

# Pediatric Central Line with Fever Clinical Pathway

July 2021

<b>Outcomes/Goals</b>	<ol style="list-style-type: none"> <li>1. Create standardization around early identification and management of central line associated bloodstream infections</li> <li>2. Adhere to the OHSU CLABSI Prevention Bundle</li> </ol>
<b>Inclusion Criteria</b>	Pediatric emergency department (ED) patients with indwelling central venous catheters with suspected central line-associated infections, suggested by fever (38.0 or greater), lethargy, malaise, vomiting, or other systemic symptoms
<b>Exclusion Criteria</b>	Patients with central lines in the absence of fever or suspected CLI-associated infections; line dysfunction without symptoms of vomiting, malaise, fever, rigors; patients with malignancy and/or on anti-neoplastic chemotherapy (see <a href="#">Pediatric Neutropenic Fever</a> pathway); apparent infection at line site/tunnel infection; Bone-marrow transplant or solid organ transplant; Sickle-cell disease (see Peds SCD with Fever pathway); Cystic fibrosis
<b>Nurse Documentation</b>	Vital signs, evidence of shock/decompensation, neuro status with attention to alertness. Onset of fever. Presence of central line, last access to port, history of line infections or problems with port, use of an Ethanol lock. Medications, allergies, weight per standard of care and triage guidelines. General appearance.
<b>INTERVENTIONS</b> Initiate on arrival	<ol style="list-style-type: none"> <li>1. ESI Triage level II</li> <li>2. Full Set of Vital Signs and Sepsis/Shock Screen. Notify MD/DO immediately if meeting Huddle criteria or if in severe shock– initiate Sepsis Pathway for fluid resuscitation and stabilization if appropriate.</li> <li>3. If not concern for sepsis notify MD of suspected CLI and abnormal vital signs.</li> <li>4. Obtain cultures from all catheter lumens (peripheral cultures NOT needed)</li> </ol>
<b>DIAGNOSTICS/ COLLECTION</b>	<ol style="list-style-type: none"> <li>1. &lt; 16 years of age: Pediatric Blood Culture Bottle (min. 1mL/recommended 4mL blood)</li> <li>2. ≥16 years of age: Aerobic and Anaerobic Blood Culture Bottles (minimum 3mL/recommended 20mL equally distributed) (Table 1HC-PC-187-PRO)</li> <li>3. Serum: CBC, CMP, Mg, Phos</li> </ol>
<b>PHYSICIAN (LIP)</b>	<ol style="list-style-type: none"> <li>1. Fluid resuscitate with crystalloid as necessary – initiate sepsis pathway if appropriate</li> <li>2. Empiric Antibiotics if indicated depending on presenting symptoms and underlying pathology (see evaluation and treatment algorithm on pages 2 and 3)</li> </ol>
Medication	Empiric Antibiotics –For all patients, if meets criteria for antibiotics, review culture results within the past 6 months and cover appropriately. If no culture results available, start with: <ul style="list-style-type: none"> <li>• Intestinal failure, home TPN with fever and no source: Ceftriaxone 50mg/kg IV (max 2 grams)</li> <li>• Non-oncology patient on immunosuppression: Ceftriaxone 50mg/kg IV (max 2 grams) if ANC &gt; 500, Cefepime 50mg/kg IV (max 2 grams) if ANC &lt; 500</li> <li>• Non-oncology patient, no immunocompromise: Ceftriaxone 50mg/kg IV (max 2 grams)</li> <li>• Add vancomycin 15mg/kg IV (max dose 3 grams) if ill appearance (see Sepsis Pathway), history of MRSA, suspected MRSA infection (e.g. cellulitis, abscess), concern for CNS infection, or close contact with a person with a history of MRSA</li> <li>• Consider fluconazole 12 mg/kg/dose (max 800 mg) if history of fungal infection or broad-spectrum antibiotics within the last 2 months</li> </ul>
Admission	Patients with an indwelling central venous catheter who present with fever, malaise, lethargy, vomiting, or other signs/symptoms of systemic illness should have blood cultures drawn AND should be admitted for observation to the appropriate service, <i>regardless</i> of initiation of empiric antibiotics <ul style="list-style-type: none"> <li>- Contact appropriate service for admission</li> <li>- Consult other subspecialty services as appropriate and depending on indication for indwelling central venous catheter (see decision tree page 2 and 3)</li> </ul>
Special considerations	Ethanol lock protocol: <a href="https://ohsu.ellucid.com/documents/view/6924">https://ohsu.ellucid.com/documents/view/6924</a> If Ethanol lock and line does not draw. Consult vascular access team (VAT). Do NOT Flush.

