

**AURORA SYSTEM NURSING ALLIANCE – SYSTEM POLICY**

**Policy No: 1007**  
**Approved: 05-18-07**  
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**INTRAVENOUS (IV) CATHETER CARE: PERIPHERAL & CENTRAL  
(ADULT, INPATIENT)**

Specialty units such as Pediatrics, Neonatal ICUs and Obstetrics, etc, as well as Ambulatory areas will address their unique patient population IV information in other policies.

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*NOTE: Check related policies for arterial and other central catheters.*

**POLICY FOR ALL IV THERAPY:**

**Note: Additional catheter-specific policies are found in the section for each type of catheter.**

**Aurora Health Care policies supersede any other references. Perry and Potter is a reference for the procedure, but not for site prep solution or line flushing amounts or frequency.**

1. Prior to any IV catheter care, disinfect hands per System Hand Hygiene Policy and Procedure. Click here for policy: <https://eportal.aurora.org/eportal/servlet/ePortal?command=default&appld=EB410>
2. To assure the safety of staff, needleless systems should be utilized whenever possible.
3. All connection sites, ports and tubing should be secured with Luer-Lock caps or connections.
4. All infusion tubing will be labeled.
5. 2% chlorhexidine gluconate (ChloraPrep®) is the solution for skin antiseptics for:
  - Peripheral IV insertion site skin preparation or dressing change (CDC, 2002)
  - Central line dressing changes (CDC, 2002)
  - Midline catheter insertion site skin prep and dressing changes
  - a. The solution should be applied with friction for 30 seconds and allowed to dry (30 seconds). Scrub is most effective with friction and multiple patterns to penetrate the epidermis. Use back and forth; up and down; may finish with inside to out concentric circles.
  - b. Do not blot, fan, or wipe dry. Do not touch site after prep unless a sterile glove is used for palpation.
  - c. 2% chlorhexidine rarely causes allergic reactions in patients. If the patient is allergic to 2% chlorhexidine or this solution is unavailable, use 10% Povidone-iodine; the least preferred solution is 70% alcohol (CDC, 2002). If using Povidone-iodine or alcohol, use concentric circles as the scrub method. Do not apply alcohol after Povidone-iodine since alcohol negates the effect of Povidone-iodine (INS, 2000, S42).
6. Transparent dressing will be the IV site dressing of choice (CDC, 2002).
7. Mark dressing with date of IV insertion, site care, or dressing change. Only midline catheter dressings need to be identified as a midline catheter; mark dressing as “Midline”, unless there is a permanent label on the catheter.
8. **ASSESSMENT and REASSESSMENT:**
  - a. Palpate for tenderness 3 times every 24 hours – approximately every eight hours through the intact dressing
  - b. If possible, visually inspect catheter insertion site for signs and symptoms of phlebitis or infiltration 3 times per 24 hours – approximately every eight hours (CDC, 2002; INS, 2000); more frequent inspection at nurse’s discretion. Inspection is more difficult with Biopatch dressing, but less critical due to continuous antimicrobial action of dressing.
  - c. Document each assessment/reassessment in the patient record.
9. **DISCONTINUING IVs:**
  - a. For all IV catheters that are removed, inspect catheter tip for signs of breakage and evaluate catheter length for possible broken catheter.
  - b. If the IV is discontinued because of suspected IV catheter-related infection (e.g., purulence, thrombophlebitis or bacteremia), the skin at the insertion site should be cleaned with alcohol and allowed to dry before the cannula is removed.
  - c. The cannula tip should be cultured (see section in this policy for directions).
  - d. The physician should be notified in cases of suspected IV infection.
10. An IV pump should be used with all primary infusions via central line.
11. All patients discharged with an intravascular catheter in place must be assessed for any needed follow-up care and arrangements made for catheter care to be done either by patient or another agency.
12. The use of pheresis and hemodialysis catheters for purposes other than hemodialysis or pheresis must be approved by the nephrologist or pheresis-credentialed physician.

