Early Recognition and Management of Sepsis

Post-acute Settings

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Overview

• Why sepsis? Why now?
• Post sepsis syndrome
• A collaborative approach to improving sepsis care at SNFs
  • Early identification and management of sepsis at SNF
  • Infection Prevention of PNA, UTI and CLABSIs
• Sepsis toolkit for Post-acute Setting
Faces of Sepsis

- [https://www.youtube.com/watch?v=12Qbnn6XfH0](https://www.youtube.com/watch?v=12Qbnn6XfH0)

Sepsis.org
Sepsis Survivor Story: Steve
Sepsis is an Epidemic

- Affects >1 million Americans per year
- 3rd leading cause of death in the US
- Sepsis occurs in just 10% of U.S. hospital patients, but it contributes to as many as half of all hospital deaths
- US spends $24 billion per year to treat

> 700 people die each day from sepsis in the U.S.- one every 2 minutes

80% of sepsis begins outside the hospital

7 out of 10 patients with sepsis had recently used health services or had chronic dx requiring frequent care

4 types of infections most connected to sepsis; lung, urinary tract, skin and gut

HCP: think sepsis & act fast
Sepsis Awareness
study done by Sepsis Alliance annually

• Sepsis awareness has significantly increased at 58% over 55% in 2016.
  • This means more than 7 million more adults are aware of sepsis in 2017 compared to 2016
  • Those under 45 are significantly more likely to have heard the term sepsis than over (62% vs. 53%)
• Almost one-quarter of Americans believe that sepsis only happens in hospitals (23%)
• An alarming 39% of Americans believe that sepsis is contagious
• Nearly three-quarters of Americans say they can identify the symptoms of someone having a stroke, whereas less than 1% can correctly identify all of the most common sepsis symptoms
• More Americans have never heard of sepsis (27%) than Ebola (5%), a nearly non-existent condition in the U.S.
• Nearly 58 million adults believe if you are healthy, an infection isn’t anything you need to worry about (24%)
Hospitalization rates for sepsis or septicemia were similar for males and females and increased with age.

Figure 2. Rates of hospitalization for septicemia or sepsis, by sex and age, 2008

NOTES: Rates are significantly higher for males and females in each successive age group.

Common Causes of Hospitalization Adults aged 85 and over: U.S.

<table>
<thead>
<tr>
<th>First-listed diagnosis</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>Percent change(^1) (2000 to 2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of hospitalization per 1,000 population</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>48</td>
<td>47</td>
<td>43</td>
<td>-9.5</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>51</td>
<td>52</td>
<td>34</td>
<td>-32.8</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>19</td>
<td>24</td>
<td>30</td>
<td>+55.9</td>
</tr>
<tr>
<td>Septicemia</td>
<td>15</td>
<td>18</td>
<td>28</td>
<td>+84.8</td>
</tr>
<tr>
<td>Stroke</td>
<td>37</td>
<td>27</td>
<td>28</td>
<td>-25.0</td>
</tr>
<tr>
<td>Hip fracture</td>
<td>28</td>
<td>23</td>
<td>21</td>
<td>-25.4</td>
</tr>
</tbody>
</table>

\(^1\)Percent change for each diagnosis is significant from 2000 through 2010 (\(p < 0.05\)).

NOTE: First-listed diagnosis is considered to be the main cause or reason for the hospitalization. The diagnoses were chosen because they were the top six first-listed diagnoses in 2010.

### Table 1. Inpatients With Sepsis Diagnoses in the Kaiser Permanente Northern California Cohort and the Healthcare Cost and Utilization Project Nationwide Inpatient Sample

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Explicit</td>
<td>Explicit POA</td>
</tr>
<tr>
<td>Hospitalizations</td>
<td>55 008 (11.4)</td>
<td>50 520 (10.5)</td>
</tr>
<tr>
<td></td>
<td>[11.3-11.5]</td>
<td>[10.4-10.5]</td>
</tr>
<tr>
<td>Hospital mortality</td>
<td>6272 (11.4)</td>
<td>5238 (10.4)</td>
</tr>
<tr>
<td></td>
<td>[11.1-11.7]</td>
<td>[10.1-10.6]</td>
</tr>
<tr>
<td>% (95% CI) of all hospital deaths among patients with sepsis</td>
<td>44.2</td>
<td>36.9</td>
</tr>
<tr>
<td></td>
<td>(43.3-45.0)</td>
<td>(36.1-37.7)</td>
</tr>
</tbody>
</table>

1 out of 2-3 Deaths r/t Sepsis, Most POA

In KPNC 2012 subset, patient meeting criteria for EGDT comprised 32.6 percent of sepsis deaths & patients with sepsis, normal BP & lactate < 4 comprised 55.9% of sepsis deaths

Liu V, et al. JAMA,2014:May 18th, online.
Chang DW; Tseng CH; Shapiro MF. Critical Care Medicine. 43(10):2085-93, 2015 Oct.
### Table. Length of Stay and Cost for Unplanned 30-Day Readmissions After an Index Admission for Sepsis, Acute Myocardial Infarction, Heart Failure, Pneumonia, and Chronic Obstructive Pulmonary Disease

