

Policy Title:	USE OF CERTRAL VERNOUS CATHETERS (CVC)		
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PURPOSE:

To provide guidelines for the insertion, maintenance, blood sampling and care of central venous catheters.

DEFINITION(S):

Central Venous Catheter (CVC) is a catheter inserted into a central vein for infusion of fluid, medication or nutritional therapies and/or central venous pressure monitoring.

***Note:** Insertion of a central venous catheter into the femoral vein is not recommended and should be avoided when alternative sites are available / suitable.

POLICY:

Physicians, who have been granted privileges, may insert central venous catheters (CVC). Registered Nurses, who have received training in blood sampling from central lines, may do so when ordered. Registered Nurses are responsible for the maintenance and dressing changes of central lines.

PROCEDURE:
I. EQUIPMENT LIST
A. For insertion:

1. DHS recommends 16 cm catheters to avoid over-insertion.
NOTE: *If selecting a triple lumen catheter, use an antimicrobial impregnated catheter for all patients unless they have indicated they are allergic to silver sulfadiazine and/or sulfa drugs, chlorhexidine or they are of Japanese descent)*
 CVC Multi-lumen catheter Kit or Percutaneous Introducer Set (CORDIS).
2. 250mL NS (IV).
3. Sterile bowl.
4. Decanter.
5. 3mL syringe with needle.
6. (3) 10mL syringes.
7. Sterile gown.
8. Sterile gloves.
9. Caps, masks, goggles or shield & mask combination.
10. IV solution/tubing set up, monitoring set-up.

11. Fenestrated drape – ¾ sheet; sterile towels.
12. CHG 2% packaged cloths.
13. Overbed table or mayo table.
14. Transparent or gauze dressing and tape.
15. Antimicrobial dressing
16. Moisture-proof underpad.
17. Towel roll if subclavian or jugular site used.
18. Portable Ultrasound.

B. For dressing change:

1. CVC dressing change kit
 2. Antimicrobial dressing.
 3. Stabilization device for CVC (if applicable).
- Additional Supplies that may be needed:
4. Transparent Semipermeable Dressing.
 5. Sterile gloves.
 6. Normal Saline (0.9% NS).
 7. Chlorhexidine or Povidone Iodine Solution, Alcohol
 8. Mask.

C. For blood sampling:

1. Chlorhexidine or Povidone Iodine Solution, Alcohol
2. Alcohol swabs.
3. 2-10cc Luer-Lok Syringes.
4. 2-6cc Luer-Lok Syringes.
5. Test Tube(s) – blood culture bottles (if ordered).
6. Blood Sample labels.
7. Needleless blood transfer device.
8. Sterile gloves.
9. Normal Saline flush.
10. 18” gauge needle (for blood cultures only).

II. PRE-INSERTION

A. PHYSICIAN:

1. Inform nurse of planned CVC line placement.
2. Explain procedure to patient/family and obtain informed consent, per policy.
3. Determine primary site for insertion using the portable bedside ultrasound.
4. Perform hand hygiene.
5. Clean site with CHG wipe prior to skin prep, then prep area with CHG and allow to dry completely.
6. Place drape over patient's face.
7. Central lines are generally inserted in the internal jugular, subclavian or femoral vein. **Note: femoral vein use is not recommended and should be used only when other sites are not available / suitable.*
8. Conduct collaborative “Time-out” to verify patient, procedure, site and availability of all equipment/supplies.

B. NURSE:

1. Verify informed consent obtained.
2. Explain procedure to patient/family and provide education/explanation as needed. Document interventions in medical record.
3. Consult with MD before giving analgesic or sedative prior to procedure.
4. Perform hand hygiene. Don PPE as appropriate.
NOTE: Primary physician and assisting physician and nurse at bedside must wear cap and mask. Any other personnel near sterile field must wear a mask.
5. Obtain baseline vital signs and pulse oximetry.
6. Place supplies at bedside.
7. Place drape over patient's face if not already in place.
8. Position bed, patient, lighting, table for insertion.
9. Clip hair with scissors if needed.
10. Assist physician with donning gown.
11. Clean insertion site with 2% CHG cloth (if not done by MD).

III. INSERTION

A. PHYSICIAN:

1. Perform hand hygiene.
2. Don cap and mask.
NOTE: Primary physician and assisting physician and nurse at bedside must wear cap and mask. Any other personnel near sterile field must wear a mask.
3. Utilize *maximum* sterile barriers including gown, mask and sterile gloves.
4. Create sterile field at insertion site and worktable with sterile sheet.
5. Direct nurse as to placement of supplies on field.
6. Prep area with chlorhexidine.
7. Let chlorhexidine ***dry completely before insertion.***
8. Administer local anesthetic.
9. The catheter tip should be parallel to the walls of the superior vena cava 1 to 2 cm above the junction of the superior vena cava and right atrium.
10. Insert catheter.
11. Remove guidewire and verify the removal has been witnessed for post-procedure documentation.
12. Secure catheter with sutures.
13. Verify venous blood flow and flush to confirm catheter patency of all lumens.
14. Return patient to neutral or head up position.