**I. TABLE 1. INTRAVENOUS (IV) THERAPY FOR HOSPITALIZED PATIENTS: DRESSING CHANGES, FLUSHING, AND CAP CHANGES**

*[A physician's order will supercede any guideline]*

VASCULAR ACCESS DEVICE	DRESSING CHANGES ** Type/Frequency	FLUSHING Solution / Frequency	CAP CHANGE	BLOOD WITHDRAW PRIOR TO LAB DRAW	SPECIAL INSTRUCTIONS
<b>Peripheral</b> - Short length  <b>Midline:</b> see <u>PICC</u> for dressing, flushing, blood withdraw info & special instructions. <u>Midline</u> considered peripheral for drug administration.	Transparent dressing change q 4 days & with catheter change, or gauze dressing every other day and PRN. <i>CDC 2002</i>	2 ml, normal saline (0.9% NaCl) every 12 hours or after any intermittent IV therapy. <i>(Goode et al 1993)</i>	Every 96 hours or with any site change or if cap removed. <i>CDC 2002</i>  Use <b>positive pressure cap when capping any infusion</b>	1 ml  <i>(Arrants et al, 1999; Powers 1999)</i> *5ml for coagulation tests	Use 0.67 ml SEPP (ChlorPrep) for skin prep. Change peripheral catheter q 96 hours. IF physician order to cap with heparin (2ml, 10 units/ml heparin, every 12 hours). No physician order needed for midline.
<b>Central (CVC)</b> - Non-tunneled - (eg, Arrow, Hohn) - Sheath/Introducer Use <b>Biopatch</b>	<i>Biopatch used ONLY for Central non-tunneled lines and midlines.</i>  Change <i>Biopatch</i> and transparent dressing every 7 days or gauze dressing every other day and PRN. <i>CDC 2002</i>	2 ml, 0.9% NaCl every 24 hours or after intermittent therapy. <i>(INS 2000; Newell-Stokes et al, 2001)</i>	Use <b>positive pressure cap when capping any infusion</b>	2 ml  *5ml for coagulation tests	Do not routinely replace catheters unless evidence of local or systemic complications ( <i>CDC, 2002</i> )
<b>Tunneled CVC</b> - Open tip - (eg, Hickman Broviac, Raaf Leonard) - Hickman Trifusion Catheter	Use 3 ml ChlorPrep. Use sterile technique & sterile gloves.  For new catheters, if soiled, change after first 24 hours, then transparent dressing every 7 days or gauze dressing every other day & PRN.	5ml, 10 units/ml, heparin per lumen 3 times weekly or after intermittent therapy or blood draws ( <i>Buswell &amp; Beyea, 1998</i> ).  Hickman Trifusion Catheter - flushed like the Neostar (apheresis)		5 ml	May remain in place indefinitely if no complications. Can be removed only by a physician.  Use 10 ml or larger syringe for all IV injections
<b>Tunneled CVC</b> - Valve tip - <b>Groshong</b>	transparent dressing every 7 days or gauze dressing every other day & PRN.	5 ml, 0.9% NaCl Every week or after intermittent therapy.		5 ml	2 ml Discard  Do not use Vacutainer.
<b>PICC Non-Groshong</b> (Open tip) Use <b>Biopatch</b> <b>Midline</b> – use PICC care; considered peripheral IV for drug administration Use <b>Biopatch</b>	Label midline dressing as <b>midline catheter</b>  Change Steri-Strips® or catheter securement device every 7 days <i>CDC 2002</i>	Follow physician order; if no order, use the following flush: 3 ml, 10 units/ml heparin q 12 hours and after intermittent therapy or blood draws. <b>Flush with 10 ml normal saline before and after IV medication.</b> Use SASH – see notes	Use <b>positive pressure cap when capping any infusion</b>	2 ml Discard  Do not use Vacutainer.	For PICC / Midline: May remain in place indefinitely if no complications ( <i>CDC 2002</i> ).  Flush with 10 ml normal saline before and after blood administration.
<b>PICC Groshong</b>  Use <b>Biopatch</b>	Home dressings may differ for tunneled catheters.	5 ml, 0.9% NaCl every week and after intermittent therapy.			
<b>Implanted Ports</b> - (eg, Mediport, Omega Port or PAS-Port [arm implanted]) - Power Port <b>Non-Groshong</b> (Open end) <b>Groshong</b>	Transparent dressing every 7 days or gauze dressing every other day when needle in place <i>CDC 2002</i>  Use sterile technique & sterile gloves, 3 ml ChlorPrep when changing dressing over needle.	5 ml, 10 units/ml heparin every 24 hours while needle capped and after each intermittent IV therapy. Heparin 100 units/ml, 5 ml, prior to discontinuing Huber needle and every month.  For Groshong: Flush vigorously with 0.9% NaCl 5ml every week and after intermittent therapy.	Use <b>positive pressure cap when capping any infusion</b>	5 ml Discard.	Huber needle to be changed every 7 days. <b>20 ml normal saline flush after blood drawn.</b>  Use 10 ml or larger syringe for all IV injections.