<table>
<thead>
<tr>
<th></th>
<th>National Readmission Data(^a)</th>
<th>Weighted Proportion of Cases in the United States</th>
<th>Percentage of Index Admissions Readmitted Within 30 Days (95% CI)</th>
<th>Percentage of Total Estimated Cost of All Readmissions (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of All Index Admissions Readmitted Within 30 Days</td>
<td>Estimated Mean Length of Stay (95% CI), (d)(^b)</td>
<td>Estimated Mean Cost per Readmission (95% CI), ($)(^b)</td>
<td></td>
</tr>
<tr>
<td>Admissions associated with 30 day readmission</td>
<td>1187697</td>
<td>6.4 (6.4-6.5)</td>
<td>8242 (8225-8258)</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Primary Analyses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>147084</td>
<td>7.4 (7.3-7.4)</td>
<td>10070 (10021-10119)</td>
<td>12.2 (11.9-12.4)</td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>15001</td>
<td>5.7 (5.6-5.8)</td>
<td>9424 (9279-9571)</td>
<td>1.2 (1.2-1.3)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>79480</td>
<td>6.4 (6.4-6.5)</td>
<td>9051 (8990-9113)</td>
<td>6.7 (6.5-6.8)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>59378</td>
<td>6.7 (6.6-6.7)</td>
<td>9533 (9466-9600)</td>
<td>5.2 (5.0-5.3)</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>54396</td>
<td>6.0 (5.9-6.0)</td>
<td>8417 (8355-8480)</td>
<td>4.6 (4.5-4.8)</td>
</tr>
<tr>
<td><strong>Sensitivity Analyses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sepsis</td>
<td>89800</td>
<td>7.6 (7.6-7.7)</td>
<td>10828 (10760-10897)</td>
<td>7.3 (7.1-7.5)</td>
</tr>
<tr>
<td>Acute myocardial infarction</td>
<td>21281</td>
<td>6.0 (5.9-6.1)</td>
<td>9530 (9408-9654)</td>
<td>1.8 (1.7-1.8)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>236636</td>
<td>6.5 (6.5-6.5)</td>
<td>9248 (9211-9285)</td>
<td>20.0 (19.6-20.4)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>130904</td>
<td>6.9 (6.9-7.0)</td>
<td>9749 (9700-9797)</td>
<td>11.1 (10.9-11.4)</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>201867</td>
<td>6.3 (6.3-6.4)</td>
<td>8677 (8641-8713)</td>
<td>17.4 (17-17.7)</td>
</tr>
</tbody>
</table>

Mayr FB, et al. JAMA, 2017, Jan 22\(^{nd}\) published online
## Discharge Disposition After Sepsis

<table>
<thead>
<tr>
<th>Disposition</th>
<th>Septicemia or sepsis</th>
<th>Other diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine</td>
<td>39</td>
<td>79</td>
</tr>
<tr>
<td>Transfer to other short-term care facility</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Transfer to long-term care institution</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Died during the hospitalization</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Other or not stated</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

1\(^\text{Difference is statistically significant at the 0.05 level. SOURCE: CDC/NCHS, National Hospital Discharge Survey, 2008.}\)
Michigan All Cause Readmission to any Hospital

All-Cause Readmission Within 30 Days of Index Discharge to Any, Same and Other Hospital by Top 10 Diagnosis Related Group (DRG), Michigan Medicare (FFS) Beneficiaries [July 1, 2016 - June 30, 2017]

<table>
<thead>
<tr>
<th>Rank</th>
<th>DRG</th>
<th>Title</th>
<th>% of Total DRG</th>
<th>No. of Discharges</th>
<th>No.30D Readmits to Any Hospital</th>
<th>% 30D Readmits to Any Hospital</th>
<th>No. 30D Readmits to Same Hospital</th>
<th>% 30D Readmits to Same Hospital</th>
<th>No. 30D Readmits to Other Hospital</th>
<th>% 30D Readmits to Other Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>871</td>
<td>SEPTICEMIA OR SEVERE SEPSIS W/O MV 96+ HOURS W MCC</td>
<td>5.14</td>
<td>17,474</td>
<td>3,765</td>
<td>21.55</td>
<td>2,850</td>
<td>16.31</td>
<td>915</td>
<td>5.24</td>
</tr>
<tr>
<td>2</td>
<td>885</td>
<td>PSYCHOSES</td>
<td>3.93</td>
<td>13,368</td>
<td>3,198</td>
<td>23.92</td>
<td>905</td>
<td>6.77</td>
<td>2,293</td>
<td>17.15</td>
</tr>
<tr>
<td>3</td>
<td>291</td>
<td>HEART FAILURE &amp; SHOCK W MCC</td>
<td>3.16</td>
<td>10,756</td>
<td>3,003</td>
<td>27.92</td>
<td>2,261</td>
<td>21.02</td>
<td>742</td>
<td>6.90</td>
</tr>
<tr>
<td>4</td>
<td>392</td>
<td>ESOPHAGITIS, GASTROENT &amp; MISC DIGEST DISORDERS W/O MCC</td>
<td>2.09</td>
<td>7,110</td>
<td>1,167</td>
<td>16.41</td>
<td>834</td>
<td>11.73</td>
<td>333</td>
<td>4.68</td>
</tr>
<tr>
<td>5</td>
<td>189</td>
<td>PULMONARY EDEMA &amp; RESPIRATORY FAILURE</td>
<td>1.93</td>
<td>6,555</td>
<td>1,603</td>
<td>24.45</td>
<td>1,261</td>
<td>19.24</td>
<td>342</td>
<td>5.22</td>
</tr>
</tbody>
</table>
What have hospital’s done to decrease sepsis mortality?
Key Components of Sepsis Care

• Infection prevention
• Early identification
• Early and aggressive management (bundles)
• Avoid iatrogenic harm
  • Understand post sepsis syndrome and how to minimize its impact
  • Prevent sepsis readmissions

ALL of these must be provided across the continuum of care
Hospital Sepsis Program Components

- Infection Prevention
- Screening for early recognition—every patient every shift
- Nursing protocols to ensure early intervention for patients with severe sepsis
- Defined placement criteria
- Standardized ICU care
- Expand beyond the hospital walls
  - EMS
  - SNF
  - Home Care
Impact on the Elderly

- Age itself independent risk factor for death
- More likely admitted to ICU
- Highest mortality in the old elderly (85+)
- Prolonged hospitalization

Post Sepsis Impact

- Contributes to Cognitive decline
- Contributes to Physical long term disabilities (walking, ADLs, and IADLs)
Post-sepsis syndrome describes physical and/or long-term effects that affect up to 50% of people who survive sepsis.

