

The full version of this guideline is located on the BC Renal Agency website <http://www.bcrenalagency.ca/committees/pvas/ProvGuide.htm>. “Guideline at a Glance” summarizes the highlights.

Recommendations & Rationale

Recommendation 1: For several reasons, which include the risk of infection, the order of preference for HD access for patients requiring chronic hemodialysis is AV fistula, then AV graft, then catheter (evidence).

Recommendation 2: Prevent vascular access related infections through:

All Vascular Accesses:

- (1) Use of standard precautions and aseptic technique in caring for HD patients.*
- (2) Education of patients about the prevention of infection.*

AV Fistulas and Grafts:

- (3) Prior to initiating dialysis, ensure the access limb is washed with anti-bacterial soap or scrub and water.*
- (4) When cannulating an AVF or AVG, use clean gloves (changed just prior to needling) and appropriate cleaning procedure (circular motion inside to outside and allow to dry thoroughly prior to needling) and solution. Preferred solutions in order of priority are:

 - 2% chlorhexidine/70% isopropyl alcohol (tincture)¹*
 - 2% chlorhexidine with 4% or no alcohol (aqueous) or 10% amuchina (use one of these if concern re alcohol due to sensitivity or impact on skin or graft/catheter).*
 - 10% povidone iodine (use if sensitivity to chlorhexidine, alcohol, and/or amuchina)**
- (5) Not cannulating red or excoriated sections on the fistula or graft.*

Catheters:

- (6) When inserting or assisting with insertion of a central venous catheter (CVC):

 - Use maximal sterile barrier precautions (staff: cap covering all hair, mask covering mouth and nose, sterile gown, and sterile gloves; patient: sterile drape draped from head to toe with a small opening for catheter insertion).**

¹ Note: Recommendations in this document re the use of chlorhexidine are for children > 2 years of age; the literature makes no recommendations for infants < 2 years of age (unresolved issue; MMWR, 2002, p. 14).

- *Cleanse the insertion site with an appropriate solution and allow to dry thoroughly prior to catheter insertion. Preferred solutions in priority order:*
 - *2% chlorhexidine/70% isopropyl alcohol (tincture)²*
 - *2% chlorhexidine with 4% or no alcohol (aqueous) (use one of these if concern re alcohol due to sensitivity or impact on skin or graft/catheter).*
- *Place tunneled cuffed CVCs in the right internal jugular vein whenever possible.*
- *Review the necessity of the CVC at every HD visit and removing unnecessary lines as soon as possible.*

(7) When connecting, disconnecting, and locking CVCs:

- *Use a mask (staff and patient) and eye protection or face shield (staff) for connect and disconnect procedures.*
- *Use clean gloves, friction, and an appropriate solution to cleanse the connection between the catheter hub and cap. Preferred solutions are the same as for cannulating AV fistulas and grafts.*
- *Maintain a clean, “no touch³” field during connect and disconnect procedures;*
- *Cap all ports when not in use.*
- *Do not use HD catheters for blood drawing or applications other than HD except during dialysis or under emergency circumstances (consult a nephrologist).*
- *Replace disposable or reusable transducers and flush devices every 72 hours.*

(8) When caring for the exit-site:

- *Check the exit-site dressing every HD treatment.*
- *Use sterile gauze or sterile, transparent dressing (gauze is preferred if patient is diaphoretic or the site is bleeding, oozing, or showing any signs of infection, or the skin is compromised, gauze dressing is preferred; otherwise either dressings are acceptable).*
- *Change transparent dressings weekly and gauze dressings every HD treatment; change either type of dressing if damp, loosened, or soiled.*
- *Use a mask staff and patient) and eye protection or face shield (staff) for dressing change procedures.*
- *Cleanse the exit site using clean gloves, a circular motion (exit-site outward to cover a diameter of 10 cm), and an appropriate solution. Preferred solutions are the same as for cannulating AV fistulas and grafts.*

² See footnote 1.

³ “No touch” refers to the ends of the catheter as it is important to keep these sterile.

Recommendation 3: Recognize and treat vascular access related infections using evidence-based protocols for AVFs, AVGs, and catheters.

AV Fistulas

Treatment includes:

- Local infection at the puncture site: incision/drainage of abscess and 2-3 weeks of topical and/or oral antibiotics.
- All other infections: IV antibiotics and surgical consult (and possible surgery).
 - Start empiric antibiotics (gram positive and negative coverage): Vancomycin 25 mg/kg IV post HD x 1 dose +/- gentamicin 2.0 mg/kg IV post HD x 1 dose (add gentamicin if acutely ill or hemodynamically unstable or if suspect gram negative infection). If allergy to gentamicin, use ceftazidime 2 g IV post HD x 1 dose.
 - Once results of culture are known, adjust antibiotics based on sensitivity results.
 - Type of antibiotic and dosage: See Appendix 1 (use same antibiotics and dosages to treat AVF/AVG infections as catheter infections).
 - Duration of antibiotic therapy: Duration of antibiotic therapy is usually 6 weeks for infected AVFs and AVGs (may be shorter if the fistula or graft is surgically removed).