VASCULAR ACCESS DEVICE	DRESSING CHANGES ** Type/Frequency	FLUSHING Solution / Frequency	CAP CHANGE	BLOOD WITHDRAW PRIOR TO LAB DRAW	SPECIAL INSTRUCTIONS
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**The use of pheresis and hemodialysis catheters for purposes other than hemodialysis or pheresis must be approved by the nephrologist or pheresis-credentialed physician. [A physician's order will supercede any guideline]**

<b>Pheresis, e.g.</b> - Dura Flow - Hickman Trifusion Catheter	Transparent dressing every 3 days or gauze dressing every other day and PRN.	Heparin 10 units/ml, 5ml per port 3 times weekly and after intermittent therapy or blood draws	Every 96 hours or with catheter change, or if cap removed. <i>CDC 2002</i>	5 ml  Discard	- Used for pheresis or oncology with physician order. - Catheter not routinely replaced ( <i>CDC 2002</i> ).
<b>Hemodialysis, e.g.</b> - Mahurkar - Permcath	Change Biopatch and transparent dressing every 7 days or gauze every other day and PRN. Use 3 ml Chloraprep. Use sterile technique & sterile gloves. Povidone-iodine ointment may be used at insertion site ( <i>CDC 2002</i> ). If not done by dialysis nurse.	<b>High dose heparin</b> capping after each use: Mix 0.5 ml of 10,000 units/ml heparin with 1.5ml of NaCl to equal 2mls. Flush each port with this mixture. Catheter volume is on catheter. <b>Alternative capping solutions</b> may be ordered by nephrologists. Only done by dialysis or pheresis-trained nurse. <b>For 3<sup>rd</sup> lumen:</b> this is a CVC-flush per CVC short term.		5 ml  Discard  <b>3<sup>rd</sup> lumen:</b> use CVC (2 ml) for blood withdraw	<b>Withdraw 5ml blood prior to any use to remove heparin from port. Do not reinfuse.</b> <b>3<sup>rd</sup> lumen:</b> clear or medial; may be used for infusion and blood draws. Catheter not routinely replaced ( <i>CDC 2002</i> ).

**\*\* NOTES:**

- Do not shave any IV sites. If hair is extremely long or thick, use clippers to trim hair.
- Site prep: Chloraprep scrub for 30 seconds, allow to dry for 30 seconds.
- Do not apply prophylactic topical antimicrobial or antiseptic ointment to insertion site (*CDC 2002*).
- Transparent dressing is the IV site dressing of choice. Gauze may be used. When transparent dressing over gauze, it is considered a gauze dressing.
- FOR ALL IVs: the transparent dressing must be made occlusive by pinching the dressing around the hub of the IV catheter or around the catheter itself in the case of a central line. When securing the IV tubing, do not overlap tape on top of the dressing. **Tape is not placed under the transparent dressing.** Sterile Steri-Strip® or other securement device may be used (e.g., StatLock) to secure a central line.
- For CVC dressing changes:
  - Wear sterile gloves when changing central line catheter dressings (*CDC 2002, p.16*) or for implanted port needle and dressing changes.
  - Ask patient to turn head away from dressing site or place face mask on patient. Masks not needed unless patient cannot keep head turned away from dressing site or nurse has respiratory ailment.
- Always use **SASH method** when administering medication or drawing blood (Saline/Administer med/Saline/Heparin) with **heparin capped catheters**.
- All catheter insertions must avoid a dependent extremity with a dialysis fistula or graft. You should also avoid the side with a mastectomy, axillary lymph node dissection, stroke, or prior radiation.
- See Perry and Potter (2006), pages 937-941, for site care procedures and pictures.