Longer term effects of sepsis include:
- Sleep disturbance including insomnia
- Experiencing nightmares, hallucinations, flashbacks and panic attacks
- Muscle and joint pains which can be severe and disabling
- Extreme tiredness and fatigue
- Inability to concentrate
- Impaired mental (cognitive) functioning
- Loss of confidence and self-belief
Post Sepsis Syndrome

• People who have suffered from severe sepsis and especially those treated in an intensive care unit are at greatest risk of suffering post-sepsis syndrome.

• “60 percent of hospitalizations for severe sepsis were associated with worsened cognitive and physical function among surviving older adults. The odds of acquiring moderate to severe cognitive impairment were 3.3 times higher following an episode of sepsis than for other hospitalizations.”

• Sepsis survivors may be more at risk for developing other infections both viral and bacterial

Iwashyna, T. JAMA 2010; Mukherjee, S. SHOCK 2012
Cognitive Impairment: Sepsis

Before Sepsis

After Sepsis

% survivors cognitively impaired

-3 years | -1 year | +1 year | + 3 years

Mild Cognitive Impairment

Moderate/Severe Cog Impairment

p<0.001

Iwashyna T, JAMA 2010;304:1787-1794
Functional Trajectories by Baseline Functioning

1.57 new limitations among patients who had no limitations before

ADL: walking, dressing, bathing, eating, getting into and out of bed and toileting

IADL: preparing a hot meal, shopping for groceries, making telephone calls, taking medicines, and managing money

Iwashyna T, JAMA 2010;304:1787-1794
Cause of Post Sepsis Syndrome

- Response to systemic inflammation
- Brain, muscle and nerve injury from inflammation, ischemia and ischemia-reperfusion
- Poor perfusion, blood clots
- End organ damage
What can post hospital providers (SNFs) do?
First steps we did:

- Developed collaborative relationship with all facilities through our local Extended Care Collaborative
- Identify top 10 facilities that we were sending patients to
- Identified sepsis as a priority disease to focus on
- Sent out call to participate—explaining program, getting commitment of facility leadership

Request for Participation in
“Early Recognition and Management of Sepsis Program”
Please respond to participate by December 14th

Early Recognition and Management of Sepsis Program Design

- Evidence based and best practice education and training on protocols and tools necessary for early recognition of sepsis
- Interactive and integrated team approach with all health professionals, including certified nurse assistants in nursing facilities
- Care-based approach
- Utilize Performance Improvement Plan
- Include nursing facilities (NFP), ED, providers and hospital
- Required data collection over the period of the improvement project and includes how to track and trend the data

Facility Expectations:

- Implement sepsis screening tool and treatment protocols as provided in Early Recognition and Management of Sepsis Program
- Participate in 6-10 learning sessions and coaching calls
- Baseline and Monthly Submission of outcome and process data

Expected Results:
Participants facilities implementing a sepsis protocol such that

1. Improved screening and identification of septic residents within nursing facilities
2. Improved identification of patients with sepsis
3. Improved early interventions for patients with sepsis
4. Reduced rate of transfer to a higher level facility
5. Appropriate identification of septic patients transferred to the hospital from a nursing home
6. Reduce mortality rates for those with sepsis (septic shock)

Program Education Benefits

With your participation, we are able to conduct a group meeting:

1. Intensive learning session
2. Coaching calls and ongoing preparation for the facilitator
3. On-site nursing facility site visit and education and appropriate next steps
4. Web-based resources
5. Training materials

Information may be progressing to severe sepsis and septic shock. As part of the performance improvement project, we will work with facilities to determine their response if dyspnea is suspected

The kickoff event for this program will be Wednesday, January 19th from 8 am – 10 am. The remaining program learning sessions will follow a calendar series of every fourth Thursday of the month from January 20th through June 30, 2016. A calendar of the remaining sessions and agendas will be provided.

Sepsis Call to Participate

[Facility Name]

Medical Director or Nursing Home Administrator
Signature Date

Facility key contact for the “Early Recognition and Management of Sepsis Program”:

Name Title

Phone Number Email Address
Early Recognition and Management of Sepsis

Overview of Training Program

• Bi-Monthly one hour face to face meetings
  • Will follow the local ECC meeting
  • Walk through action plan to implement a sepsis early identification and management program that includes a focus on infection prevention
• (optional) Bi-Monthly site specific coaching calls, to provide individualized support
• Provide training and educational materials (powerpoints, recorded videos ect)
• Defined process and outcome measures to evaluate success of the program
Roles and Responsibilities

• Each facility must have a team identified to do this work
  • Should include: medical director, DON (or designee), infection prevention nurse at a minimum

• Team work through action plan provided in specified timeframe
• Implement screening process
• Implement early management of sepsis process
• Educate staff on screening and management processes
• Assess current infection prevention practices related to PNA, UTI and CLABSI and identify one intervention to improve upon
• Collect defined process and outcome data
First Focus

• Educate on why sepsis and why now.
• Educate on what is sepsis, definitions and evidence based management
• Review early identification process: routine screening
Severe Sepsis: Defining a Disease Continuum