# Clinical Pathway Decision Making Process

## Pediatric ED Central Line with Fever

Patient with indwelling CVC presents with one of following:  
 Fever (38.0 or greater)  
 Rigors  
 Vomiting  
 Malaise

### Immediate Action

1. Obtain cultures from each lumen
2. Draw CBC, CMP, procalcitonin
3. Consider 20 ml/kg fluid bolus

Concern for sepsis?

NO

YES

Sepsis  
Pathway

**Hemodialysis or primary renal indication**

See next page for additional patient populations including hemophilia and thalassemia

**Home Parenteral Nutrition**  
**Intestinal failure (e.g. short gut syndrome)**

**Consult Nephrology**

Fever without clear source

Vomiting or malaise but without fever

Fever with possible source (ex: URI symptoms)

If line dysfunction present, consult vascular access team. Consider pediatric surgery consultation if continued dysfunction

### **Admission + Empiric Antibiotics**

Admission to general medicine service (Hood, Kaiser, or Family Medicine)

#### **Empiric antibiotics:**

- Review organisms from prior culture results within the past 6 months and cover appropriately
- If no culture results available, empiric antibiotics with ceftriaxone
- Assess risk factors for addition of vancomycin and fungal disease\*\*

### **Admission without Empiric Antibiotics**

Admission to general medicine service (Hood, Kaiser, or Family Medicine)

#### **\*\*Indications for adding Vancomycin:**

- Ill appearance (see Sepsis Pathway)
- History of MRSA
- Suspected MRSA infection such as cellulitis, abscess
- Concern for CNS infection
- Close contact with a person with a history of MRSA

#### **Indications for considering Fluconazole**

- History of fungal infection
- Use of broad-spectrum antibiotics w/in 2 months

### **GI consultation needed?**

*Urgent* GI issues present (ex: bloody stool)

*Non-urgent* GI issues present (ex: TPN adjustments needed) or no GI questions

GI consultation in ED

NO GI consultation in ED required, admit directly to general pediatrics

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3. Consider 20 ml/kg fluid bolus

Concern for sepsis?

NO

YES

Sepsis Pathway

**Heme (non-onc/non-BMT) patient WITH immunosuppressive medication (including mycophenolate, tacrolimus, sirolimus)**

### Admission to Hem/Onc and Empiric Antibiotics

- Review organisms from prior culture results within the past 6 months and cover appropriately
- If no culture results available, empiric antibiotics with ceftriaxone (vs cefepime if neutropenic)
- Assess risk factors for addition of vancomycin and fungal disease\*\*

**Heme (non-onc/non-BMT such as hemophilia or Thalassemia) with CVC and NO immunocompromise**

Ill appearance or concern for clinical deterioration

### Admission to Hem/Onc and Empiric Antibiotics

- Review organisms from prior culture results within the past 6 months and cover appropriately
- If no culture results available, empiric antibiotics with ceftriaxone
- Assess risk factors for addition of vancomycin and fungal disease\*\*

Isolated Fever and otherwise clinically well appearing? As defined by:

- Vitals otherwise within normal limits
- Tolerating feeds
- No other obvious treatable infection source
- No evidence of soft tissue infection surrounding central line site

