Patient exhibits 2 or more of the following criteria:
- Temperature < 36°C or > 38.1°C
- Unexplained tachycardia or bradycardia
- Respiratory rate greater than normal for age
- WBC count < 3 or ≥ 15 K/microliter
- Pediatric early warning score (PEWS) ≥ 6
- Nurse or parental concern

Note: If on steroids and/or scheduled acetaminophen, patient might not have temperature elevation.

**PRESENTATION**

Is patient unresponsive?

Yes

Call CODE Blue Team (x2-7099)
- Notify the following teams:
  - PICS Team (x5-0570) and
  - Inpatient G9 Team for inpatients or
  - Triage APP for outpatients

Admit to PICS

No

Call MERIT (x2-7090)
- Administer oxygen via nonrebreather face mask at 10 L/minute to maintain O₂ saturation > 92%
- Notify the following teams:
  - PICS team (x5-0570) and
  - Inpatient G9 Team for inpatients or
  - Triage APP for outpatients
- Teams to assess for suspicion of infection

**EVALUATION**

Suspicion of infection?

Yes
- See Page 2: Sepsis Management

No
- Continue evaluation for further treatment or alternative diagnosis

---

APP = advanced practice provider
PICS = pediatric intensive care service

1 See Appendix A: Age Specific Vital Signs
2 See Appendix B: Modified Pediatric Early Warning Signs (PEWS) Tool
3 See Appendix C: Pediatric Primary Teams
4 See Appendix D: Suspect of Infection

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Sepsis Management - Pediatric

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TREATMENT

- Initiate sepsis orders
- Obtain Cultures (blood x2 sites with one set preferably from peripheral site, and other sources as indicated) STAT
- Give broad spectrum antibiotics – first dose STAT Do not delay antibiotic therapy if cultures cannot be obtained within 45 minutes
- Obtain the following STAT: CBC with differential, complete metabolic panel, VBG+, lactic acid, magnesium, phosphorus, calcium, PT, PTT, fibrinogen, cortisol, CRP, procalcitonin, NT ProBNP and type and screen
- Initiate cardiac monitoring
- Verify and if needed, obtain adequate IV access
- Give fluid challenge up to 20 mL/kg crystalloids [e.g., plasmalyte, Lactated Ringer’s, sodium chloride 0.9% (NS)]; each fluid challenge should be given over 10 - 30 minutes
- Monitor vital signs every 15 minutes for 1 hour, then every hour for 5 hours, then every 2 hours for 24 hours
- Titrated oxygen to maintain SpO2 > 92%
- Consider transthoracic echocardiogram

Septic Shock
- Transfer to PICS for further management
- Consider placement of arterial line and additional venous access
- Monitor and maintain respiratory/hemodynamic status
- May repeat fluid challenge if indicated
  - If lactic acid elevated, repeat level within 4 hours
  - Consider norepinephrine for persistent hypotension
- Obtain transthoracic echocardiogram if not already completed

Sepsis
- Continue to monitor and maintain respiratory/hemodynamic status
- Review stat labs
- Assess IV fluid provision
- Continue broad spectrum antibiotics
- Request appropriate team consults

See Page 3 for EC/PICS Management

Hypotensive or lactic acid > 2 mmol/L despite adequate fluid resuscitation?

Yes

No

VBG = venous blood gas
1 Preferable volume includes 5-10 mL per blood culture bottle for children < 20 kilograms and 10 mL for children ≥ 20 kilograms
2 Considerations for fluid resuscitation:
- If not hypotensive (Appendix A) but with history of insensible losses, administer fluid challenge of 10–20 mL/kg
- If history of cardiomyopathy, administer fluid challenge of 10 mL/kg
- Monitor for signs of fluid overload: signs of fluid overload (worsening tachycardia/respiratory distress, desaturations) during administration of bolus

3 See Appendix A: Age Specific Vital Signs
4 If inpatient, may start norepinephrine as listed above while awaiting transfer to PICS; may administer peripherally if central access is not available

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Approved by the Executive Committee of the Medical Staff on 03/24/2020

Department of Clinical Effectiveness V3
Sepsis Management - Pediatric

Septic Shock in the EC/PICS (inpatient unit until PICS bed available)

- **MAP** low for age?
  - Yes
    - If SVR high, consider starting milrinone at 0.5 mcg/kg/minute via continuous IV infusion
  - No
    - **Hgb** < 9 grams/dL?
      - Yes
        - PRBC transfusion to maintain hemoglobin ≥ 9 grams/dL.
        - Consider escalating to high flow nasal cannula or non-invasive positive pressure ventilation if anemic with or without respiratory failure and/or hypoxia.
      - No
        - Consider escalating to high flow nasal cannula or non-invasive positive pressure ventilation if anemic with or without respiratory failure and/or hypoxia.
    - No
      - Check MAP
      - Check cardiac index or examine for clinical symptoms of diastolic dysfunction/decreased cardiac output.
      - Check Hemoglobin
      - Check respiratory status
      - If **SVR** high, consider starting milrinone at 0.5 mcg/kg/minute via continuous IV infusion.
      - If refractory hypotension², add hydrocortisone 2 mg/kg IV STAT (if not already given) and then 0.5 mg/kg IV every 6 hours.

**Resuscitation Goals**
- Normalize **MAP**¹ for age.
- Urine output ≥ 1 mL/kg/hour (consider higher target if oliguric).
- Normalization of lactic acid and NT ProBNP if elevated.