Infection → SIRS → Sepsis → Severe Sepsis

**Adult Criteria**
A clinical response arising from a nonspecific insult, including ≥ 2 of the following:

- **Temperature**: > 38°C or < 36°C
- **Heart Rate**: > 90 beats/min
- **Respiration**: > 20/min
- **WBC count**: > 12,000/mm³, or < 4,000/mm³, or > 10% immature neutrophils

**SIRS**
SIRS with a presumed or confirmed infectious process

**Sepsis**
with ≥1 sign of organ dysfunction, hypoperfusion, or hypotension.

**Examples:**
- Cardiovascular (refractory hypotension)
- Renal
- Respiratory
- Hepatic
- Hematologic
- CNS
- Unexplained metabolic acidosis

**Shock**

SIRS = Systemic Inflammatory Response Syndrome
Identifying Acute Organ Dysfunction as a Marker of Severe Sepsis

**Neurological**
Altered level of consciousness (unrelated to primary neuro pathology)

**Respiratory**
Increased O2 requirements SaO2 < 90%

**Metabolic**
Unexplained metabolic acidosis
- pH < 7.30 or Base deficit ≥ 5.0 mEq/l
- Lactate > 4

**Cardiovascular**
- Tachycardia SBP < 90mmHg

**Renal**
- UO < 0.5 ml/kg per hr (despite fluid)
- Creatinine increase of greater than 0.5mg/dl from baseline

**Hematologic**
- Platelets < 80,000/mm3
- Decline in platelet count of 50% over 3 days
Except on few occasions, the patient appears to die from the body's response to infection rather than from it."

Sir William Osler – 1904
The Evolution of Modern Medicine
Homeostasis Is Unbalanced in Severe Sepsis

Coagulation

Inflammation

Fibrinolysis

Inflammation, Coagulation and Impaired Fibrinolysis In Severe Sepsis

Inflammatory Response to Infection

Thrombotic Response to Infection

Fibrinolytic Response to Infection

Endothelium

Tissue Factor

Monocyte

IL-6

IL-1

TNF-α

Neutrophil

IL-6

COAGULATION CASCADE

Factor VIIIa

Factor Va

THROMBIN

TAFI

PAI-1

Suppressed fibrinolysis

Fibrin clot

Tissue Factor

COAGULATION CASCADE

Factor VIIIa

Factor Va

THROMBIN

TAFI

PAI-1

Suppressed fibrinolysis

Fibrin clot

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Microcirculation of Septic Patient: Orthogonal Polarization Spectral Imaging

- BP: 120/80 Hg
- SaO$_2$: 98%

Microcirculation of Septic Shock Patient: Orthogonal Polarization Spectral Imaging

- Resuscitated with fluids and dopamine
  - HR: 82 BPM
  - BP: 90/35 mm Hg
  - SaO₂: 98%
  - CVP: 25 mm Hg

Definitions

• Infection

• Sepsis: infection plus 2 or more SIRS

• Severe Sepsis: infection plus 2 or more SIRS plus new organ dysfunction

• Septic Shock: severe sepsis with a lactic acid greater than or equal to 4mmol/L OR continued hypotension (systolic BP<90 or 40mmHg decrease from their baseline) after initial fluid bolus (30ml/kg)
SEPSIS (SEVERE SEPSIS) AND SEPTIC SHOCK ARE MEDICAL EMERGENCIES, AND WE RECOMMEND THAT TREATMENT AND RESUSCITATION BEGIN IMMEDIATELY

2017 Surviving Sepsis Guidelines Best Practice Statement
TO SAVE LIVES.....

**Early** identification

**Early** antibiotics

**Early** fluid resuscitation
Initiation of Inappropriate Antimicrobial Therapy Results in a 5-fold Reduction of Survival in Human Septic Shock

- Objective: Determine the impact of the initiation of inappropriate antimicrobial therapy on survival to hospital discharge of patients with septic shock
- Retrospective review of 5,715 patients from 22 different hospitals in Canada, US and Saudi Arabia
- Data collected from 1996-2005
Initiation of Inappropriate Antimicrobial Therapy Results in a 5-fold Reduction of Survival in Human Septic Shock

- 5,715 patients in septic shock in three countries
- 55% of cases were from community acquired infection
- Decrease in survival with inappropriate initial antibiotics was fivefold

Kumar A. et al. Chest, 2009; 136; 1237-1248
Duration of Hypotension Before Initiation of Effective Antimicrobial Therapy is the Critical Determinant of Survival in Human Septic Shock

*2,154 septic shock patients

*Effective antimicrobial administration within the 1st hour of documented hypotension was associated with increased survival in patients with septic shock

*Each hour of delay over the next 6 hours was associated with an average decrease in survival of 7.6% (range 3.6-9.9%)
SEP-1

TO BE COMPLETED WITHIN 3 HOURS OF TIME OF PRESENTATION†:

1. Measure lactate level
2. Obtain blood cultures prior to administration of antibiotics
3. Administer broad spectrum antibiotics
4. Administer 30ml/kg crystalloid for hypotension or lactate ≥4mmol/L

† “time of presentation” is defined as the time of earliest chart annotation consistent with all elements severe sepsis or septic shock ascertained through chart review.
TO BE COMPLETED WITHIN 6 HOURS OF TIME OF PRESENTATION:

5. Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) \( \geq 65\text{mmHg} \)

6. In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was \( \geq 4\text{ mmol/L} \), re-assess volume status and tissue perfusion and document findings according to table 1.

7. Re-measure lactate if initial lactate elevated.
## TABLE 1

**DOCUMENT REASSESSMENT OF VOLUME STATUS AND TISSUE PERFUSION WITH:**

**Either**
- Repeat focused exam (after initial fluid resuscitation) by licensed independent practitioner including vital signs, cardiopulmonary, capillary refill, pulse and skin findings.

