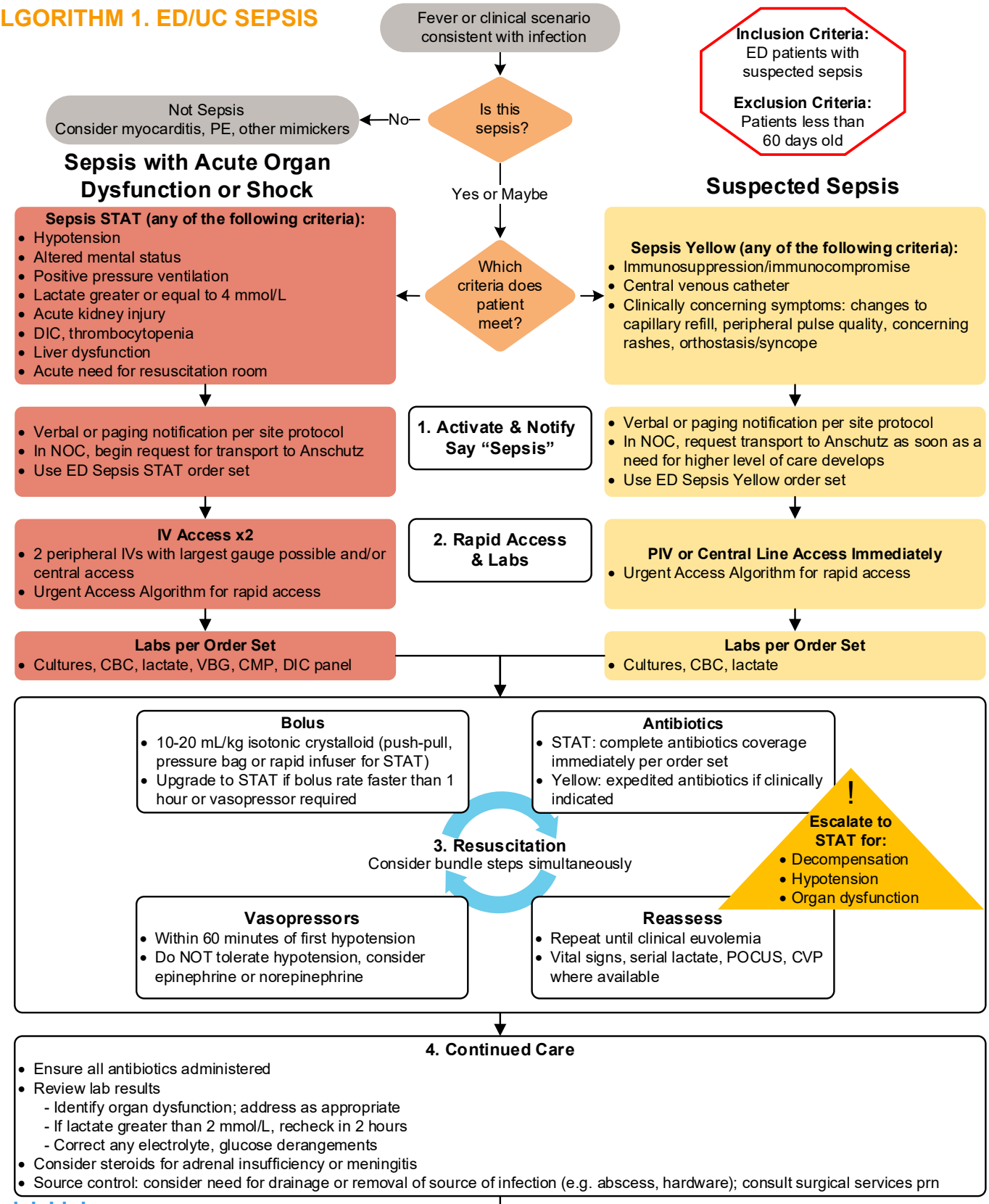
Sepsis Pathway: Initial Management

ALGORITHM 1. ED/UC SEPSIS

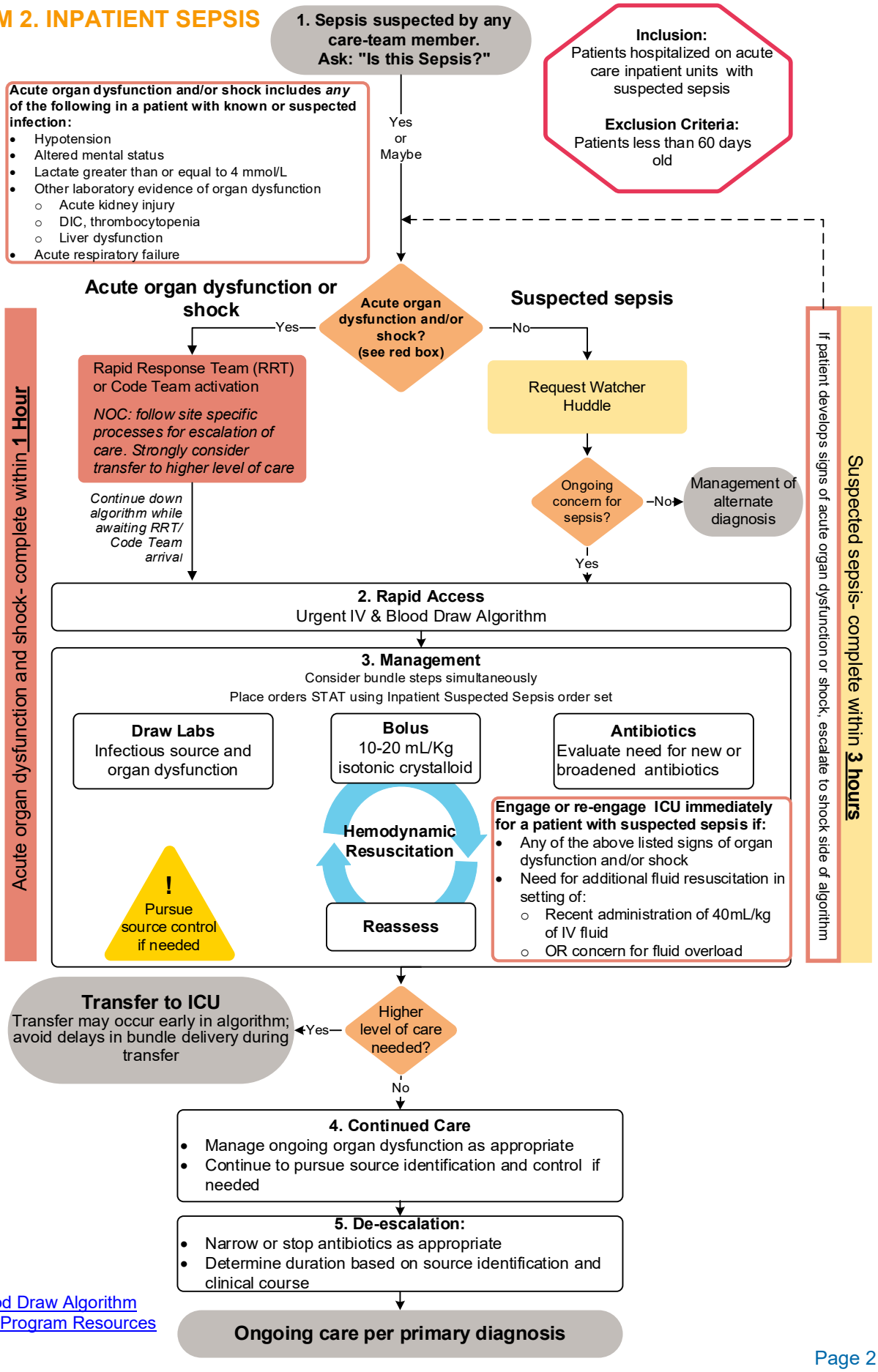


Quick Links

Emergent Abx Selection for Sepsis STAT

Urgent Access Algorithm

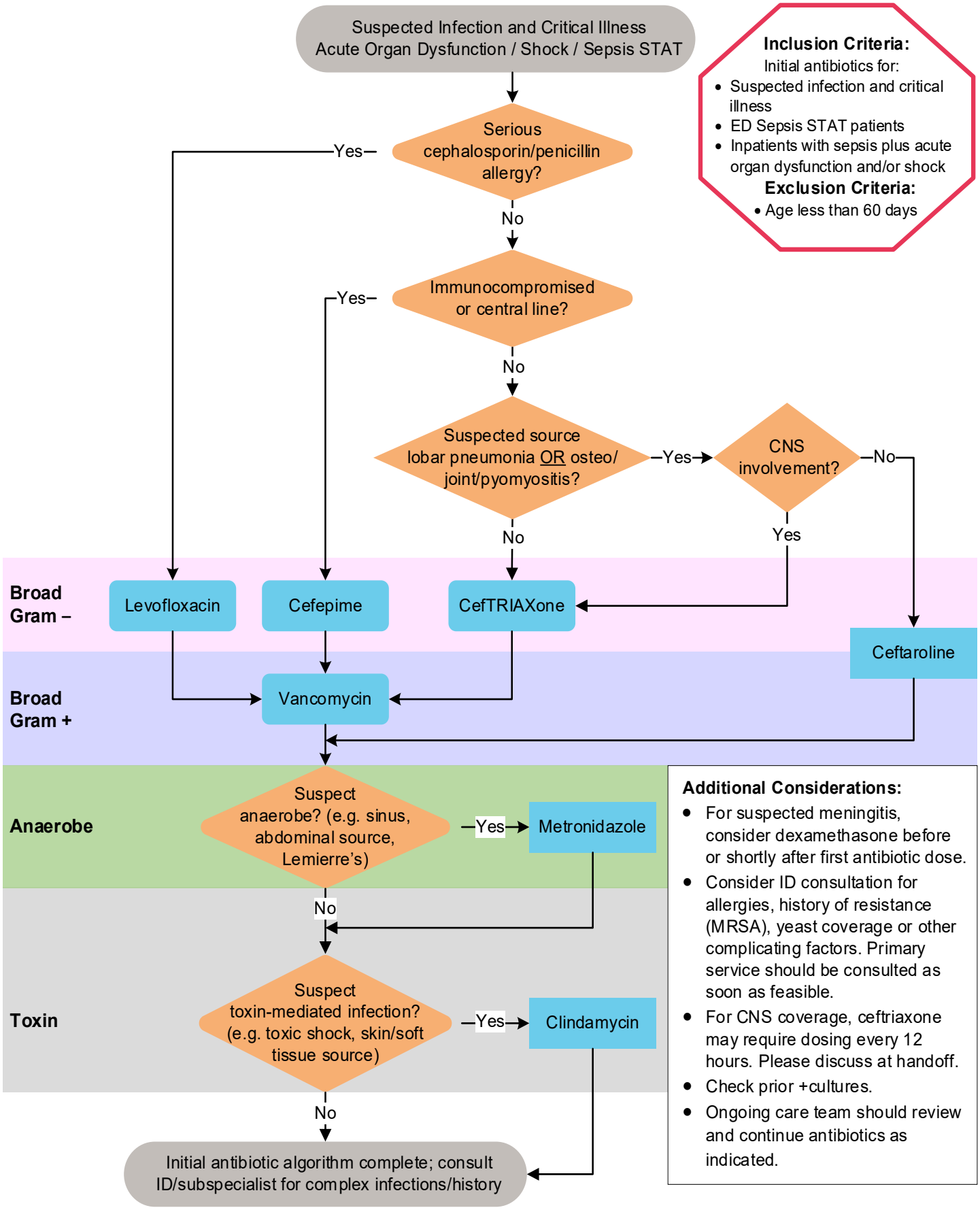
ALGORITHM 2. INPATIENT SEPSIS



Quick Links

Urgent IV & Blood Draw Algorithm
RAPID Watcher Program Resources

ALGORITHM 3. EMERGENT ANTIBIOTIC SELECTION FOR SEPTIC SHOCK/SEPSIS STAT



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TARGET POPULATION

Inclusion Criteria

All patients in Emergency Department/Urgent Care (ED/UC) or acute care (non-ICU inpatient) units with suspected or confirmed sepsis

Exclusion Criteria

Patients less than 60 days old (reference the Fever in Infants Less than 60 Days Pathway)

BACKGROUND

Over 75,000 cases of pediatric sepsis occur annually in the United States[2], where it accounts for 8% of all PICU admissions[3] and is a leading cause of pediatric mortality. Mortality rates for severe sepsis episodes are as high as 2-4% for previously healthy and 10-20% for medically complex children[2-4]. Among sepsis survivors, 35% had not returned to their baseline quality of life by 1 year[5]. Timely recognition and resuscitation of pediatric sepsis are lifesaving.