**Sepsis Management Goals**
- Use of lung protective strategies (tidal volume for mechanically ventilated patients with ARDS is 6 – 8 mL/kg, and initial upper limit goal for plateau pressures is < 30 cm H₂O).
- Hemoglobin after patient stabilization ≥ 9 grams/dL.
- Glucose after initial patient stabilization < 180 mg/dL (tight glucose control not recommended).
- Stress ulcer prophylaxis for patients receiving steroids or have other risk factors³.
- Deep vein thrombosis prophylaxis for adolescents and young adults.

**Definitions**
- **MAP** = mean arterial pressure
- **SVR** = systemic vascular resistance
- **ARDS** = acute respiratory distress syndrome

---

1 See Appendix A: Age Specific Vital Signs
2 Refractory hypotension is hypotension despite adequate fluid resuscitation and vasopressors.
3 Risk factors for GI bleeding include: mechanical ventilation, coagulopathy, thrombocytopenia, higher severity of illness score, renal failure, liver failure, hypotension, heart failure and arrhythmias.
## APPENDIX A: Age Specific Vital Signs

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Tachycardia Heart Rate</th>
<th>Tachypnea Respiratory Rate</th>
<th>Hypotension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant 1 month to 1 year</td>
<td>&gt; 180 beats/min</td>
<td>&gt; 34 breaths/min</td>
<td>&lt; 70 mmHg</td>
</tr>
<tr>
<td>Toddler and Preschool 1 to 5 years</td>
<td>&gt; 140 beats/min</td>
<td>&gt; 24 breaths/min</td>
<td>&lt; [70 + (2 x age in years)] mmHg</td>
</tr>
<tr>
<td>School Age 5 to 12 years</td>
<td>&gt; 130 beats/min</td>
<td>&gt; 22 breaths/min</td>
<td>&lt; [70 + (2 x age in years)] mmHg</td>
</tr>
<tr>
<td>Adolescent 12 to 18 years</td>
<td>&gt; 110 beats/min</td>
<td>&gt; 20 breaths/min</td>
<td>&lt; 90 mmHg</td>
</tr>
</tbody>
</table>

1 Minimum goal for Mean Arterial Pressure (MAP) is [55 + (1.5 x age in years)] mmHg
### APPENDIX B: Modified Pediatric Early Warning Signs (PEWS) Tool

<table>
<thead>
<tr>
<th>Score</th>
<th>Behavior</th>
<th>Cardiovascular System</th>
<th>Respiratory System</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Playing, Appropriate</td>
<td>Within normal parameters for age</td>
<td>Within normal parameters for age</td>
</tr>
<tr>
<td>1</td>
<td>Irritable, but consolable</td>
<td>Tachycardia &lt; 20 above normal for age</td>
<td>Tachypnea 10-19 above normal parameters for age</td>
</tr>
<tr>
<td>2</td>
<td>Irritated, but not consolable</td>
<td>Tachycardia 20-29 above normal for age</td>
<td>Tachypnea ≥ 20 above normal parameters for age with retractions</td>
</tr>
<tr>
<td>3</td>
<td>Lethargic, Confused, Reduced response to pain</td>
<td>Tachycardia ≥ 30 above or bradycardia ≥ 10 below normal for age</td>
<td>Bradypnea ≥ 5 below normal parameters for age with retractions</td>
</tr>
</tbody>
</table>

1 Add 2 extra points if patient requires frequent interventions (e.g., suctioning, positioning, change in O2 needs, multiple IV attempts required, or every 15-minute or continuous nebulized treatments) or has persistent post-op vomiting
2 As defined in patient’s orders
3 Includes home bilevel positive airway pressure (BiPAP)/continuous positive airway pressure (CPAP) or home ventilator at baseline settings

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APPENDIX C: Pediatric Primary Teams

Inpatient G9 Team: For pediatric inpatients on G9 or other floors
- AM Team (7am-5pm) – G9 Resident + Fellow + APP + Attending
- PM Team (5pm-7am) – G9 Resident + Nocturnalist + Fellow + APP + Attending

APPENDIX D: Suspicion of Infection

- Fever or hypothermia
- Recent surgical procedure
- Immunocompromised
  - Chemotherapy
  - Steroids/immunosuppressed
  - Loss of skin integrity
  - HIV/suspected HIV
- Skin wound
- Invasive device
  - Central line
  - Foley catheter
- Infiltrate on chest x-ray
- Cough with sputum production
- Diarrhea with or without abdominal pain
- Diabetes mellitus
- Unilateral sinusitis (and/or facial swelling)
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**SUGGESTED READINGS**


Sepsis Management - Pediatric

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DEVELOPMENT CREDITS

This practice consensus statement is based on majority opinion of the Pediatric Sepsis work group at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

Patricia Amado, MSN, RN (Nursing, G9)
Micah Bhatti, MD (Laboratory Medicine)
Jose A. Cortes, MD (Pediatrics)
Natalie J.M. Dailey Garnes, MD (Infectious Diseases)
Linette J. Ewing, DO (Pediatrics)†
Olga N. Fleckenstein♦
Rodrigo Mejia, MD (Pediatrics)†
Demetrios Petropoulos, MD (Pediatrics)†
Shehla Razvi, MD (Pediatrics)†
Mary Lou Warren, DNP, RN, CNS-CC♦

† Core Development Team
♦ Clinical Effectiveness Development Team