**Or two of the following:**
- Measure CVP
- Measure ScvO2
- Bedside cardiovascular ultrasound
- Dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge
Early Identification through Screening
# Severe Sepsis Screening Tool

**Directions:** The screening tool is for use in identifying residents upon admission, daily on every shift and PRN upon condition change or a STOP AND WATCH notification.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
</table>

## I. Systemic Inflammatory Response Syndrome (SIRS)
- Temperature greater than or equal to 101 or less than or equal to 96.8
- Heart rate greater than 90 beats/minute
- Respiratory rate greater than 20 breaths/minute
- WBC greater than 12,000 or less than 4,000 (do not use blood work greater than 24 hours old)
- Blood glucose greater than 140 in non-diabetics (Obtain if 1 or more SIRS present)

Check blood glucose if any one above is checked.
- If less than two checked above - negative screen for sepsis (initial), Continue to assess resident. Proceed to II if one or more checked.
- If two checked above, proceed to II.

## II. Infection
### Suspected or documented infection
- Antibiotic therapy

If no checks above - negative screen for sepsis (initial), No need to proceed to III. Continue to assess resident for changes. STOP and WATCH early warning tool or using your senses.
- If one checked above, patient has screened positive for sepsis. Place resident on I & O. Monitor and record urine output every shift. Obtain order for lactic acid and proceed to III.

## III. Organ Dysfunction
- Respiratory: SaO2 less than 90% or increasing O2 requirements
- Cardiovascular: SBP less than 90 mmHg or 40 mmHg less than baseline
- Renal: Urine output less than 0.5 mL/kg over last 8 hours
- CNS: Mental status changes
- Labs: Do not use lab results older than 24 hours
- Platelets less than 100,000
- INR greater than 1.5
- Bilirubin greater than or equal to 2 mg/dl
- Serum lactic acid greater than 2 mEq/l

If no checks above - negative screen for severe sepsis (initial), Continue to assess. No further action at this time. If one checked above - patient screens positive for severe sepsis. Review advance directives. Contact family if no advance directives on record. Call physician and follow SBAR.

## SITUATION
Tell physician resident screened positive for severe sepsis.

## BACKGROUND
Describe positive SIRS; inform physician if resident is currently being treated for a known infection; share which organ system has dysfunction.

## ASSESSMENT
Share VS, the SaO2 (pulse ox) and any additional vital information.

## RECOMMENDATION
- Blood cultures, CBC, lactic acid (if not previously drawn); IV antibiotic. The systolic blood pressure is less than 90 mmHg (or 40 mmHg less than baseline) - need an order to administer fluid bolus of 30 mL/kg over 1 hour. After reassessment, if resident's hypotension has not resolved, may we send to the ER?
Screening

• When do you screen?
  • Upon admission, daily, with condition change or stop and watch alert or if receiving antibiotics
  • **First step**: Does the patient have signs of systemic inflammatory response syndrome (SIRS)?
Screening

- **Second Step**: Does the patient have a known or suspected infection?

<table>
<thead>
<tr>
<th>II. Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected or documented infection</td>
</tr>
<tr>
<td>Antibiotic therapy</td>
</tr>
</tbody>
</table>

- **If no checks above - negative screen for sepsis (initial)**
  No need to proceed to III. Continue to assess resident for changes:
  STOP and WATCH early warning tool or using your senses.
- **If one checked above, patient has screened positive for sepsis.**
  Place resident on I & O. Monitor and record urine output every shift.
  Obtain order to lactic acid and proceed to III.
Screening

**Third Step:** Does the patient have any new organ dysfunction in an organ system distant from site of infection?

<table>
<thead>
<tr>
<th>III. Organ Dysfunction</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Respiratory: SAsO2 less than 90% or increasing O2 requirements</td>
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<tr>
<td>Cardiovascular: SBP less than 90 mmHg or 40 mmHg less than baseline</td>
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<tr>
<td>Renal: Urine output less than .5 ml/kg over last 8 hours</td>
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<tr>
<td>CNS: Mental status changes</td>
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<tr>
<td>Labs: Do not use lab results older than 24 hours</td>
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<tr>
<td>Platelets less than 100,000</td>
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<tr>
<td>INR greater than 1.5</td>
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<td></td>
</tr>
<tr>
<td>Bilirubin greater than or equal to 2 mg/dl</td>
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<td></td>
<td></td>
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<tr>
<td>Serum lactic acid greater than 2 mEq/l</td>
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</tbody>
</table>

If no checks above - negative screen for severe sepsis (initial) __
Continue to access. No further action at this time.

If one checked above - patient screens positive for severe sepsis. Review advance directives. Contact family if no advance directives on record. Call physician and follow SBAR.
Screening

- If screens positive for severe sepsis, then follow the SBAR at bottom of tool

<table>
<thead>
<tr>
<th>SITUATION</th>
<th>Tell physician resident screened positive for severe sepsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKGROUND</td>
<td>Describe positive SIRS; inform physician if resident is currently being treated for a known infection; share which organ system has dysfunction</td>
</tr>
<tr>
<td>ASSESSMENT</td>
<td>Share VS, the SAO2 (pulse ox) and any additional vital information</td>
</tr>
</tbody>
</table>
| RECOMMENDATION Request order for following | Blood cultures; CBC; lactic acid (if not previously drawn); IV antibiotic  
The systolic blood pressure is less than 90 mmHg (or 40 mmHg less than baseline) - need an order to administer fluid bolus of 30 ml/kg over 1 hour. After reassessment; if resident’s hypotension has not resolved, may we send to the ER? |
### Background / History
The screening tool is for use in identifying guests upon admission, daily on every shift, AND pm upon condition change or a Stop And Watch notification.  