**TABLE 2. IV TUBING / IV FLUIDS: FREQUENCY OF CHANGE AND SPECIAL INSTRUCTIONS (CDC 2002)**

IV Tubing	FREQUENCY	SPECIAL INSTRUCTIONS
Non-filtered tubing	Change every 96 hours	
Filtered tubing	Change every 48 hours	Phenytoin, 20-25% mannitol and amiodorone. Ask pharmacist for use of filtered tubing with other drugs.
Blood tubing	Change filter tubing after a max time of 4 hours OR after a max of 2 units; or Change filter tubing if a change in ABO blood type in 2 consecutive transfusions	
TPN tubing: if only dextrose and amino acids	Change every 96 hours	
TPN tubing: with lipid emulsions, 3-in-1 admixture	Change every 24 hours	

IV Fluids	FREQUENCY	SPECIAL INSTRUCTIONS
IV fluid	Change every 24 hours	
TPN: if only dextrose and amino acids TPN: if contains lipid emulsions, 3-in-1 admixture	Change every 24 hours Complete infusion in 24 hrs	With Lipids, use 1.2 Micron Filter supplied as needed Without Lipids, use 0.22 Micron Filter supplied as needed
Lipids alone	Complete within 12 hours of initiation, unless 24 hours is needed due to volume	

**II. PERIPHERAL INTRAVENOUS (IV) CATHETER (Short length and Midline): Policy, insertion and removal**

**A. POLICY:**

1. A physician’s order is necessary to perform venipuncture, including insertion, capping and discontinuation of catheters.
2. RNs or other caregivers approved by the organization and with demonstrated competency may perform venipuncture.
3. INSERTION:
  - a. Peripheral IVs should be inserted only in an upper extremity. If necessary, a lower extremity may be used as an alternate site. A physician order is needed to use a lower extremity (Camp-Sorrell, 2003). Peripheral IVs inserted at an alternate site should be changed as soon as a satisfactory site can be established elsewhere.
  - b. Peripheral or capped IVs inserted in a crisis situation without proper asepsis should be replaced at the earliest opportunity and within 48 hours of emergency placement (CDC 2002). IVs placed at another institution without proper documentation of site, gauge, and start date will be restarted, this includes any running fluids and tubing.
  - c. An order is not required to restart an IV that has been discontinued because of infiltration, phlebitis, catheter dislodgment, infection, or other adverse reaction.
4. Document the venipuncture site, type and gauge of needle or catheter in the patient record.
5. A peripheral IV catheter with the exception of a midline, may be left in place for a maximum of 96 hours provided no IV-related complications are encountered before this time. The existing patent IV device should be left in place until the new IV is successfully inserted to ensure continuous IV access.
6. If in the judgment of a RN, the IV cannula must remain in place longer than 96 hours, notify physician, and document rationale for leaving the IV device in place and the condition of the site. This documentation must occur approximately every eight-hours as long as the IV remains at that site.
7. Only RNs who have completed midline training insertion may insert midline catheters.

**PROCEDURES**

**B. INSERTING THE PERIPHERAL IV CATHETER OR NEEDLE**

**SPECIAL CONSIDERATIONS:**

1. Please reference Clinical Nursing Skills and Techniques by Perry and Potter (2006) pages 903-921.
2. All catheter insertions should avoid a dependent extremity with a dialysis fistula or graft; or the side with a mastectomy, axillary lymph node dissection, stroke, or prior radiation. Notify physician if the affected limb is the only available site.

Note: Select site opposite to an OR procedure site. If it is known the patient will be in the prone position, avoid an antecubital site.

3. Special considerations when choosing an IV type or size:

- a. It is preferred that an #18-20 gauge needle/catheter be used for blood.
  - b. A #22 gauge may be necessary for elderly clients.
  - c. A #18-20 gauge IV catheter is used for the surgical patient. If unable to insert IV prior to any procedure, notify the appropriate area/department.
4. Site prep:
- a. Site should be visibly clean. May use povidone-iodine swab or alcohol swab to remove debris.
  - b. Cleanse peripheral IV site with 2% chlorhexidine (ChlorPrep) (0.67ml [SEPP] size)
    - 1) Wipe side to side, then in one concentric circle from the intended puncture site working out 2-4 inches in diameter depending on the size of the patient. May also wipe up and down as well (basketweave) before using final concentric circle cleansing.
    - 2) Friction and multiple pattern swabbing allows the solution to penetrate the epidermal layer.
    - 3) Considerations for elderly or fragile skin: use softer ChlorPrep product if needed (eg, sponge type); use gentle pressure when wiping.
  - c. The solution should be applied with friction for 30 seconds and allowed to dry (30 seconds).
  - d. Allow to dry before inserting catheter. **Once site has been prepped, do not palpate vein or area unless using a sterile glove.**
- Note: Chlorhexadine skin antiseptics has been proven to provide better skin antiseptics than other antiseptic agents such as povidone-iodine solutions.
5. Do NOT infuse vesicant drugs, TPN, sclerosing agents or other drugs or fluids that should be administered through a central line unless an emergency situation. For Metro Region, see MN-18 for drug infusions via specific access.
6. Comfort measures:
- a. Transdermal analgesic (eg, EMLA) may be applied to insertion site if ordered by the physician. Transdermal analgesics may increase patient comfort and decrease anxiety; to be effective, the cream must be applied 60 minutes prior to access.
  - b. A saline or Lidocaine wheal may be injected subdermally near the insertion site to decrease insertion pain. Lidocaine must be ordered by the physician. See Appendix B.