What is sepsis?

A practical, clinical definition of sepsis is known or suspected infection with acute organ dysfunction or shock.

Formal academic definitions are in transition for children. Organ dysfunction may be defined using the formal Goldstein, Schlapbach or Matics criteria, and clinical definitions are included in the pathway algorithms.

Tiered approach to sepsis care

The Surviving Sepsis Campaign International Guidelines for the Management of Septic Shock and Sepsis-Associated Organ Dysfunction in Children were published in 2020[1] and mirror the tiered approach used at CHCO. At a macro level, they recommend a timely, protocolized delivery of sepsis interventions as soon as possible (i.e. within 1 hour for patients with sepsis plus acute organ dysfunction and/or shock and 3 hours for patients with suspected sepsis but without acute organ dysfunction and/or shock). In a patient with unknown severity of illness or organ dysfunction, these guidelines encourage expedited diagnostic evaluation for organ dysfunction and ongoing decision making to promote both optimal sepsis care and resource and antibiotic stewardship. The guideline includes 49 recommendations for pediatric sepsis care, and we have attempted to align this pathway with those recommendations. Teams should be familiar with the Surviving Sepsis Campaign guidelines when caring for patients with sepsis. We highlight important CHCO-specific sepsis processes below.

Determining the presence or absence of acute organ dysfunction and/or shock is crucial in our tiered approach to sepsis care

What is acute organ dysfunction and/or shock?

Acute organ dysfunction refers to new (or worsening above baseline) organ dysfunction suspected to be due to infection. Several slightly different definitions currently exist. At CHCO, we will use the following general guidelines, with the expectation that specific pediatric guidelines/thresholds may be published that will supersede them:

- Hypotension or elevated lactate
- Respiratory failure (new positive pressure ventilation)
- Severely altered mental status
- Acute kidney injury
- Disseminated intravascular coagulation
- Doubled liver transaminases

Sepsis bundle

This pathway includes a collection of clinical steps collectively referred to in existing sepsis literature as a *sepsis bundle*. Detailed descriptions of the components of our CHCO sepsis bundle are provided below. Broadly, this pathway prompts the care-team to *simultaneously*:

- Deliver parenteral antibiotics
- Evaluate for organ dysfunction and an infectious source
- Fluid resuscitate the patient

Depending on the location and clinical scenario, not all bundle elements may be indicated for every patient with suspected sepsis. Additionally, the urgency with which the bundle elements should be implemented vary within our tiered approach to sepsis care dependent on the presence or absence of acute organ dysfunction and/or shock. Please refer to the ED and Inpatient algorithms (Algorithms 1 and 2) above for further guidance.

CLINICAL MANAGEMENT

Patients with sepsis require time-sensitive evaluation and intervention to achieve the best possible outcomes. Although the specific steps may look different depending on a patient's location and whether they have acute organ dysfunction and/or shock, the core elements remain the same system-wide:

- Activate and notify
- Rapid access
- Resuscitation/management (laboratory evaluation, parenteral antibiotics, targeted fluid resuscitation and vasopressor use to optimize hemodynamics)
- Continued care/de-escalation

Team members who suspect sepsis should access the resources below to efficiently escalate care. Using these resources helps to create a shared situation awareness and sense of urgency, expedite important diagnostic evaluation, and ensure timely delivery of lifesaving interventions for the right patients.