B. NURSE:

1. Monitor patient for adverse effects of insertion (i.e., inadequate oxygenation under drapes/mask, EKG changes and hemodynamic instability, or pain/anxiety). Complications may include:
 - Hemothorax.
 - Pneumothorax (tension Pneumothorax, pneumothorax).
 - Arterial puncture.
 - Thoracic duct perforation.
 - Nerve injury.

- Venous air embolism.
- Arrhythmias.

IV. POST-INSERTION

A. PHYSICIAN:

1. Remove and dispose of all sharps from field.
2. Handle sharps very carefully and place in Sharps Container.
3. Verify guidewire has been removed.
4. Assess lung sounds and orders STAT chest x-ray (CXR). Review x-ray film as soon as possible. The x-ray should be read before administration of fluids, TPN, or medication unless emergency access is required for a Code Situation. **Note: CVP may be assessed pending x-ray review.*
5. The MD must document x-ray findings and approval to begin using line for infusion.
6. Document results in the medical record, including appropriate documentation that the guidewire has been removed and witnessed.

B. NURSE

1. Apply antimicrobial dressing and cover site with transparent semipermeable dressing. Label site, date of insertion, time and RN initials.
2. Verify line placement per CXR and MD approval for infusion has been documented prior to infusion.
3. If CXR results indicate that catheter is not properly positioned notify MD immediately. Repositioning of the line must be documented in the medical record.
4. Assure patency of each lumen of CVC by assessing:
 - Return blood flow (when applicable, i.e. should not interrupt flow of continuous IV medications such as vasoactive drips.)
 - Free flow of infusing IV solution.
5. All connections must be Luer-LOCKED. Refer to "Central Venous Pressure Measurement" procedure, ICU Policy and Procedure Manual for reading CVP and waveform documentation.

V. DOCUMENTATION

A. PHYSICIAN:

1. Document indication, insertion site, catheter type, sterile procedure used and "time-out" verification process on procedure note.
2. Document guidewire removal and witness verification on procedure note.
3. Document CXR review findings and approval for line use.
4. Document post-procedure findings, complications or indications for post-procedure review.
5. Document therapy orders on physician order sheet.

B. NURSING:

1. Verification of consent in patient's medical record.
2. Document line insertion in patient's medical record reflecting the patient's tolerance to procedure.

3. Document Patient/Family Education given and note response to teaching in the medical record.
4. Document catheter type, date and time of insertion in medical record.
5. Document related information in the patient's plan of care.
6. Document all dressing changes and condition of the exit and insertion sites and the skin per unit standard.
7. Document physician notification of complications and need for catheter site change.

VI. LINE MAINTENANCE

A. PHYSICIAN:

1. Evaluate and document necessity of all catheters daily and remove any non-essential lines.
2. DO NOT routinely replace non-tunneled Central Venous Catheters unless the catheter is malfunctioning or central line associated blood stream infection is suspected.
3. Use a guidewire assisted catheter exchange to replace or convert an existing line ONLY if there is NO evidence of infection at catheter site.

B. NURSING:

1. Evaluate insertion site and notify physician of adverse sign/symptoms.
2. Adverse signs/symptoms include: leakage from exit site, swelling, increase temperature, increased redness that may be indicative of: systemic or local infection, perforation or erosion of vascular structure, thrombosis, or air embolism.
3. RN may apply hemostatic gauze for minor site bleeding.
4. For ordered IV infusions/pressure monitoring, etc.:
 - Change IV solution every 24 hours.
 - Change IV tubing every 96 hours.
 - TPN or intralipid tubing must be changed every 24 hours.
 - Change pressure monitoring lines, transducer and tubing every 96 hours.
 - Propofol tubing must be changed every 12 hours.
 - Maintain line patency and sterility by continuous free flow of infusion in lines and adequate flush flow to pressure lines. (saline, antibiotic, saline flush)
5. ALL "CAPPED" LINES MUST BE LUER-LOCKED.
6. Place alcohol impregnated caps on all ports not in use including those of patient's other lines (including peripheral IV ports).
7. Use alcohol or chlorhexidine to clean catheter tip/luer-lock junction whenever tubing or cap is manipulated.
8. Maintain forward pressure on injection of solution during withdrawal when flushing to prevent blood reflux.
9. Use only "needleless" system for injection.
10. Perform chlorhexidine bath every 24 hours.

