I. **PURPOSE**
   To provide guidelines for the safe insertion of central venous catheters (CVC) and reduce associated morbidity and complications.

II. **SCOPE**
   A. This policy applies to all staff who insert central venous catheters at Pennsylvania Hospital, including attending physicians or resident physicians under the direct supervision of a physician, certified registered nurse anesthetists (CRNA), physician assistants or nurse practitioners who have delineated privileges or who perform them under appropriate supervision.

   B. Staff who have demonstrated competence in peripherally inserted central catheters (PICC) technique or perform it under appropriate supervision will insert PICC consistent with hospital policy.

III. **NEW CATHETER INSERTION**
   A. **Equipment**
      1. CVC Procedure Tray
      2. Sterile pack with gowns, masks, caps, large fenestrated drape, ChloraPrep, sterile bowl, sterile gauze, Tegaderm, sterile tray, sterile swab, sterile saline, and label.
      3. Sterile gloves

   B. **Procedure**
      1. Consider the best site for insertion
         a) Catheter insertion into the subclavian vein is preferred if reducing the risk of infection alone is considered; however, the risk of infection must be weighed against other noninfectious risks such as pneumothorax, or stenosis due to hemodialysis catheters.

         b) The femoral area is the least preferred site and should be reserved for emergency situations or when no other site can be used. *In these situations, the femoral site should be discontinued as soon as possible.* There is also a very high risk of deep venous thrombosis with femoral access. If the groin is to be used as an insertion site, the catheter should be inserted into the femoral vein below the inguinal ligament.

      2. **Catheter Choice:**
         a) Should depend on the duration of required central access and the number of lumens needed for infusion. PICCs and tunneled accesses (Hickman catheters or subcutaneous ports) should be strongly considered for infusions of greater than 30 days duration. Single lumen catheters carry a lower infection rate than multi-lumen devices.

      3. Wash hands with antimicrobial soap prior to line insertion.
4. The operator who is inserting the catheter must wear a sterile gown, sterile gloves, cap, and mask. If an assistant handles sterile equipment, he/she should wear gown, gloves, and mask similar to the operator.

5. If necessary, excessive hair around the site can be removed with scissors or clippers. Razor shaving is discouraged since the microabrasions may serve as a site for infection, leading to a local folliculitis.

6. The operator will don a pair of sterile gloves.

7. The insertion site and an area of 20 cm in diameter around the site will be cleansed with ChloraPrep: use three-3ml sticks to cover area, scrub for 30 seconds and let skin air dry. If groin access is used, scrub for 2 minutes.

8. Drape the patient with a large sterile drape.

9. Drape the insertion site using a small fenestrated sterile drape.

10. Flush lines with IV fluid to remove air before inserting.

11. If gloves have been contaminated, remove. Don new pair of sterile gloves.

12. Insert the CVC using sterile technique.

13. Check the patency of the line by withdrawing blood.

14. Suture the catheter following insertion to prevent movement and irritation.

15. Apply a transparent dressing using sterile technique. Do not apply antimicrobial ointment to site.

16. Replace caps at the proximal end of the catheter with the positive pressure valve CLC-2000 to permit needleless access.

17. Aspirate each port to remove residual air within the catheter system and flush with 5 ccs of saline.

18. Obtain a chest x-ray to ensure correct tip placement of subclavian or jugular CVC and to ensure there was no pneumothorax (not necessary for femoral lines). The physician must give an exact reading of the placement of the catheter tip, then release the catheter for use.

19. If repositioning is required, re-prep the site and drape locally; sterile gloves are required for the manipulation. The catheter may only be withdrawn and never advanced in this setting.
20. Document date and time of catheter insertion on the dressing and in the medical record.

21. The use of prophylactic antibiotics to reduce the incidence of line infection is not of proven benefit and not recommended.

IV. **CHANGING A CVC OVER A GUIDEWIRE**

A. It is appropriate to change a line over a guidewire only when the insertion site is not reddened or erythematous, there is no visible pus or drainage, and no tenderness is palpable along the track.

B. **Procedure**

1. Wash hands with antimicrobial soap prior to line insertion.

2. The operator must wear a sterile gown, sterile gloves, cap, and a mask during the insertion of a CVC. If an assistant handles sterile equipment, he/she should wear gown, gloves, and mask similar to the operator.

3. Place the catheter to be exchanged on a sterile barrier.

4. Clean the insertion site and 20 cm diameter around it with three-3ml ChloraPreps for 30 seconds and let skin air dry.

5. Secure the catheter and remove the sutures.

6. Clean the insertion site and 20 cm surrounding diameter with appropriate antiseptic and let area dry completely.

7. Cover area with sterile drape and remove cap from distal port.

8. Put on another pair of sterile gloves.

9. Carefully insert guidewire through the distal port ensuring that the wire does not contact the external surface of the hub.

10. Remove the old catheter, taking care not to contact the surrounding skin with the catheter tip.

11. If line is not visibly infected but is suspected as the source of infection:
   a) Cut the distal 5 cm of removed catheter with sterile scissors, place in a sealed specimen cup, and send to Microbiology for quantitative culture;

   b) Obtain 2 sets of blood cultures: one peripherally and one through the catheter.

12. Coat the portion of the guidewire protruding from the skin and the external surface of the new catheter with appropriate antiseptic solution.

13. Place new catheter over guidewire into proper anatomic position.
14. Check the patency of the line by withdrawing blood.

15. Suture the catheter following insertion to prevent movement and irritation.

16. Apply a transparent dressing using sterile technique. Do not apply antimicrobial ointment to site.

17. Consider obtaining a chest x-ray to ensure correct placement of the CVC tip before releasing the catheter for use.

18. Document the date and time of insertion on the dressing and in the medical record.

C. Culture Results
1. Blood cultures (-) and CVC not cultured: if continued fever and no other source found, remove and culture CVC

2. Blood cultures (-) and CVC culture (-), look for another source of infection.

3. Blood cultures (-) and CVC ≥15 cfu: in patients with valvular heart disease or neutropenia and S. aureus or Candida colonization of CVC, monitor closely for signs of infection and repeat blood cultures accordingly.

4. Blood cultures (+) and CVC ≥15 colony forming units (cfu): remove CVC, treat according to current recommendations.

V. CATHETER REMOVAL
A. The necessity of central venous access should be assessed daily. The line should be discontinued when it is no longer required or when there is evidence of subcutaneous infection at the insertion site.

B. Document removal in patient’s medical record, including date and time, name of removing physician or nurse, reason for removal, complications of removal, if any.

C. CVCs placed in emergent settings with breaks in aseptic technique should be changed within 24 hours, as conditions permit.

VI. REFERENCES:


APPROVED BY:
Infection Control Committee: 7/2001; 5/2003