Sepsis is a potentially life-threatening complication of an infection. It occurs when chemicals released into the bloodstream to fight the infection trigger inflammation throughout the body. This inflammation can trigger changes that can damage multiple organ systems, causing them to fail. If sepsis progresses to septic shock, blood pressure drops dramatically, this may lead to death.

Algorithm 1: Recognize and Resuscitate

**Time Zero – On Presentation:**

**RECOGNIZE SEVERITY OF INFECTION**

Patient presents with suspected infection*

**Does patient meet sepsis definition/criteria?**

(See Table 1, Page 2)

- **NO**
  - Consider presumptive treatment for sepsis if at risk population and no alternative diagnosis (See Page 2)

- **YES**
  - Reassessment Steps (6 Hour Bundle)
    - Re-measure lactate if initial lactate was elevated (> 2 mmol/L)
    - IF hypotension persists after fluid administration, for septic shock, give vasopressors to maintain MAP > 65 mmHg
      - Norepinephrine is the first line vasopressor therapy for septic shock. Epinephrine can be used in addition or instead of norepinephrine when needed to reach MAP goals.
    - In the event of persistent hypotension after initial fluid administration (MAP < 65 mmHg) or if initial lactate was > 4 mmol/L, document and reassess volume status and tissue perfusion (see below)

**Immediate Steps (3 Hour Bundle)**

- Measure initial lactate level
- Obtain blood cultures prior to administration of antibiotics (if blood cultures cannot be obtained DO NOT delay antibiotic administration)
- Administer broad spectrum antibiotics (Goal: within 1 hour)
  - Consideration should be given to suspected site of infection, previous organisms isolated (including evidence of multi-drug resistance), prior antimicrobial exposure, and the hospital antibiogram when selecting empiric drug therapy. For further information, please consult the hospital Infection by Site grid and the Multi-drug Resistant Organism (MDRO) treatment table.
  - Administer 30 ml/kg crystalloid fluids for hypotension
    - ALL patients with septic shock should receive the recommended fluid administration if they present with hypotension, including CHF, ESRD, and cirrhotic patients.

**Reassessment of Volume Status and Tissue Perfusion**

<table>
<thead>
<tr>
<th>EITHER</th>
<th>Focused exam including:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Vital signs, AND</td>
<td>• Cardiopulmonary exam, AND</td>
</tr>
<tr>
<td>• Capillary refill evaluation, AND</td>
<td>• Peripheral pulse evaluation, AND</td>
</tr>
<tr>
<td>• Skin examination</td>
<td>• CVP measurement</td>
</tr>
<tr>
<td>• CVP measurement</td>
<td>• ScvO2 measurement</td>
</tr>
<tr>
<td>• Bedside cardiovascular ultrasound</td>
<td>• Passive leg raise or fluid challenge</td>
</tr>
</tbody>
</table>

**Note:** Consider escalation of care based on Level of Care Guidelines

**Nursing Protocol**

- Nursing can order lactate and blood cultures per **Sepsis Management Nursing Protocol** via Sepsis Nursing Order set.
  - IP GEN: SEPSIS NURSING TRIAGE ORDERS

**Sepsis Order Sets**

- Providers should use **Sepsis order sets** to order lactate, blood cultures, antibiotics, and fluids.
  - IP ED: SEPSIS ALERT
  - IP ED: SEPSIS ALERT TRIAGE PROTOCOL
  - IP GEN: INITIAL SEPSIS MANAGEMENT

**Sepsis Note Templates**

- Providers should use **Sepsis note templates** to document bundle elements appropriately.
  - SEPSISALERTNOTE
  - SEPSISFOLLOWUPNOTE

*In addition to traditional sources of infection, consider possible infection in patients with unexplained abdominal pain or distention, unexplained altered mental status and indwelling medical device or IV line.