1. Is the guest/elder's history suggestive of a new infection?  
   - 1. Pneumonia, Empyema  
   - 2. Urinary tract infection  
   - 3. Acute abdominal infection  
   - 4. Meningitis  
   - 5. Skin/Soft Tissue Infection  
   - 6. Bone/Joint infection  
   - 7. Wound Infection  
   - 8. Blood stream catheter infection  
   - 9. Endocarditis  
   - 10. Implantable device infection  
   - 11. Other infection  

### Systemic Inflammatory Response Syndrome (SIRS)
2. Are any two of the following signs and symptoms of infection both present and new to the guest/elder?  
   - 1. Hyperthermia (>101.0°F)  
   - 2. Hypothermia (<98.8°F)  
   - 3. Altered mental status  
   - 4. Tachycardia > 90 bpm  
   - 5. Tachypnea > 20 bpm  
   - 6. Leukocytosis (WBC count > 12,000 µL⁻¹)  
   - 7. Leukopenia (WBC count < 4000 µL⁻¹)  
   - 8. Hyperglycemia (plasma glucose > 140 mg/dL or 7.7 mmol/L in the absence of diabetes)  
   - If less than 2 checked above - negative screen for Sepsis. Continue to assess guest. (Proceed to no.2 if one or more checked.)  

### Infection
3. ☐ Suspected or documented infection  
   - iv. ☐ Antibiotic Therapy  
   - If no checks above - negative screen for sepsis. No need to proceed to 3. Continue to assess guest/elder for changes: STOP and WATCH early warning tool or using your senses. If one checked above, guest/elder has screened positive for sepsis. Place resident on I & O. Monitor and record urine output every shift. Obtain order to lactic acid and proceed to 3.  

### Organ Dysfunction
4. Are any of the following organ dysfunction criteria present at a site remote from the site of the infection that are NOT considered to be chronic conditions?  
   - 1. SBP < 90 mmHg  
   - 2. SBP decrease > 40 mmHg from baseline  
   - 3. Creatinine > 2.0 mg/dL (178.8 mmol/L)  
   - 4. Bilirubin > 2 mg/dL (34.2 mmol/L)  
   - 5. Platelet count < 100,000 µL  
   - 6. Lactate > 2 mmol/L (18.0 mg/dL)  
   - 7. Coagulopathy (INR > 1.5 or aPTT > 60 secs)  
   - 8. Acute lung injury with SAO2 < 90% or increasing O2 requirements  
   - 9. Acute lung injury with SAO2 < 90% or increasing O2 requirements in the presence of pneumonia as infection source  
   - 10. Change in LOC- Mental status changes  
   - Labs: Do not use lab results older than 24 hours  

5. If no checks above - negative screen for severe sepsis (Continue to assess. No further action at this time.)  

vi. If one is checked above - guest/elder screens positive for severe sepsis. (Review advance directives. Contact family if no advance directives on record. Call physician and follow SBAR.)  

### SITUATION
6. Tell physician guest/elder screened positive for severe sepsis  
   - ☐ Done  
   - ☐ N/A = Not Applicable  

### BACKGROUND
7. Describe positive SIRS; inform physician if resident is currently being treated for a known infection; share which organ system has dysfunction.  
   - ☐ Done  
   - ☐ N/A = Not Applicable  

### ASSESSMENT
8. Share VS, the SAO2 (pulse ox) and any additional vital information.  
   - ☐ Done  
   - ☐ N/A = Not Applicable  

### RECOMMENDATION
9. Blood cultures; CBC; lactic acid (if not previously drawn); IV antibiotic. The systolic blood pressure is less than 90 mmHg (or 40 mmHg less than baseline) - need an order to administer fluid bolus of 30 ml/kg over 1 hour. After reassessment; if resident's hypotension has not resolved, may we send to the ER?  
   - ☐ Done  
   - ☐ N/A = Not Applicable  

---

**SECTION Cust. Evaluation for Severe Sepsis Screening Tool (1)**
Severe Sepsis Screening

Upon admission, daily and with condition change

I. Infection

Suspected or documented?

Yes

Temp  > 101.3 or < 96.8

No

On antibiotic therapy?

Yes

Respiratory rate  > 20 breaths/min

No

Blood glucose > 140 mg/dL non-diabetic

No

HR > 90 BPM

Yes

No

No sepsis. Repeat screening process daily.

II. Systemic Inflammatory Response Syndrome

Are 2 or more checked?

Yes

No

Patient Screening Positive for Sepsis

1. Place resident on I & O
2. Record urine output, O2 shift
3. Obtain lactic acid test

III. Organ Dysfunction

Sao2 < 90% or increase in SaO2 required

No

SBP < 90mmHg or 40 mmHg less than baseline

No

Methine output < 5ml/kg over 8 hours

No

CNS mental status change

No

Platelets < 100,000

No

INR > 1.5

No

Bilirubin ≥ 4 mg/dl

No

Serum lactate ≥ 2mEq/L

Yes

Treat for Sepsis

SBAR

Situation: Tell physician patient screened positive for severe sepsis.

Background: Describe positive SIRS; inform physician if resident is currently being treated for a known infection; share which organ system has dysfunction.

Assessment: Share VS and SaO2 (pulse ox) and any additional information.

Recommendation: Blood cultures; CBC; IV antibiotic. For decreased BP, fluid bolus 30 ml/kg over 1 hour or faster. If resident does not respond to bolus, send to ER.

Call Dr., transfer to ED with ED Transfer checklist.

