Sepsis Update: Early Identification and Management

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Session Goal
To provide the latest evidence-based guidelines for the early recognition and rapid intervention of patients with sepsis

Session Topics
- Urgency of early identification and nursing’s role
- Hemodynamics in sepsis
- Evidence-based interventions
- Surviving Sepsis Campaign’s updated guidelines

Can You Recognize Sepsis?

It can be subtle until it is so obvious ...

you can’t miss it.
Case Presentation

A 62-year-old man is admitted to the hospital with a hip infection.

Vital Signs on Admission

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>38.5°C</td>
</tr>
<tr>
<td>Heart rate</td>
<td>104 bpm</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>24 breaths/min</td>
</tr>
<tr>
<td>White blood count</td>
<td>19,000 cells/mm³</td>
</tr>
</tbody>
</table>

Where should this patient be admitted?

36 Hours After Admission

Urine output drops.

What should be done?
48 Hours After Admission

SpO₂ drops and becomes difficult to read.

What should be done now?

Admitted to the ICU...

when hypotension develops.

After 2 weeks of aggressive therapy in the ICU, the patient dies.
Early Recognition

Goal: Prevent Sepsis

First and foremost—AVOID INFECTIONS!

- Once sepsis starts, it is difficult to manage.
- Early recognition $\rightarrow$ greater chance the patient will be better managed.
Goal: Prevent Sepsis (cont’d.)

Surviving Sepsis Campaign:
World’s leading authority on identifying and treating sepsis

- Has guidelines for managing sepsis, but ...
- Treatments are limited and often ineffective.

Recognizing Sepsis and Sepsis States Early

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SIRS*</th>
<th>Sepsis</th>
<th>Severe Sepsis</th>
<th>Septic Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse</td>
<td>Any 2 with or without infection</td>
<td>&gt;90 bpm</td>
<td>&gt;20 breaths/min</td>
<td>Yes</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td></td>
<td></td>
<td>&gt;38°C or &lt;36°C</td>
<td>No</td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td>&lt;4,000 or &gt;12,000 or bands &gt;10%</td>
<td>Yes</td>
</tr>
<tr>
<td>White blood count</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Known/suspected infection</td>
<td>Yes</td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Organ dysfunction</td>
<td>→</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hypotension</td>
<td>→</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Systenmic inflammatory response syndrome
Sepsis Can Affect Any Organ

- CNS: Altered consciousness
- Pulmonary
- Hepatic
- Metabolic
- Cardiovascular: Tachycardia
- Renal
- Hematologic

Key to Survival: Rapid Identification

Nursing’s role is critical!

- Implement protocols on the floor, ED, and ICU.
- Look for signs of SIRS in patients with known or suspected infection.
  - Obtain a lactate level for potential tissue hypoxia.
Don’t Assess Vital Signs—Assess Lactate!

Lactate Levels and Systolic Blood Pressure (SBP)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum lactate</td>
<td>5.9</td>
</tr>
<tr>
<td>Stroke index</td>
<td>20 mL/m²</td>
</tr>
<tr>
<td>StO₂*</td>
<td>51%</td>
</tr>
<tr>
<td>SpO₂</td>
<td>94%</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>92/50 mm Hg</td>
</tr>
<tr>
<td>Heart rate</td>
<td>81 bpm</td>
</tr>
<tr>
<td>Respiration rate</td>
<td>20 breaths/min</td>
</tr>
<tr>
<td>Temperature</td>
<td>38.1°C</td>
</tr>
<tr>
<td>Urine output</td>
<td>1 mL/kg/hr (55 mL/hr)</td>
</tr>
</tbody>
</table>

*StO₂: Tissue Oxygen Saturation

Is action needed?

Case Presentation
A 29-year-old man with a history of Crohn disease is admitted with a perirectal abscess.

Patients A 29-year-old man with a history of Crohn disease is admitted with a perirectal abscess.
Sepsis Hemodynamics

<table>
<thead>
<tr>
<th>Vital Sign</th>
<th>Early Sepsis</th>
<th>Late Sepsis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure</td>
<td>88/52 mm Hg</td>
<td>88/56 mm Hg</td>
</tr>
<tr>
<td>Heart rate</td>
<td>108 bpm</td>
<td>104 bpm</td>
</tr>
<tr>
<td>Stroke volume</td>
<td>43 mL</td>
<td>81 mL</td>
</tr>
<tr>
<td>CVP</td>
<td>5 mm Hg</td>
<td>7 mm Hg</td>
</tr>
<tr>
<td>ScvO$_2$*</td>
<td>37%</td>
<td>84%</td>
</tr>
</tbody>
</table>

*ScvO$_2$ – Central Venous Oxygen Saturation

Regional vs. Systemic Flow
How Do We Identify Sepsis Now?

With no biomarkers, we rely on crude physical indicators.