If line dysfunction present, consult vascular access team. Consider pediatric surgery consultation if continued dysfunction

### Empiric Ceftriaxone and Discharge Home

Please notify PHO of discharge if they did not refer patient in to ED so family can be contacted for prompt hem/onc clinic follow-up

If cultures come back positive after a patient was discharged (including coag negative staph):

- Contact hem/onc on call:
  - If during clinic hours, could facilitate clinic follow-up for repeat cultures
  - If after-hours patient will likely come back through ED for repeat cultures +/- admission

### \*\*Indications for adding Vancomycin:

- Ill appearance (see Sepsis Pathway)
- History of MRSA
- Suspected MRSA infection such as cellulitis, abscess
- Concern for CNS infection
- Close contact with a person with a history of MRSA

### Indications for considering Fluconazole

- History of fungal infection
- Use of broad-spectrum antibiotics w/in 2 months

## Pediatric Central Line with Fever Rationale and Data

### Goals of Clinical Pathway

1. To ensure timely identification and treatment patients with indwelling central venous catheters with concern for infection
2. To standardize care of these patients when presenting to the emergency department
3. Create an efficient team-oriented approach in conjunction with the pediatric inpatient team
4. Ensure stability of patient after antibiotic administration (if appropriate) prior to admission to the floor

Data Considerations	Interventions	Rationale
Obtain baseline rate of obtaining blood cultures in the peds ED within this population	Initiate clinical pathway	Goal is to increase rate of obtaining blood cultures after standardized pathway is introduced
Obtain baseline data on initiation of antibiotics and initial antibiotic choice within this population	Clinical pathway will include suggested empiric antibiotic choice	Risk for bacteremia varies depending on the underlying medical condition for patients with indwelling central venous catheters. Children who have central venous catheters secondary to intestinal failure have even higher rates of infection, with rates from 2-26.5 infections/1000 catheter days, likely due to dependence on parenteral nutrition which serves as a rich medium for bacterial growth, in addition to increased bacterial gut translocation. Previous retrospective studies within the pediatric emergency department identified CLABSI rates at 47-69% in intestinal failure children who presented with fever. Patients without fever or with central lines for other conditions may be at lower risk of central line associated infections and therefore may not warrant empiric antibiotic therapy.
Previous positive blood cultures	Base empiric antibiotic selection on previous positive blood cultures	Patients with central venous catheter infections tend to have recurrent infections with the same organisms
Blood culture from central venous catheter, all lumens	Draw blood culture from central line only and defer peripheral cultures	Blood cultures obtained from central venous catheterization appear to be more sensitive with a higher negative predictive value for ruling out bloodstream infection, while peripheral blood cultures are more specific. There is not current consensus on the ideal approach in the pediatric population. Collaborators from this workgroup feel that given the challenges with peripheral phlebotomy in some children, including those who may require multiple attempts due to difficult access, given that many of these children will require frequent evaluation, and given that this is a painful procedure, it is reasonable to prioritize sensitivity to specificity and forego routine peripheral cultures.

#### References:

- \*DesJardin JA, Falagas ME, Ruthazer R, Griffith J, Wawrose D, Schenkein D, Miller K, Snyderman DR. Clinical utility of blood cultures drawn from indwelling central venous catheters in hospitalized patients with cancer. *Ann Intern Med.* 1999 Nov 2;131(9):641-7.
- \*Cheshyre E, Goff Z, Bowen A, Carapetis J. The prevention, diagnosis and management of central venous line infections in children. *Journal of Infection.* 2015;71(1):S59-S75
- \*Eisenberg M, Monuteaux M, Fell G, et al. Central line-associated bloodstream infection among children with intestinal failure presenting to the emergency department with fever.
- \*Jabbour M, Curran J, Scott S, et al. Best strategies to implement clinical pathways in an emergency department setting: study protocol for a cluster randomized controlled trial. *Implement Sci.* 2013;8:55