SBP > 90

Administer 30 ml/kg fluid bolus/hour

No
Evangelical Home-Saline Sepsis Screening Pathway

I. INFECTION - IF ONE or MORE PRESENT:
- Signs and Symptoms of Infection
- Current Antibiotic Therapy
IF ONE OR MORE PRESENT, PROCEED TO SECTION II. MD SHOULD BE NOTIFIED OF ALL NEW ONSET/WORSENING SYMPTOMS OF INFECTION. CONSIDER ORDERS FOR UA, CXR and/or CULTURES.

II. SIRS-IF TWO OR MORE PRESENT:
- Heart Rate > 90 beats/minute
- Respiratory Rate > 20 breaths per minute
- WBC ≥ 12,000 mm3 OR ≤ 4,000 mm3
- Temperature ≤ 96.8° F OR ≥ 101° F
- Acute Mental Status Changes
- Blood Glucose greater than 140 in non-diabetic
IF TWO OR MORE PRESENT, PROCEED TO SECTION III. INITIATE I & O, MONITOR & RECORD URINE OUTPUT Q SHIFT. CONTACT MD, REQUEST ORDERS FOR LACTIC ACID, CBC W/DIFF (IF NOT DONE IN LAST 24 HOURS), COMPREHENSIVE METABOLIC PANEL, & INR.

III. ORGAN DYSFUNCTION: IF ONE or MORE PRESENT:
- SaO2 < 90% or increasing O2 requirements
- Mental Status Changes
- DO NOT USE LABS > 24 hours
- Total serum bilirubin ≥ 4 mg/dl
- Serum lactic acid ≥ 2.0 meq/L
- SBP < 90 mm Hg or ≥40 mmHg below baseline
- Urine output < 0.5 ml/kg/hr over last 8 hrs
- Platelet count less than 100,000
- INR > 1.5
- Creatinine > 2.0 mg/dl without history of renal disease
IF ONE OR MORE PRESENT, SCREEN IS POSITIVE FOR SEVERE SEPSIS. PROCEED TO SBAR & CALL MD.

SEVERE SEPSIS
CONTACT MD USING SEVERE SEPSIS SBAR & REQUEST ORDERS:
- Blood Cultures x 2
- IV Antibiotic Therapy
- CBC
- If hypotensive, IV fluid bolus @ 30 ml/kg, or as ordered by MD
FOR PERSISTENT HYPOTENSION THAT DOES NOT RESPOND TO IV FLUID BOLUS, OR IF CONDITION WORSENS, CONTACT MD & TRANSFER TO ER
ECF-Severe Sepsis Bundle

For patients with a known/suspected infection + 2 or more SIRS + new organ dysfunction (provide the following interventions per physician order)

- Blood cultures x 2 (prior to antibiotics)
- Obtain lactic acid, if greater than 2 get repeat in 6 hours
- Broad spectrum IV antibiotic(s) within 1 hour of screening positive for severe sepsis.
- Vital signs: twice a shift x 24 hrs (if a PRISM 1 or 2: every 4 hours x 2, then every shift x 2, then qd)
- Monitor I & O every shift
- If SBP <90 mmHg or 40mmHg decrease from their baseline, administer a 30ml/kg fluid bolus as fast as possible
  
  IF resident’s hypotension has not resolved, call physician regarding transfer to the ED

Perform severe sepsis screen every shift and with a condition change or a STOP and WATCH notification
Stop and Watch (INTERACT®)

- **Link with current process**
  - S – Seems different than usual
  - T – Talks or communicates less
  - O – Overall needs more help
  - P – Pain, new or worsening – Participating less in activities
  - A – Ate less
  - N – No bowel movement in 3 days/diarrhea
  - D – Drank less
  - W – Weight change
  - A – Agitated or nervous more than usual
  - T – Tired, weak, confused, or drowsy
  - C – Change in skin color or condition
  - H – Help with walking, transferring, toileting more than usual

- **Educate CNAs**
# Sepsis Early Identification Action Plan

<table>
<thead>
<tr>
<th>Step</th>
<th>Who? When?</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Get team together to create early identification process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Develop screening tool/process</td>
<td></td>
<td></td>
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<tr>
<td>3. Get medical staff support for screening and early intervention</td>
<td></td>
<td></td>
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<tr>
<td>4. Develop and implement educational plan for sepsis and screening</td>
<td></td>
<td></td>
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<tr>
<td>5. Develop patient &amp; family education process and tools</td>
<td></td>
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<tr>
<td>6. Evaluate screening: define outcome and process metrics</td>
<td></td>
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<tr>
<td>7. Develop an infection prevention education plan for PNA, UTI, and CLABSI</td>
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</tbody>
</table>
Typical Agenda

- Review homework from prior meeting
  - Round Robin
    - Identify issues and barriers
    - Group networking and problem solving
- Review discuss next area on action plan
- Define homework

### Early Recognition and Management of Sepsis Program

**Program Agenda**

Thursday, January 28, 2016 | 9 am-10 am | SJMHS Women’s Health Center, Room 1A

<table>
<thead>
<tr>
<th>Agenda item</th>
<th>Description</th>
<th>Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome and Roll Call</td>
<td></td>
<td>2 minute</td>
</tr>
<tr>
<td>Round Robin</td>
<td>Open Discussion for Action Plan Steps 1-3 and results of sepsis screening on 10 patients</td>
<td>45 minutes</td>
</tr>
<tr>
<td>Sepsis Bundle</td>
<td>Discussion of implementation of a sepsis bundle</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Action Plan</td>
<td>Review of the next activity, coaching calls or learning session</td>
<td>2 minutes</td>
</tr>
<tr>
<td>Homework</td>
<td>Define content for your staff education, whom will provide education, and implementation plan for the program</td>
<td>3 minutes</td>
</tr>
<tr>
<td>Coaching calls</td>
<td>Sign-up for coaching calls</td>
<td>3 minutes</td>
</tr>
</tbody>
</table>
Provide homework for teams at each meeting