#### C. UNSUCCESSFUL PERIPHERAL INTRAVENOUS INSERTION ATTEMPTS

It is recommended that no more than two IV insertions be attempted by any one nurse. After two unsuccessful IV attempts, the nurse will contact a resource to insert IV. After four unsuccessful IV sticks, consider alternative IV access with appropriate agency resources (e.g., anesthesia, CRNA, etc.) If no vascular access obtained, notify attending physician.

#### D. FOR PERIPHERAL CATHETER REMOVAL:

1. Reference Clinical Nursing Skills and Techniques (Perry & Potter, 2006, pages 947-951, or 2002, pages 614-616.)
2. A band-aid may be used to cover the site.
3. Certified Nursing Assistants may remove peripheral catheters upon completion of the skill checklist.

#### E. IV BAG DISPOSAL:

All IV bags must be disposed so that patient information is protected:

- Empty bag and peel off sticker; dispose of bag in garbage container and sticker in confidential paper bin
- Conceal patient name and MRU # using permanent marker and dispose in garbage

#### F. MIDLINE CATHETER:

1. A peripherally inserted 6-8-inch catheter for intermediate duration (i.e., several weeks) of IV therapy

2. A midline catheter is considered a peripheral catheter:
  - A physician order is not needed;
    1. Do NOT infuse vesicant drugs, TPN, sclerosing agents or other drugs or fluids that should be administered through a central line unless an emergency situation. For Metro Region, see MN-18 for drug infusions via specific access.
3. Label dressing as a midline catheter
4. Dressing and flushing per PICC procedure; use nursing order: "Flush midline per policy."
5. Do not place blood pressure cuffs or other restrictive devices above the midline insertion site.
6. Recommended for: (a) patients over the age of 80 with infusion expected to last longer than 4 days or (b) patients with fragile or difficult to cannulate veins after consultation with expert nurse
7. RNs may remove midline catheters: remove dressing, Biopatch and any securement device; place sterile gauze over site (do not apply pressure) and gently pull catheter out 2-3 inches at a time. Apply pressure on site until bleeding stops. Cover with sterile gauze (4x4 or 2x2) occlusive gauze dressing and tape securely.
8. May remain in place indefinitely if no complications (CDC, 2002).

### III. CATHETER TUBING FOR IV INFUSIONS: SETTING UP, CHANGING AND USE OF SECONDARY TUBING

Reference Clinical Nursing Skills and Techniques (6<sup>th</sup> ed.) (Perry & Potter, 2006, pages 930-937)

#### A. GENERAL INFORMATION about Tubing and Drug Administration

1. All catheter tubing must be clamped when opening system.
2. The same tubing can be used for various added medications and backflushed between medications. The diluent solutions can be D5W or 0.9% NaCl (normal saline) based on the condition of the patient, type of medication to be diluted, compatibility of solutions and primary IV fluid.
3. Flush solutions should be on the primary tubing. If the main IV solution is used as hydration, it may be used as a flush solution. Medications should be hung on the secondary tubing. This allows for adequate priming/flushing of tubing between medications.
4. Seek assistance from pharmacy when questioning drug incompatibilities.

#### B. INTERMITTENT IV INFUSION

##### Equipment:

- IV solution minibag
- Secondary tubing
- Luer-lock cannula

#### PROCEDURE:

IMPORTANT STEPS	KEY POINTS
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**If main IV tubing is already present, the following steps should be taken to administer intermittent medication.**

1. Obtain IV solution/medication minibag and secondary tubing.
2. Primary IV bag is suspended from hanger.

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IMPORTANT STEPS	KEY POINTS
<ol style="list-style-type: none"> <li>3. Close roller clamp on the secondary IV tubing.</li> <li>4. Insert secondary tubing IV spike into the minibag port using aseptic technique.</li> <li>5. Attach needleless Luer-Lock cannula to end of secondary IV tubing.</li> <li>6. Insert Luer-Lock cannula of secondary IV tubing into first injection port nearest primary bag below drip chamber on primary tubing.</li> </ol>	