After resolution of an extensive infection, a new AVF can be constructed and the risk of re-infection is very low. A new AVF can be created in the same arm if suitable vessels remain.

AV Grafts

Treatment includes:

- Local infection not involving the graft: topical and/or oral antibiotics until clear.
- All other infections: IV antibiotics and surgical consult (likely resection of the infected graft segment or the entire graft, depending upon the extent).
 - IV antibiotic protocol and duration is the same as per AVFs.
 - If the graft is infected or has been removed, use a catheter for dialysis until another permanent access is in place. After resolution of the infection, resume use of the existing AVG or construct a new AVF or AVG on the other arm.

Catheters

Treatment includes:

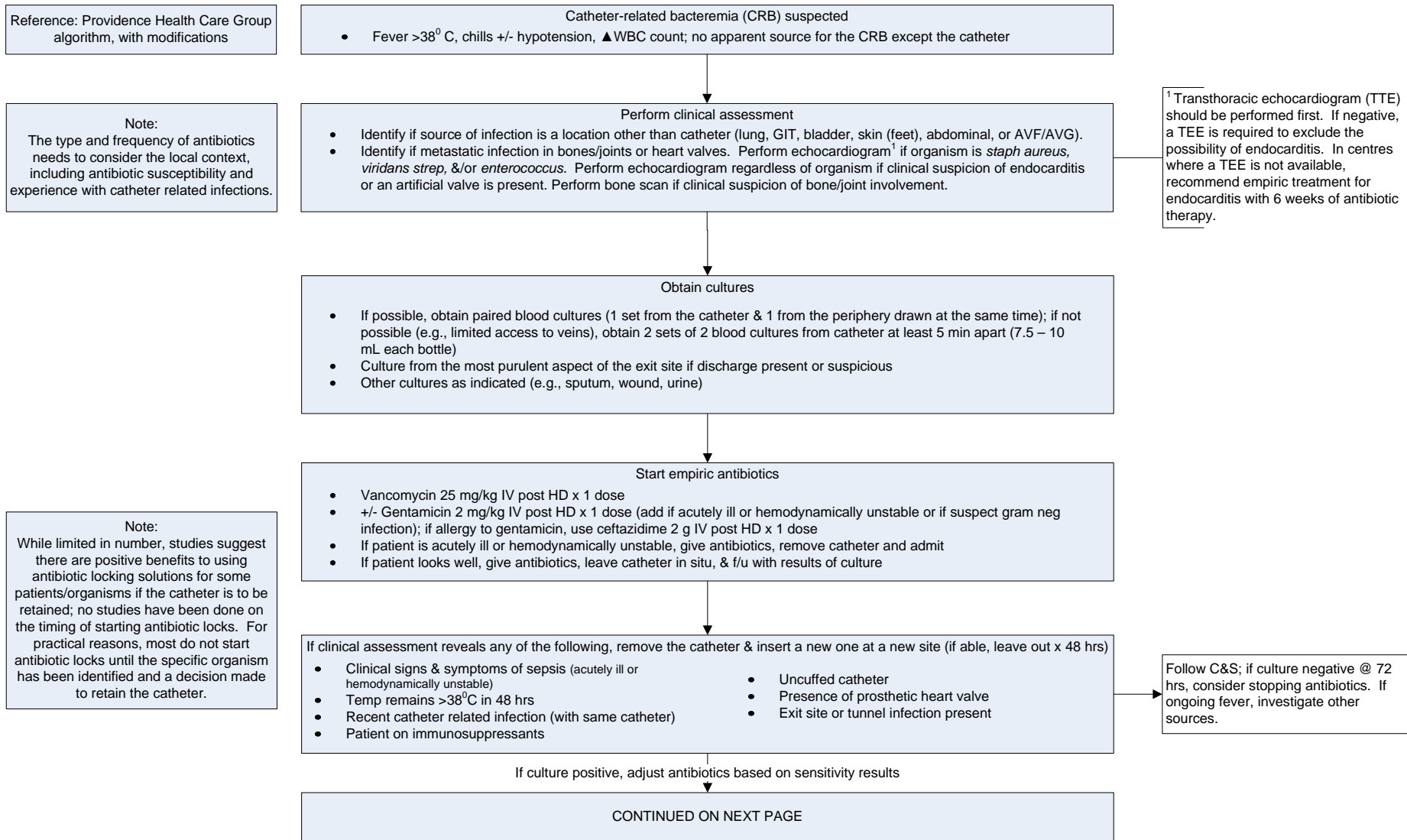
Uncuffed Catheters:

- For any type of infection, remove the catheter and move to another site (preferably after a 48 hour rest). If bacteremia is present, see Appendix 1 for antibiotic protocol.

Tunneled, Cuffed Catheters:

- Exit site infection with no bacteremia: Topical and/or oral antibiotics and proper exit site care. Replacement of catheter is not usually required.
- Tunnel infection with no bacteremia: See Appendix 1 (same as for catheter-related infection with bacteremia).
- Catheter-related infection with bacteremia (positive blood culture): see Appendix 1.

