CLINICAL GUIDELINE

SUSPECTED SEPSIS, SEPSIS, AND SEPTIC SHOCK GUIDELINE

Infants (≥37 weeks at birth) to children < 18 years

Children's MINNESOTA

Aim: To standardize initial management of patients with suspected sepsis in order to reduce time to blood culture, fluid bolus and antibiotics.

Patient with signs/symptoms of sepsis (see Note 1) →

Concern for sepsis:

If in ED, alert the MD immediately, triage as RED or YELLOW, consider resuscitation room placement.
If on floor: RN to immediately notify charge RN, housestaff, AND attending provider

- Page should include pt. name, room #, RN callback #, "STAT to bedside for concern for sepsis"
- Call RRT (rapid response team) if patient has unstable vitals, is rapidly deteriorating, and/or more resources needed at the bedside
- Call Code Blue if impending respiratory/cardiac failure

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ACT NOW*: Initial RN + Provider Assessment

RN to initiate care escalation while awaiting provider

- Assess airway, breathing, circulation. Obtain full set of vital signs (VS) including BP/MAP, neuro check, skin assessment, core temp (no rectal temps on oncology patients). Repeat VS every 15 minutes. NPO. Obtain point-of-care glucose.
- Pulse-oximeter, start supplemental oxygen if needed for goal SpO_2 92–97%
- Get IV/IO (intraosseous) access **(Note 3)**.
- Ordering provider to use "Pediatric Suspected Sepsis" Orderset in Cerner *if sepsis suspected based upon clinical evaluation*.
  - Obtain STAT blood culture and additional labs **(Note 4)** as indicated (do not delay antibiotics for labs).
  - Initial fluid bolus, IV antibiotics **urgently* (Note 5)**
    - Empiric Antibiotic Recs for Patients >60 Days Old and <18 Years Old
    - Febrile Infant Inpatient Guideline
  - Provide analgesia, antipyretics (no rectal medications if oncology patient)
- **Provider to assess if patient meets sepsis criteria (Note 6):**
  - **Suspected infection and Phoenix Sepsis Score ≥2**

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Meets sepsis criteria based on Phoenix Sepsis Score (Suspected infection and Phoenix Sepsis Score ≥2)?

→ No

Ongoing management on med-surg unit

- Consider PICU consultation if not already involved
- Tailor antibiotics based on lab, imaging, and exam findings/history as well as cultures, if available.
- Evaluate source control
- Consider ID consultation

↓ Yes

Discuss admission/transfer to ICU with the Intensivist

- Central venous/arterial access and intubation as indicated
- Vasopressors as indicated (see septic shock definition, Note 6)
- Give antibiotics STAT if not already given* (Note 5). Tailor antibiotics based on lab, imaging, and exam findings/history as well as cultures, if available.
- Evaluate source control
- Consider ID consultation

Act ***fast for sepsis. Give fluids, antibiotics and get labs within 1 hour for septic shock or 3 hours for sepsis.*

EXCLUSION GUIDELINES

Patients **excluded** from this guideline:

- NICU patients
- Newborns < 37 weeks gestation
- ECMO patients
- Adults ≥18 (see note 7)

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NOTE 1: CONCERN FOR SEPSIS: unwell child with concern for infection. Signs including, but not limited to:

- Core temp abnormality: see table 1, pg 4
- High-risk condition (Note 2)
- Change in perfusion: grey, cool, mottled, clammy or flush
- Change in mental status: agitation, distress, inconsolable, lethargic, limp
- Hypotension (MAP ≤ 5th %ile for age) see page 4 for parameter
- Tachycardia
- Reduced urine output
- Tachypnea/new O2 requirement
- Concerning rash: petechial or purpuric rash
- High caregiver concern

NOTE 2: HIGH RISK CONDITIONS INCLUDE:

- Immunodeficiency (chronic steroids, immune suppression, asplenia, Sickle Cell Disease, malignancy, etc.) (Fever and Neutropenia Guideline)
- In-dwelling devices (central line, urinary catheter, trach, VP shunt, cardiac device, etc.) increasing risk for healthcare associated infection
- Age < 60 days (Fever Without Obvious Source Infant 1-60 Days Guideline)
- Severe developmental delay
- Urogenital abnormalities
- Single cardiac ventricle

NOTE 3: IV ACCESS

- May use functioning central line
- If central line occluded, place peripheral IV (PIV)
- If unable to place PIV within 15–30 min. consider other access (e.g., intraosseous [IO], intramuscular medication, central line)

NOTE 4: LABS/IMAGING

- Suggested labs (tailor depending on potential sources, timing of past labs, clinical presentation):
  - Blood culture* (prioritize), CBC w/ diff, venous blood gas (VBG), lactate (if venous, without a tourniquet; place immediately on ice), CMP, CRP, Procalcitonin, INR, D-dimer, fibrinogen.
    - *If patient has central line, obtain blood culture from **both** central line and peripheral draw. Prefer culture obtained ***prior*** to antibiotics, however, do not delay antibiotic administration.
  - Discuss with the nursing team regarding lab order priority if labs difficult to obtain
- Urinalysis and urine culture unless alternate source apparent (e.g. cellulitis, pneumonia)
- Consider culture of any wound drainage or suspicious skin lesions
- Consider throat culture for Staph aureus and Streptococcus, vaginal culture if concern for toxic shock
- Consider lumbar puncture
- Consider chest radiograph, EKG, other imaging depending on likely sources
- Consider MRSA nasal PCR if concern for pneumonia
  - Negative predictive value (NPV) is high (~99%), so negative result is good predictor of no MRSA pneumonia
  - Positive predictive value (PPV) is low (~10%), so positive result is poor predictor of MRSA pneumonia

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NOTE 5: KEY INTERVENTIONS EARLY

Delays of as little as an hour have been shown to increase mortality in septic shock. National sepsis guidelines recommend initial interventions within 1 hour of recognition if patient has septic shock, and within 3 hours if patient has sepsis.

- Obtain **blood culture** (and additional labs as indicated). Prefer culture obtained prior to antibiotics, however, do not delay antibiotic administration.
- Give isotonic (lactated ringers [LR]) preferred to normal saline [NS]) **fluid bolus.**
  - Recommended fluids for patients in septic shock are up to 40–60 ml/kg over the first hour, divided in 10–20 ml/kg increments at a time (e.g. each 20 ml/kg bolus in over 20 minutes), titrated to cardiac output markers and watching for signs of fluid overload.
  - If hypotension present, administer up to 40 ml/kg in first hour.
  - For patients > 50 kg, goals are aliquots of 500 ml to 1 liter for approximately 2–3 liters in 3 hours if indicated.
  - There are ongoing studies evaluating benefit of LR over NS. Albumin not recommended for initial resuscitation.
- Administer 1st dose of **antibiotic.**
  - Antimicrobial recommendations are available on Star Net (Clinical Guidelines), on the AvoMD Children's Minnesota Guideline app, as well as in the Pediatric Suspected Sepsis orderset in Cerner.
    - Empiric Antibiotic Recs for Patients >60 Days Old and <18 Years Old
    - Empiric Antibiotic Recs for Patients ≥18 and <25 Years Old with Common Infections including Sepsis (see note 7)
    - Febrile Infant Inpatient Guideline
  - Consideration should be made for community vs. health care associated infection, for which antimicrobial recommendations differ.

NOTE 6: PHOENIX SEPSIS SCORE

The International Society of Critical Care Medicine Pediatric Sepsis Definition Task Force developed and validated the International Consensus Criteria for Pediatric Sepsis and Septic Shock in 2024 for children (<18 years old)[16]. The new Phoenix Sepsis Score is a composite 4-organ system model including criteria for cardiovascular, respiratory, neurological, and coagulation dysfunction to identify potentially life-threatening organ dysfunction in children younger than 18 years with infection. Children with a Phoenix Sepsis Score of ≥ 2 points had in-hospital mortality of 7.1% in higher-resource settings and 28.5% in lower-resource settings, more than 8 times that of children with suspected infection not meeting these criteria[17].