Homework after first meeting:

- Complete 1-3 on action plan
- Screen 10 patients using the screening tool
Education for staff

• Tools and materials:
  • Powerpoint presentation from today (slides 8-49)
  • Videos from MPRO: https://www.youtube.com/playlist?list=PL5ITOxWOe7JoWfbVblphE1rOOh1uCavBA

Your homework related to education (item 4 on action plan):

• Define content for your staff education and whom will provide education
• Develop implementation plan for the program
Infection Prevention

- After sepsis focus on infection prevention:
  - PNA
  - UTI
  - CLABSI

### Early Recognition and Management of Sepsis
**PNA Prevention Action Plan**

<table>
<thead>
<tr>
<th>Step</th>
<th>Who? When?</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Agree on evidence based practice to implement</td>
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<tr>
<td>2.</td>
<td>Understand current practice (walk the process, talk to staff)</td>
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<tr>
<td>3.</td>
<td>Where is gap between current practice and evidence based practice?</td>
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<tr>
<td>4.</td>
<td>Identify barriers to implementing new practice and strategies to resolve them</td>
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<tr>
<td>5.</td>
<td>Educate staff on new/revised practice</td>
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<tr>
<td>6.</td>
<td>Implement new practice</td>
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<tr>
<td>7.</td>
<td>Audit new process</td>
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</tbody>
</table>
Post-Acute Sepsis Toolkit

Table of Contents

3 Toolkit Overview
   How to use this toolkit

5 Training Materials
   Participation agreement form
   Agenda template
   Action plans
   Presentation slides
   Sepsis education pre-test
   Sepsis education post-test
   Prevention practice current state assessments
   Videos
   Evaluation

7 Sepsis Tools
   Severe sepsis screening tool assessment
   Severe sepsis screening algorithm
   Severe sepsis bundle
   STOP and WATCH INTERACT tool
   Patient and family engagement tools

8 Resources
Data Collection

- **Process metrics:**
  - Percent screened—**most facilities are above 90%**
  - Percent screened correctly—**most facilities are above 90%**
  - If patient transferred to hospital for infection or sepsis:
    - Chart review-was patient screened appropriately and were the correct interventions completed

- **Outcome Metrics**
  - Unplanned readmissions to hospital
  - Mortality

Complete process metrics monthly and submit
Working with MPRO on the outcome metrics
1. Readmission rates for patients discharged with sepsis diagnosis
   • 30 day all-cause
   • 90 day all-cause

2. Mortality rates for patients discharged with sepsis diagnosis
   • 30 day
   • 90 day
CSAT Processing

- **Lake Superior QIN CSAT processing**
  - 30d and 90d readmissions are flagged
    - Days between discharge and admission
  - Sepsis is flagged, among many other diseases
    - Per ICD9/10
- **Limit dataset to sepsis discharges**
  - Primary and secondary diagnosis
- **Limit to 2 hospitals**
  - St. Joseph Mercy Health System Ann Arbor
  - St. Joseph Mercy Health System Livingston
Results: SNF: 30-Day and 90-Day Readmission and Mortality Rates

Nonparticipating SNFs: Readmission and Mortality

- Sepsis 30d Readmission %
- Sepsis 90d Readmission %
- Sepsis 30d Mortality %
- Sepsis 90d Mortality %

Participating SNFs: Readmission and Mortality

- Sepsis 30d Readmission %
- Sepsis 90d Readmission %
- Sepsis 30d Mortality %
- Sepsis 90d Mortality %
Results Combined: Participating and Nonparticipating SNFs: Readmission Rates
4 Key Element of Sepsis Quality Improvement Programs

- Leadership
- Data reporting and technology
- Evidence-based clinical protocols and integration of screening tools
- Frontline staff education
Conclusions

- Early Recognition and Management of Sepsis Program demonstrate:
  - Fewer sepsis readmission
  - Reduces the costs of inpatient care, stops the progression of sepsis along the trajectory to severe sepsis and septic shock and avoids associated morbidity and treatment costs.
  - Lower mortality rates
Early Recognition and Management of Sepsis Programs for Post-Acute Settings

Four sepsis programs:
- **2018 winter-spring programs (3 concurrent)**
- **2018 summer-fall programs (2 concurrent)**
  - Each program has 5 consecutive monthly sessions with 2 sepsis educators/session from BH, HFHS, Trinity
  - Implement Early Recognition and Management of Sepsis for Post-Acute Settings Toolkit
  - Participation agreement
  - Sepsis screening audit
Learning

- Must have support of facility administration
  DON (or designee) must attend each meeting
- Coaching calls help to clarify expectations, answer questions
- Provide as many tools and materials to make it easy for facilities
- Must have group meet face to face to increase engagement, networking and sharing
Resources

New jersey Sepsis Learning-Action Collaborative
www.njha.com/sepsis

Surviving Sepsis Campaign
http://www.survivingsepsis.org/Pages/default.aspx

Centers for Disease Control and Prevention – Sepsis
http://www.cdc.gov/sepsis/index.html

Centers for Disease Control and Prevention – Nursing Homes and Assisted Living Resources
http://www.cdc.gov/longtermcare/

Minnesota Hospital Association “Seeing Sepsis Long Term Care Resources”

American Hospital Association’s Health Research and Educational Trust “Sepsis Resources”
QUESTIONS?