VII. DRESSING CHANGE PROCEDURE**A. NURSING:**

1. Perform hand hygiene and explain procedure to patient.
2. (See "Exit Site Care for Long Term Venous Access Devices" in Nursing Policy and Procedure Manual)
3. Don mask and place supplies at bedside.
4. Instruct patient to wear facemask and turn head laterally away from dressing.
5. Expose site, don gloves, remove old dressing and tape with caution from catheter insertion site. Remove from edges towards catheter. Remove gloves.
6. Don sterile gloves.
7. Remove any dried blood and secretions from site using sterile gauze and chlorhexidine.
8. Assess the insertion site for sign and symptoms of inflammation, purulence, erythema, pain or leakage of fluids.
9. Cleanse catheter around insertion site with chlorhexidine.
10. **Allow chlorhexidine solution to dry on the skin completely** to promote full anti-bacterial effects.
11. Apply antimicrobial dressing and transparent dressing.
12. Change transparent dressing at least every 7 days. Replace dressing if it becomes damp, loosened, or soiled or when inspection of the site is necessary.
13. Label new dressing with the date and time of and dressing change and initials of nurse.
14. For Cap Change, refer to Guidelines: IV Access Device-Adult

VIII. OBTAINING BLOOD/SAMPLES**A. PHYSICIANS AND NURSING:**

1. Clean work surface, gather supplies and wash hands.
2. Assess for hemodynamic stability prior to stopping any infusion (i.e., vasopressor). If a patient has a multi-lumen catheter, use DISTAL PORT for blood sample(s).
3. Stop IV infusion for one (1) full minute before blood drawn.
4. Don Gloves.
5. Clean injection cap with alcohol and Povidone-iodine or Chlorhexidine. Allow to dry (1) one full minute.
6. Attach Luer-Lock syringe and withdraw.
7. Attach second Luer-Lock syringe and withdraw required amount of blood from injection site.
8. Attach a "needleless" cannula to end of syringe.
9. Transfer blood sample to blood tube by inserting cannula into Multiple Sample Luer Adapter on blood tube vacutainer holder.
10. Activate vacuum by fully engaging blood tube onto Multiple Sample Luer Adapter. DO NOT depress syringe plunger.
11. Label all samples.
12. Flush catheter with normal saline.
13. Dispose of used supplies in appropriate receptacle.

IX. OBTAINING BLOOD CULTURES

- A. If patient is suspected of having a catheter-related blood stream infection do the following:
1. If the physician removes the catheter, send the tip for culture and also send a second blood culture with blood drawn from a peripheral venipuncture site. INDICATE under Comments section in the HIS, type of catheter from which the tip was sent. If patient requires continuous vascular access, a new insertion site should be used.
 2. If the physician does NOT remove the catheter, draw blood from the catheter for culture and also send a second blood culture with blood drawn from a peripheral venipuncture site. INDICATE under comments section in the culture order, type of central catheter from which the blood was drawn.
 3. If patient has a multi-lumen catheter, use DISTAL PORT for blood draw.
 4. Collect blood sample(s) (See Section F).
 5. Attach 18" gauge needle. Inject blood into blood culture bottle(s).
 6. Throw entire set-up into sharps container.

X. CENTRAL VENOUS CATHETER REMOVAL

- A. The Physician removes central venous catheter at this facility. The nurse may assist.
1. Perform hand hygiene and don PPE as appropriate.
 2. Assemble supplies (suture removal kit, sterile gauze).
 3. Ensure that the patient has adequate and functioning IV access.
 4. Put on personal protective equipment (exam gloves) and remove the central venous catheter dressing.
 5. Change gloves and prepare insertion site; cut and remove suture.
 6. Place the patient in the supine position with the head of the bed in the Trendelenberg position.
 7. Proper patient positioning and avoiding inspiration during removal of catheter, reduces the risk of air embolism. Air embolism following removal of the catheter is a result of air drawn in along the subcutaneous tract and into the vein. During inspiration, negative intrathoracic pressure is transmitted into the central veins; therefore, any opening external to the body to one of these veins may result in aspiration of air into the central venous system. This is more likely to occur on deep inspiration when the patient is in an upright position.
 8. Cooperative patients should be asked to "hum", exhale or Valsalva at the time of removal.
 9. Withdraw the catheter in a continuous motion at the appropriate time. (Withdraw during expiration if patient is on a ventilator)
 10. Apply pressure over the puncture site with sterile gauze until hemostasis has been achieved. For continued bleeding, apply hemostatic gauze/dressing to site.
 11. Cover the site using an occlusive dressing to prevent air from entering the line track.
 12. Inspect the catheter to ensure that it has been removed intact.
 13. Monitor the patient for signs of infection, air embolism, and bleeding.
 14. Record removal in patient's medical record.

XI. HEPARIN USE

- A. Heparin/Heparin solution will not be routinely used for the insertion and maintenance of Central Venous Catheters, unless ordered by the physician.

- B. For Central Venous Catheters used for Hemodialysis (Quinton, Permacath), the Physician/Nephrologist must write an order for the Heparin when used during Hemodialysis, and if needed to maintain patency of the dialysis catheter.

ATTACHMENTS/FORMS:

None

REFERENCE(S)/AUTHORITY:

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- F. Hospital Infection Control Practices Advisory Committee, 1996. "Guidelines for the Prevention of Intravascular Device – Related Infections." Infection Control and Hospital Epidemiology. Vol. 17, No. 17.

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