Both ED/UC and acute care settings have sepsis-specific order sets to help facilitate the timely and accurate placement of STAT evaluation and intervention (including antibiotic) orders:

- In the *ED/UC*, use the **ED Sepsis STAT and ED Sepsis Yellow order sets**
- In an *acute care unit*, use the **Inpatient Suspected Sepsis order set**

To expedite management, all orders—including lab tests and interventions—should be placed using the EPIC sepsis order set appropriate to the current unit.

Activate and notify

This means using available resources to ensure a shared situation awareness and sense of urgency across the entire care-team. As soon as one team member suspects sepsis, the entire team should huddle at the patient's bedside to evaluate the patient. The earlier one person's suspicion for sepsis is communicated to the rest of the team, the earlier and more efficiently the patient can receive lifesaving interventions.

Never be hesitant to use the word or ask the question, "Is this sepsis?"

The processes below help to efficiently facilitate this communication and the clinical care that follows:

- In the *ED/UC*, activate using **Sepsis Yellow and Sepsis STAT.** For critically ill patients in the NOC, initiate transfer process as soon as possible.
- In an *acute care unit*, reference the **RAPID Watcher Program Resources** and **RRT/Code Blue policy**. The sepsis activation process is embedded within the broader escalation of care system. Teams should complete a Watcher Huddle, activate the Rapid Response Team, or activate the Code Team depending on the scenario. Central to each of these processes is the team meeting in-person at the bedside of the patient.

Rapid access

Immediate parenteral access and blood sampling is crucial in the care of a patient with suspected sepsis. This facilitates both diagnostic evaluation and the delivery of lifesaving interventions like IV antibiotics. As soon as sepsis is suspected, reference the following resources to ensure parenteral access is obtained as rapidly as possible.

- In the *ED/UC*, reference the **ED/UC Urgent Access Algorithm**
- In an *acute care unit* at Anschutz, reference the **Inpatient Urgent IV & Blood Draw Algorithm**
- In an *acute care unit* outside Anschutz, access unit-specific resources

Laboratory tests and evaluation

Early laboratory evaluation for patients with suspected sepsis has two crucial purposes: (1) identification of organ dysfunction and (2) identification of an infectious source.

Identification of acute organ dysfunction and/or shock

The presence of organ dysfunction helps to define sepsis severity and guide resuscitation. *All patients* with suspected sepsis should have the following tests ordered to evaluate for organ dysfunction:

- Complete metabolic panel (CMP)
- Complete blood count (CBC) with differential
- Lactate
- Disseminated intravascular coagulation (DIC) panel (includes fibrinogen, PT/INR, PTT, and D-dimer)

Identification of infectious source

Identification of an infectious source allows for attempts at directed source control and focused antibiotic de-escalation after sepsis resolution. Teams should urgently pursue source control as soon as an amenable infection is identified in a patient with sepsis. Without adequate source control, treatment of sepsis is challenging. *All patients* with suspected sepsis should have the following diagnostic tests ordered to identify an infectious source:

- Blood culture x 2

  **Attempt to obtain blood cultures prior to initiating antibiotics unless it will substantially delay antibiotic delivery*

Additional diagnostic tests should be chosen based on the clinical scenario and may include:

- Urinalysis (UA) with urine culture
- Lumbar puncture with CSF cell counts, protein, glucose, bacterial culture, and Meningitis/Encephalitis Panel (MEP)

- Wound or joint aspirate with gram stain and aerobic culture
- Abscess incision and drainage (I&D) with gram stain and aerobic culture
- Focused imaging
- Other diagnostic tests as indicated by clinical suspicion

IV antibiotics

Early antibiotic administration is critical to survival of patients with sepsis. Empiric, broad-spectrum antibiotics to cover all likely pathogens are indicated during the initial resuscitation with the opportunity for focused antibiotic narrowing after sepsis resolution. For patients with sepsis despite appropriate antibiotics for the most likely pathogens, consideration of inadequate source control is important. For emergent scenarios involving patients with sepsis and acute organ dysfunction and/or shock, please reference the algorithm for Emergent Antibiotic Selection for Septic Shock/Sepsis STAT (algorithm 3) to choose empiric, broad-spectrum antibiotics appropriate to the patient's clinical signs and symptoms.