Key: MAP = mean arterial pressure
Table 1: Sepsis Definitions and Criteria

<table>
<thead>
<tr>
<th>Definition</th>
<th>Clinical Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sepsis-3</td>
<td>Life-threatening organ dysfunction caused by a dysregulated host response to infection.</td>
</tr>
<tr>
<td></td>
<td>- Suspected/documented infection PLUS Sequential Organ Failure Assessment (SOFA) Score ≥ 2 points OR at least 2 of the following criteria (HAT):</td>
</tr>
<tr>
<td></td>
<td>- Hypotension (Systolic BP ≤ 100 mmHg)</td>
</tr>
<tr>
<td></td>
<td>- Altered Mental Status (GCS &lt; 15)</td>
</tr>
<tr>
<td></td>
<td>- Tachypnea (≥ 22 respirations/min)</td>
</tr>
<tr>
<td></td>
<td>- Note: SaO2/FiO2 can be used when PaO2/FIO2 is unavailable for the SOFA</td>
</tr>
<tr>
<td></td>
<td>Hyperlink: SOFA Score Calculator</td>
</tr>
<tr>
<td>Sepsis-2</td>
<td>2 or more and suspected infection -&gt;</td>
</tr>
<tr>
<td></td>
<td>- Temperature &gt; 38.3° C or &lt; 36° C (&gt; 100.9° F or &lt; 96.8° F)</td>
</tr>
<tr>
<td></td>
<td>- Heart rate &gt; 90 beats/min</td>
</tr>
<tr>
<td></td>
<td>- Respiratory rate &gt; 30 respirations/min</td>
</tr>
<tr>
<td></td>
<td>- Altered mental status</td>
</tr>
<tr>
<td></td>
<td>- White blood cells &gt; 12,000 uL-1 or &lt; 4000 uL-1 or Bands &gt;10%</td>
</tr>
<tr>
<td></td>
<td>- Hypotension (Systolic BP &lt; 90 mmHg or MAP &lt; 70 mmHg)</td>
</tr>
<tr>
<td></td>
<td>- Elevated lactate &gt; 1 mmol/L</td>
</tr>
<tr>
<td></td>
<td>- Creatinine rise greater than 0.5 mg/dL</td>
</tr>
<tr>
<td>Septic Shock Definition</td>
<td>A subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality.</td>
</tr>
<tr>
<td></td>
<td>- Sepsis PLUS</td>
</tr>
<tr>
<td></td>
<td>- Vasopressor therapy needed to maintain MAP ≥ 65 mmHg PLUS</td>
</tr>
<tr>
<td></td>
<td>- Lactate &gt; 2 mmol/L despite adequate fluid resuscitation</td>
</tr>
</tbody>
</table>

Presumptive Treatment / At Risk Populations

The patient populations listed below may manifest infection in atypical ways. Consider treatment for sepsis if acutely decompensating.

- Abdominal Pain / Distention
- Indwelling medical device or IV lines
- Altered mental status
- History of recent chemotherapy
- History of organ transplant
- Elderly with unclear etiology of illness
- Immunosuppressive status

Initial Management Phase (First 24 hours)

- History and Physical
- Source control (remove and address infection source)

- Additional diagnostic testing for cause of organ failure and site of infection
  - ABG
  - Basic Metabolic Panel
  - Blood and Urine Cultures
  - CBC with diff.
  - Glasgow Coma Scale, RASS
  - INR, PT
  - Lactate
  - LFT
  - Urine Output

- Narrow antibiotic treatment as soon as source/organism is identified (see ASP Infection by site antibiotic grid and the Multi-drug Resistant Organism (MDRO) treatment table)

- Remove central line as soon as possible following positive cultures for Staphylococcus aureus, gram-negative bacteria or yeast blood stream infection
Adjunctive Therapy

Corticosteroids
- Consider adjunct corticosteroids for vasopressor refractory shock - See MICU Corticosteroids in Septic Shock Guidelines.
- The need for adjunct corticosteroids should be especially considered among patients with chronic corticosteroid use and/or chronic adrenal insufficiency
  - Dosing: Hydrocortisone IV 50mg every 6 hours (not to exceed 200 mg per day)
  - Corticosteroids should be tapered or discontinued when vasopressors are no longer required
- Corticosteroids have been shown to promote the reversal of septic shock in adults, but no clear mortality benefit has been established.
- Current guidelines support the use only in a select group of patients who have been deemed poorly responsive to fluid resuscitation and vasopressor therapy.
- The ACTH stimulation test does not appear to be helpful in identifying those patients who may benefit from intravenous corticosteroids.

References
- Singer M, Deutschman CS, Seymour CW, Shankar-Hari M et al. Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3) JAMA 2016; 315: 801-10

OSUWMC Resources
- Antimicrobial Stewardship Program Infection by Site Antibiotic Grid
- Multi-drug Resistant Organism (MDRO) Treatment Table
- Epidemiology Antibiograms
- All Infectious Disease Related Guidelines
- Refractory Hypoxemia Guideline
- Standards of Practice: Blood Cultures
- Sepsis Management Nursing Protocol

Quality Measures
- CMS Compliance with Severe Sepsis and Septic Shock: Management Bundle
- Sepsis Mortality Rate
- PSI-13: Post-op Sepsis Rate

Guideline Authors
- Matthew Exline, MD, MPH
- Erik Adkins, MD
- Christina Liscynesky, MD
- Manoj Ramachandran, MD
- Leslie Andritsos, MD
- Tracey Sheppard, BSN, RN, CCRN
- Lynette Roush, MS, RN
- Lynn Wardlow, Pharm D, MBA
- Claire V. Murphy, PharmD, BCPS, FCCM
- Elizabeth Rozycki, PharmD, BCPS
- Mary Wightman, MAOM, CPHQ
- Constance McCarthy, RN

Guideline Approved

Disclaimer: Clinical practice guidelines and algorithms at The Ohio State University Wexner Medical Center (OSUWMC) are standards that are intended to provide general guidance to clinicians. Patient choice and clinician judgment must remain central to the selection of diagnostic tests and therapy. OSUWMC’s guidelines and algorithms are reviewed periodically for consistency with new evidence; however, new developments may not be represented.

Copyright © 2017. The Ohio State University Wexner Medical Center. All rights reserved. No part of this document may be reproduced, displayed, modified, or distributed in any form without the express written permission of The Ohio State University Wexner Medical Center.