Sepsis*:

- Suspected infection and
- Phoenix Sepsis Score ≥2

Septic shock*: sepsis + ≥1 cardiovascular points on the Phoenix Sepsis Score (any one of the following):

- Severe hypotension for age
- Blood lactate >45 mg/dL (5 mmol/L)
- Need for vasoactive medication

*The score may be calculated in the absence of some variables (unmeasured variables will count as 0). Labs and other measurements obtained at discretion of provider.

Caveats for usage: the goal of this score is to identify those at highest risk of mortality and is not meant to be an initial screening tool; the Phoenix Sepsis Score was developed using clinical data collected within the first 24 hours of hospitalization so is not validated for sepsis acquired after admission.

NOTE 7: PATIENTS ≥18 YEARS: The Phoenix Criteria does not include patients ≥18 years of age. Refer to Empiric Antibiotic Recs for Patients ≥18 and <25 Years Old with Common Infections including Sepsis for antibiotic recommendations and escalate/address concerns for sepsis as clinically indicated.

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TABLE 1: VITAL SIGN PARAMETERS*:

Age	High Heart Rate	High Respiratory Rate	Low Systolic Blood Pressure	Low Temp, Celsius	High Temp, Celsius*
< 1 month	> 205	> 60	< 60	< 36	> 38
≥ 1 to < 3 months	> 205	> 60	< 70	< 36	> 38
≥ 3 mo to < 1 yrs	> 190	> 60	< 70	< 36	> 38.5
≥ 1 yrs to < 2 yrs	> 190	> 40	< 70 + (age x 2)	< 36	> 38.5
≥ 2 yrs to < 4 yrs	> 140	> 40	< 70 + (age x 2)	< 36	> 38.5
≥ 4 yrs to < 6 yrs	> 140	> 34	< 70 + (age x 2)	< 36	> 38.5
≥ 6 yrs to < 10 yrs	> 140	> 30	< 70 + (age x 2)	< 36	> 38.5
≥ 10 yrs to < 13 yrs	> 100	> 30	< 90	< 36	> 38.5
≥ 13 yrs	> 100	> 16	< 90	< 36	> 38.5

PALS (Pediatric Advanced Life Support) Vital Signs Parameters for Age. 2005 American Heart Association (AHA) Guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) of Pediatric and Neonatal Patients: Pediatric Basic Life Support | American Academy of Pediatrics (aappublications.org)

*For patients with an oncologic diagnosis, preferred fever definition includes: one temperature >= 38.3 or two temperatures >= 38.0 1 hour apart

Age	5th percentile for MAP (Mean Arterial Pressure)	Median MAP (50%ile)
37 weeks post-menstrual age to 30 days	39	56
1–3 months	41	59
3–6 months	44	62
6–12 months	48	67
1–2 year	52	72
2–3 year	53	71
3–4 year	52	69
4–5 year	52	69
5–6 year	53	69
6–7	54	71
7–9 year	55	72
9–16 year	56	73–75
> 16 years	57	75–76

Mean Arterial Pressure (MAP) Table derived from: Roberts JS, Yanay O, Barry D. Age-Based Percentiles of Measured Mean Arterial Pressure in Pediatric Patients in a Hospital Setting. *Pediatr Crit Care Med.* 2020 Sep;21(9):e759-e768. doi: 10.1097/ PCC.0000000000002495. PMID: 32740191.

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Other organizational guidelines reviewed: Seattle Children's, Children's Hospital of Philadelphia, Royal College of Melbourne, Texas Children's Hospital, Children's Hospital of Richmond at VCU.

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