Fluid resuscitation

IV fluid boluses should be used to restore euvolemia and optimize hemodynamics, keeping in mind the specific volume status and fluid needs/vulnerabilities of the individual patient. Rapidly administer boluses of 10-20 ml/kg of isotonic crystalloid as indicated. If feasible on current unit, consider use of a push-pull system, pressure bag, or rapid infuser as appropriate to each patient (see Fluid Resuscitation Guidelines). Teams should perform immediate clinical reassessment of volume status/perfusion and repeat IV fluid boluses until clinical euvolemia is achieved (usually 30-60 ml/kg). Secondary assessments of hemodynamics including bedside echocardiogram, SVO2 and serial lactate levels should be used as available.

For patients in the ED/UC, teams should start vasoactive agents for persistent hypotension no later than 60 minutes after the first episode of hypotension. Vasoactive agents may be used sooner as clinically indicated, particularly when euvolemia or fluid overload is present. Teams should anticipate the need for vasoactive agents and begin ordering and setting up infusions when hypotension is not responding to early fluid boluses.

For patients on an acute care (non-ICU inpatient) unit, there is absolutely no requirement to give any set fluid amount prior to involving the ICU, and ICU involvement should be considered at the first notice of hypotension or inadequate perfusion in a patient with sepsis regardless of what interventions have been tried. Many of the above steps (repeated IV fluid boluses, vasopressors) will likely occur in the ICU in cases of sepsis with acute organ dysfunction and/or shock.

Continued care

Continuously re-evaluate the patient's hemodynamics and for the presence or resolution of organ dysfunction. Efforts at identifying and controlling an infectious source should continue until resolved.

- In the *ED/UC*, disposition after initial resuscitation should be determined in consideration of hemodynamic stability, resolution or presence of ongoing organ dysfunction, and other clinical situational factors
- In an *acute care unit*, teams should have a low threshold to involve the ICU at any point after development of suspicion for sepsis. When indicated, ICU involvement should occur simultaneous to the steps above. Intervention delivery should never be delayed while waiting for consultant involvement when treating sepsis. Specific triggers for ICU involvement at any point in the care of a patient with sepsis include concern for acute organ dysfunction and/or shock. Hypotension should never be tolerated, and early involvement of the ICU at first notice of acute organ dysfunction and/or shock should be the standard to facilitate vasopressor initiation within 60 minutes of the start of hypotension as appropriate.

De-escalation

After initial resuscitation, teams should deliberately re-evaluate the need for continued broad spectrum antibiotics daily. Attempts to narrow or stop antibiotics as appropriate to the clinical picture should be made early and frequently. Final antibiotic choice and duration should be determined based on source identification & susceptibility and clinical course.

INTERNAL SEPSIS RESOURCES

Sepsis Resources Launch Pad

PARENT | CAREGIVER EDUCATION

Sepsis and Kids English | Spanish

REFERENCES

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2. Hartman, M.E., et al. Trends in the epidemiology of pediatric severe sepsis. Pediatr Crit Care Med. 2013; 14(7):686-693.

3. Weiss S.L., et al. Sepsis Prevalence, Outcomes, and Therapies (SPROUT) Study Investigators and Pediatric Acute Lung Injury and Sepsis Investigators (PALISI) Network: Global epidemiology of pediatric severe sepsis: The sepsis prevalence, outcomes, and therapies study. Am J Respir Crit Care Med. 2015; 191(10):1147–1157.

4. Balamuth F., et al. Pediatric severe sepsis in U.S. children's hospitals. Pediatr Crit Care Med. 2014; 15(9):798–805.

5. Zimmerman J.J., et al. Trajectory of mortality and health-related quality of life morbidity following community-acquired pediatric septic shock. Crit Care Med. 2020; 48(3):329-337.

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Clinical Pathways and Measures Review Committee – December 15, 2020
Pharmacy & Therapeutics Committee – January 5, 2021

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LAST DATE OF REVIEW OR REVISION	January 5, 2021
COLORADO SPRINGS REVIEW BY	 Mike DiStefano, MD
APPROVED BY	 Lalit Bajaj, MD

REVIEW | REVISION SCHEDULE

Scheduled for full review on January 5, 2025

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