Appendix 1: Algorithm for Treatment of Catheter-Related Bacteremia (Page 1 of 2)

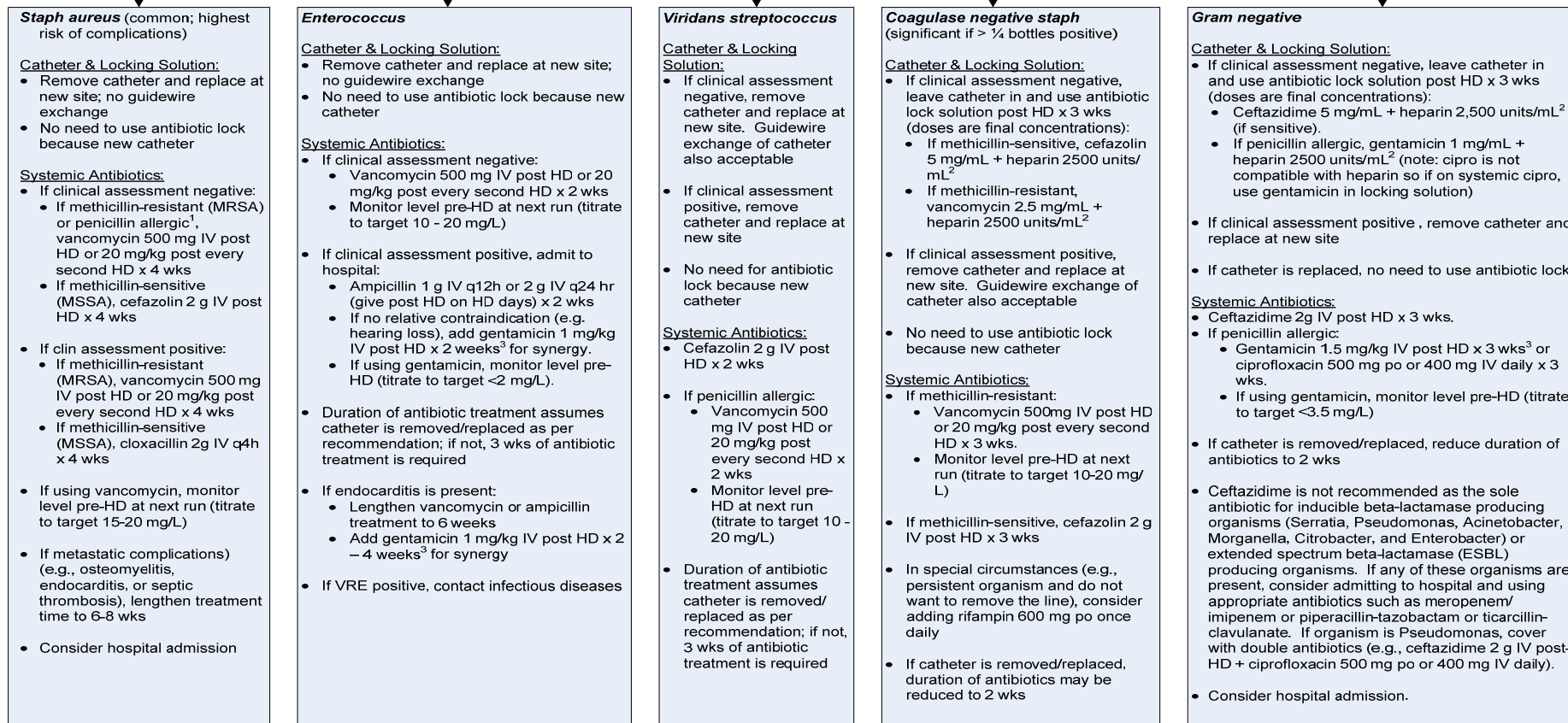


Appendix 1: Algorithm for Treatment of Catheter-Related Bacteremia (Page 2 of 2)

While this algorithm indicates IV antibiotics are given "post HD," local practice will determine whether IV antibiotics are given during the last portion of HD or after HD is complete.

If culture positive, adjust antibiotics based on sensitivity results

All medication dose recommendations are for patients of average weight. Patients who are higher than average weight may require higher doses than specified (unless the specified dose is weight based)



Repeat blood culture 1 wk after completion of antibiotic therapy

Note: If the culture is positive for a fungus (usually *Candida* spp.), remove catheter and replace at a different site. Initiate appropriate antimicrobial treatment and continue for at least 2 weeks following line removal. Draw repeat cultures 1 week after antimicrobial completion to ensure eradication of the organism

1. Take history to confirm allergy and consider penicillin skin testing. Use of vancomycin should be restricted to patients with true penicillin allergies because beta-lactam antibiotics are more effective than vancomycin in treating *staph aureus* infections.
2. There is no consensus in the literature about the optimal concentration of heparin in lock solutions. Most studies used higher concentrations of heparin; no studies compared the use of higher vs lower concentrations. Heparin concentration for lock solutions will be determined by each HA upon consideration of safety concerns and current practice.
3. The risk for ototoxicity with gentamicin increases with duration, especially after 7 – 10 days of use. Weekly audiogram tests are recommended.