Empiric management of Central Line-Associated Blood Stream Infections (CLABSI)

Central lines (including peripherally inserted central catheters [PICC]) provide a direct portal of entry into the bloodstream and place patients at risk for central-line associated or catheter-related bloodstream infections (CLABSI and CRBSI)). Rates have decreased significantly through implementation of infection prevention intervention bundles, however the burden of CLABSI remains significant given the associated morbidity and mortality (death rates of up to 30% in the most vulnerable patients).

DEFINITION[4]: A laboratory-confirmed bloodstream infection (≥ 1 blood culture specimens positive with non commensal pathogen that is not related to infection at a different site) where a central line was in place for >2 days at the time of the positive blood culture.
Typical symptoms of CLABSI include fever, chills, rigors; history of difficulty drawing blood or poor flow; pain, tenderness and/or discharge at the catheter exit site. Pain, redness and discharge at the site of line insertion may or not be present. Patients can present with tachycardia and hypotension without other focal symptoms or signs**.** Absence of signs of inflammation at exit site does not rule out a CLABSI.

RISK FACTORS FOR CLABSI include patient factors predisposing to infection (neutropenia, recent chemotherapy, hematologic malignancy, loss of skin integrity, malnutrition), and characteristics related to the insertion procedure or the device itself (emergency insertion, inadequate adherence to infection control measures during routine care, site of insertion (femoral sites pose higher risk than neck veins), excessive manipulation, multiple lumens)[3].

MOST COMMON PATHOGENS

- Coagulase-negative *Staphylococcus* spp. (*Staph. Epidermidis* and others): usually of low pathogenicity but can form biofilms on catheters leading to CLABSI.
  Susceptibility profile of Coag neg Staph sp at MUHC (cumulative antibiogram results for blood isolates 2020-2023): Oxacillin-susceptibility in **only 39%**
- *Staphylococcus aureus (*MSSA or MRSA)
- *Enterococcus* sp, Gram-negative organisms and *Candida sp* are less frequently implicated than Gram-positive organisms

DIAGNOSTIC CONSIDERATIONS

- Exit site examination including inspection/palpation of subcutaneous track for tunneled catheters
- Blood cultures from peripheral vein (>1 set, ideally 2 sets from different venipuncture sites) and from the central line (1 set) **PRIOR** to empiric therapy.
  - Blood cultures should *not routinely be collected from central lines*, unless there is a strong clinical suspicion of CLABSI, given high rates of contamination
- If unable to obtain a peripheral sample, can collect ≥ 2 blood cultures from different lumens of a multi-lumen central line (poses a high contamination risk)
- Routine culture of the line tip is not required - rarely changes therapy choice or duration.

EMPIRIC TREATMENT (BEFORE culture results) for suspected CLABSI

Hemodynamically unstable (with **hypotension**)	**Vancomycin**[1] 25 mg/kg IV x once followed by 15 mg/kg IV q12h AND **Piperacillin-tazobactam** 4.5 g IV q8h (extended infusion over 3h) AND **REMOVAL OF CENTRAL LINE FOR SOURCE CONTROL** once temporary vascular access established
Hemodynamically stable	**Vancomycin**[1] 25 mg/kg IV x once followed by 15 mg/kg IV q12h

CULTURE-DIRECTED TREATMENT[5]

Staphylococcus aureus* and *S. lugdunensis	See MUHC ASP *S. aureus* bacteremia guideline and *Consult ID* Central line removal is required; prompt removal associated with improved outcome[3].
Coagulase-negative *Staphylococcus* spp.	Can be difficult to differentiate from blood culture contaminant but contamination unlikely if >1 blood culture positive for same organism in patient with central line Tailor antibiotic choice to susceptibility results If oxacillin-Susceptible**, cefazolin 2g IV q8h** If oxacillin-Resistant, **Vancomycin**[1] 25 mg/kg IV x once followed by 15 mg/kg IV q12h If CVL removed, continue antibiotics for 5-7 days after removal. CVL can be retained in some cases (patient clinically well, no exit site infection, blood cultures negative by 72h); consult with pharmacy +/- ID for antibiotic lock therapy and systemic therapy x 10-14d
Gram negative organism	Exclude non-central line sources of bacteremia*; Consult* ID Tailor antibiotic choice to susceptibility results. Central line removal is required. Recommended treatment duration 7-14 days from line removal and negative blood cultures, whichever is later.
***Enterococcus* spp.**	Exclude non-central line sources of bacteremia; *Consult ID* Tailor antibiotic choice to susceptibility results. CVL removal recommended; treatment duration 7-14 days from CVL removal and negative blood cultures, whichever is later. If removal not practical (in case of tunneled/other long-term lines), use antibiotic lock therapy (*consult Pharmacy*) plus systemic therapy given through all ports of line x 10-14 days from blood culture clearance.
***Candida* spp.**	See MUHC ASP Candidemia guideline and *Consult ID* Central line removal is required.

REFERENCES

1. Ziegler, M. J. et al: *Infection* **43**, 29–36 (2015).
2. MUHC Infection Prevention and Control Service. MUHC Infection Prevention and Control Service Annual Report, 2022-2023. (2023).
3. National Healthcare Safety Network. Bloodstream Infections. *NHSN Patient Saf. Man.* (2024).
4. Mermel, L. A. *et al.* Clinical practice guidelines for the diagnosis and management of intravascular catheter-related infection:*Clin. Infect. Dis.* **49**, 1–45 (2009).

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