level Responder Notified:
  - Now
  - Now
- 2nd Level Evaluation Completed:
  - Now
  - Now
## 2nd Level Screening Assessment – part 3

### Protocol Compliance Measures:

<table>
<thead>
<tr>
<th>Measure</th>
<th>Date/Time</th>
<th>Minutes Elapsed from T0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid Resuscitation (30mL/kg)</td>
<td>Now</td>
<td>a</td>
</tr>
<tr>
<td>Blood Culture #1</td>
<td>Now</td>
<td>a</td>
</tr>
<tr>
<td>Blood Culture #2</td>
<td>Now</td>
<td>a</td>
</tr>
<tr>
<td>Broad Spectrum Abx</td>
<td>Now</td>
<td>a</td>
</tr>
<tr>
<td>Lactic Acid #1</td>
<td>Now</td>
<td>a</td>
</tr>
<tr>
<td>Lactic Acid #2 (repeat @4hrs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Confirmed Sepsis:
- Yes
- No

### Sepsis Staging:
- Sepsis
- Severe Sepsis
- Septic Shock

### Did patient require transfer to higher level of care?
- Yes
- No

### Did the patient require transfer to another facility?
- Yes
- No

### Confirmed Source of Infection:
- (check all that apply)

#### Line Source:
- Drain
- Other Device/Implant
- Head/Eyes/Nose/Throat
- Thorax (not pneumonia)
- Pneumonia
- Other

#### Abdomen:

#### Gallbladder:

#### Small Bowel:

#### Colon:

#### Skin/Soft Tissue:

#### UTI:

### Organism Data:
- Negative to Date/No Growth/Culture Negative
- Gram Negative
- Gram Positive
- Fungal
- Other

### Discharge Disposition:

### Comments:
Recognition/Intervention

- After recognizing sepsis (or another acute problem) intervention is necessary.
Nurse’s Role

- Early recognition – KEY!!
- Provider notification – House Sup, NPs, PAs, MDs
- Early intervention – Fluids, cultures, antibiotics
- Continuous monitoring
  - Frequent vital signs – Q15 min, Q30 min, Q1 hour
  - Telemetry
- Reassessment – Mental status, respiratory rate, UOP
- Nursing care and intervention
  - Diligent hand hygiene, aspiration precautions and mouth care, early ambulation, advocate prompt removal of urinary catheters and central venous catheters when appropriate, early call for help!
• **General Interventions**

1. **Administer** high flow oxygen
2. **Obtain** cultures
   a) blood (2 separate sites), urine, sputum, wounds, etc.
3. **Start antibiotics within 1 hour**
   (as soon as cultures have been collected, if possible)
4. **Begin** rapid IVF resuscitation (use pressure bag)
5. **Draw** other lab work
   1. CBC, BMP, lactic acid
6. **Monitor** intake and output
In the KNOW:

Information to have ready for the MD:

- Current vital signs including temperature
- Vital sign trends - past 24 hours (temp, RR, HR, BP)
- Baseline and current mental status
- Diagnosis, co-morbidities, and recent procedures/surgeries
- Current CBC & culture results; relevant labs
- Date of vascular access or Foley placement
- Antibiotic therapy – current or past

SBAR format!
# Sepsis order set

## Early interventions – implement if SERRI score is ≥ 4, but does not require ICU transfer

<table>
<thead>
<tr>
<th>Early interventions</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notify Attending MD</td>
<td>Notify attending MD</td>
</tr>
<tr>
<td>Consult ID</td>
<td>Consult ID</td>
</tr>
<tr>
<td>Consult Critical Care</td>
<td>Consult critical care</td>
</tr>
<tr>
<td>Blood cultures x2, 15 minutes apart (one from central/PICC line and one from peripheral stick)</td>
<td>Blood cultures x2, 15 minutes apart (one from central/PICC line and one from peripheral stick)</td>
</tr>
<tr>
<td>Urine culture/UA</td>
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</tr>
<tr>
<td>Sputum culture w/gram stain</td>
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</tr>
</tbody>
</table>

## Fluid Bolus

<table>
<thead>
<tr>
<th>Fluid Bolus</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9% NaCl 500ml bolus over 15 minutes to maintain MAP 85-90 (may be repeated x3)</td>
<td>0.9% NaCl 500ml bolus over 15 minutes to maintain MAP 85-90 (may be repeated x3)</td>
</tr>
</tbody>
</table>

## Labs

<table>
<thead>
<tr>
<th>Labs</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT then q6</td>
<td>STAT then q6</td>
</tr>
<tr>
<td>Lactic acid</td>
<td>Lactic acid</td>
</tr>
<tr>
<td>BMP</td>
<td>BMP</td>
</tr>
<tr>
<td>CBC w/diff</td>
<td>CBC w/diff</td>
</tr>
<tr>
<td>PT/INR PTT</td>
<td>PT/INR PTT</td>
</tr>
<tr>
<td>STAT once</td>
<td>STAT once</td>
</tr>
<tr>
<td>ABG</td>
<td>ABG</td>
</tr>
<tr>
<td>Type and screen</td>
<td>Type and screen</td>
</tr>
<tr>
<td>Hepatic function panel</td>
<td>Hepatic function panel</td>
</tr>
<tr>
<td>Bedside glucose monitoring q4</td>
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</tr>
</tbody>
</table>