WBC
blood pressure
SCVO₂
lactate level
temperature
CVP
urine output
heart rate

SIRS and Sepsis

SIRS ➔ Sepsis ➔ Severe Sepsis ➔ Septic Shock ➔ MODS*

*Multiple Organ Dysfunction Syndrome
Evidence-Based Interventions

Surviving Sepsis Campaign

SSC Launched: 2002
Guidelines Published: 2004
Guidelines Revised: 2008
Guidelines Updated: 2012
Organizational Approach to Sepsis

- **Routinely** screen potentially infected patients for sepsis.
  - Early recognition = Early intervention
- Establish an organizational sepsis performance improvement process.
  - Potential Core Measure in 2014

Overview: Sepsis Therapies

1. **Antibiotics** within the first hour and rapid source identification and control (eg, removal of infected area)
2. **Fluid therapy** to maintain BP and hemodynamics
3. (a) **Vasopressors** and **inotropes**; and (b) **corticosteroids only** if fluid is ineffective
4. **Glucose control:** Maintain 90 to 180 mg/dL
1. Antibiotics and Rapid Source Identification

- Administer IV antibiotics **within 1 hour**.
- Obtain blood cultures **before** initiating IV antibiotics.
- **Do not delay antibiotics if >45-minute delay** occurs in obtaining cultures.
- Obtain:
  - Other cultures (e.g., urine, sputum, wound)
  - Imaging studies to identify the source of infection.

2. Initial Fluid Resuscitation

**Fluid resuscitation by protocol**

- Administer 30 mL/kg crystalloid initially.
- Continue resuscitation for persistent hypoperfusion.
- Albumin may be used. **Do not** use hetastarch!
- Lactate >4 mmol/L = Resuscitate to normalize.

*SvO₂: Mixed Venous Oxygen Saturation*
Sepsis Bundle: 3-Hour

3-Hour Bundle: Complete Within 3 hours

- Measure lactate level.
- Obtain blood cultures before initiating IV antibiotics.
- Administer broad-spectrum antibiotics.
- Administer 30 mL/kg crystalloid for hypotension or lactate level ≥4 mmol/L.

3a. Vasopressors in Severe Sepsis

- Target mean arterial pressure (MAP) at >65 mm Hg.
- Initiate vasopressors after fluid resuscitation if no improvement:
  - Norepinephrine
  - Epinephrine
  - Vasopressin 0.03 unit/min
- Use dopamine only in selected patients.

Vasopressors are powerful agents. Side effects include loss of peripheral perfusion.
### Sepsis Bundle: 6-Hour

#### 6-Hour Bundle: Complete Within 6 hours

Apply vasopressors for persistent hypotension.

For persistent hypotension (septic shock):
- Measure CVP (target: >8 mm Hg).
- Measure ScvO$_2$ (target: >70%).

Remeasure lactate if initially elevated (target: normal value).

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### 3b. Corticosteroids in Severe Sepsis

- Begin hydrocortisone 200 mg IV daily **only if patient:**
  - Remains in septic shock, despite adequate fluid resuscitation.
  - Remains hemodynamically unstable despite vasopressor and inotropic support.
4. Glucose Control

- If 2 consecutive blood glucose levels are >180 mg/dL, begin continuous IV insulin protocol.
- Once insulin infusion is started, monitor blood glucose levels hourly until the levels are within target.

Setting Goals

- Discuss goals of care and prognosis with patients and families.
  - Sepsis has a high mortality rate.
  - Patient’s wishes may help dictate the aggressiveness of therapy.
Key Points

- **Preventing** infection is the **only** way to manage sepsis.
- **Initial recognition** is often made by the bedside clinician.
- **Rapid treatment** = increased survival rates.
- **No cure exists**—only supportive therapies.
- **Make end-of-life discussions** a part of sepsis care.

AACN Implementation Tools

**Designed to help you apply these practices in your environment:**

- Tools and Tactics: Blueprint for Implementing New Sepsis Guidelines
- Bridging the Gap to Improved Survival: A Gap Analysis for New Sepsis Practices
- Breaking Through Barriers: Effectively Communicating Sepsis Conditions
- Daily Goals Worksheet (with sepsis screening criteria)
- Screening for Sepsis: Identifying Patients at Risk
- Managing Sepsis Conditions: A Sample Protocol
- Webinar Series Learn Network: Discussion Forums
  - Ask the Expert
  - Share Your Story

**Find these tools on the sepsis webinar information page at www.aacn.org.**
Recognize Sepsis Early—Improve Survival

1. Download the **Implementation Tools**. Find them on the sepsis webinar information page at [www.aacn.org](http://www.aacn.org).

2. **Discuss** the tools and new practices with your colleagues.

3. **Implement practices** that are suitable for your organization.

4. Join the [Webinar Series Learn Network](http://www.aacn.org) online discussion forums to continue the conversation.