## Empiric Antibiotic Coverage

<table>
<thead>
<tr>
<th>Empiric Antibiotic Coverage</th>
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</tr>
</thead>
<tbody>
<tr>
<td>After cultures are drawn, begin antibiotic (within 1 hour of sepsis recognition)</td>
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</tr>
<tr>
<td>Cefepime 2g IV over 30min then 1g q12</td>
<td>Cefepime 2g IV over 30min then 1g q12</td>
</tr>
<tr>
<td>Tobramycin 5mg/kg IV over 30min x1</td>
<td>Tobramycin 5mg/kg IV over 30min x1</td>
</tr>
<tr>
<td>Vancomycin 1g IV over 1hr then q12</td>
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</tr>
</tbody>
</table>

## Advanced Interventions – SERRI score ≥ 4 or rapid response initiated for signs of sepsis

<table>
<thead>
<tr>
<th>Advanced Interventions</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin sepsis protocol</td>
<td>Begin sepsis protocol</td>
</tr>
<tr>
<td>Notify Attending MD</td>
<td>Notify attending MD</td>
</tr>
<tr>
<td>Consult ID</td>
<td>Consult ID</td>
</tr>
<tr>
<td>Consult Critical Care</td>
<td>Consult critical care</td>
</tr>
<tr>
<td>Obtain EKG</td>
<td>Obtain EKG</td>
</tr>
<tr>
<td>Transfer to ICU</td>
<td>Transfer to ICU</td>
</tr>
<tr>
<td>Keep SpO2 &gt; 92%</td>
<td>Keep SpO2 &gt; 92%</td>
</tr>
<tr>
<td>Monitor continuous pulse ox</td>
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</tr>
<tr>
<td>Apply telemetry monitoring if any delay in transfer to ICU</td>
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</tr>
<tr>
<td>Monitor vital signs q/15 minutes for two hours then follow ICU protocol</td>
<td>Monitor vital signs q/15 minutes for two hours then follow ICU protocol</td>
</tr>
<tr>
<td>STAT C/ABR</td>
<td>STAT C/ABR</td>
</tr>
</tbody>
</table>

If indicated:

- Replace C/VLP/PPG with new line, then old line (if suspecting line infection)
- Place C/VL, if no central access available
- Replace Foley
- Hold tube feeds

## Pressors

<table>
<thead>
<tr>
<th>Pressors</th>
<th>Action</th>
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<tbody>
<tr>
<td>Norepinephrine - titrate to maintain MAP 65-90</td>
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</tr>
<tr>
<td>Epinephrine - titrate to maintain MAP 65-90</td>
<td>Epinephrine - titrate to maintain MAP 65-90</td>
</tr>
<tr>
<td>Vasopressin - 0.03 units/min</td>
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</tbody>
</table>

## Cultures

<table>
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## STAT Fluid Bolus

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</tbody>
</table>

## Patient label

- Patient label

## Physician signature

- Physician signature

## Date/time

- Date/time
Interventions

- **Empiric Antibiotic Coverage**
  - After cultures are drawn, begin antibiotic (within 1 hour of sepsis recognition)
  - o Cefepime 2g IV over 30min then 1g q12 +
  - o Tobramycin 5mg/kg IV over 30min x1 +
  - o Vancomycin 1g IV over 1hr then q12
  - o Substitute aztreonam 2g IV over 30min for cefepime if allergic to cephalosporins.
  - o Consult Pharmacy for renal dose
  - o Call physician when culture results are available. De-escalate abx as appropriate.

- **Cultures**
  - o Blood cultures x2, 15 minutes apart (one from central/PICC line and one from peripheral stick)
  - o Urine culture/UA
  - o Wound cx (if pt. has wound)
  - o Sputum cx w/gram stain
Interventions

- Labs
  - STAT then q6
  - o Lactic acid
  - STAT then daily
  - o BMP
  - o CBC w/diff
  - o PT/INR PTT

- STAT once
  - o ABG
  - o Type and screen
  - o Hepatic function panel
  - o Bedside glucose monitoring q4
  - o Other

- STAT Fluid Bolus
  - o 0.9% NaCl (30ml/kg) bolus over 15 minutes to maintain MAP 65-90 (may be repeated x1)
Other Recommendations

- Infectious Disease Consult
- Critical Care consult
- Telemetry monitoring
EARLY RECOGNITION

EARLY INTERVENTION

IMPROVED SURVIVAL
TAKE HOME MESSAGES

• Early recognition of subtle signs of sepsis combined with early intervention is imperative
• Think sepsis until proven otherwise
• Know the signs and symptoms of sepsis
• Complete a thorough physical assessment
• Identify high risk patients
• Know the sepsis protocol and what to expect
Conclusion

- What is SERRI? (sepsis early recognition and response initiative)
- Why is understanding sepsis important? (effects mortality, ALOS, budget)
- What are the stages of sepsis? (sepsis continuum)
- How to recognize sepsis? (s/s plus algorithm)
- How and when to intervene? (early with order set)
- Who intervenes? (you, the patient advocate)
Questions?
References


References