IMPORTANT STEPS	KEY POINTS
<ol style="list-style-type: none"> <li>7. Hold secondary bag/tubing below the level of the primary set-up.</li> <li>8. Open clamp on IV tubing and purge all air from system.</li> <li>9. Hang minibag on IV pole.</li> </ol>	<p>This will back-fill the secondary IV tubing eliminating any air.</p>

**IV. CENTRAL VENOUS CATHETERS (CVC): NON-TUNNELED CVC, SHEATH / INTRODUCER, PICCs, TUNNELED CVC (Hickman, Broviac, Leonard), and IMPLANTED VASCULAR DEVICES (implanted port, eg, MediPort):**

**A. POLICY for all CVCs:**

1. All CVCs:
  - a. A chest x-ray is to be done after insertion of a central line and before using for infusions to verify catheter tip position in the superior vena cava. If an order has not been written, the nurse may write in the order sheet "Per policy".
  - b. Upon transfer from another facility (non-AHC), a central line dressing change and exit site care should be done the day of transfer/admission to assess the site.
  - c. If a central line was inserted without proper asepsis or if it was placed at another institution (non-AHC) without proper documentation, the physician should be asked if the central line requires replacement. If the catheter is replaced, all fluids and tubing should also be replaced.
  - d. A positive pressure access system (e.g., Flowlink or PosiFlow) will be used as the main type of end cap system for all central lines.
2. Implanted ports (e.g., MediPort or PowerPort): Special Huber-point needles (noncoring) must be used when the septum is punctured.

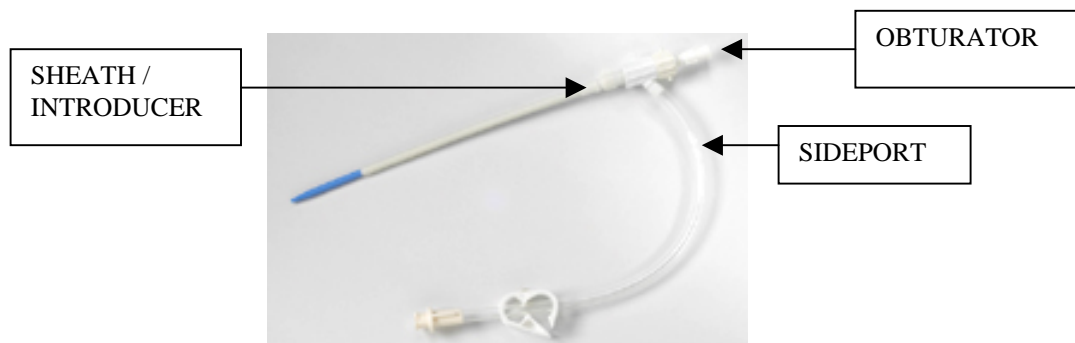
**B. CVC INSERTION GUIDELINES FROM IHI (Institute for Healthcare Improvement)**

- One way to decrease the likelihood of central line infections is to use proper hand hygiene. Washing hands or using an alcohol-based waterless hand cleaner can help to prevent contamination of central line sites and bloodstream infections (CDC, 2002). Refer to the System Hand Hygiene Policy and Procedure. Some examples are:
  - Before and after invasive procedures
  - Before and after removing gloves
- For the operator placing the central line and for those assisting in the procedure, maximal barrier precautions means strict compliance with hand hygiene, wearing a cap, mask, sterile gown and gloves. The cap should cover all hair and the mask should cover the nose and mouth tightly. These precautions are the same as for any other surgical procedure that carries a risk of infection.
- For the patient, maximal barrier precautions means covering the patient from head to toe with a sterile drape with a small opening for the site of insertion (Mermel et al., 1991; Raad et al., 1994):

- Maximal barrier precautions clearly decrease the odds of developing catheter-related bloodstream infections.
- Chlorhexadine skin antiseptics has been proven to provide better skin antiseptics than other antiseptic agents such as povidone-iodine solutions.
  - Apply chlorhexidine solution using a back and forth friction scrub for at least 30 seconds. Do not wipe or blot.
  - Allow antiseptic solution to *dry completely* before puncturing the site (~ 2 minutes).
- Daily review of central line necessity will prevent unnecessary delays in removing lines that are no longer clearly necessary in the care of the patient.

### C. GENERAL INFORMATION FOR CENTRAL VENOUS CATHETERS

1. See Perry and Potter (2006) page 959, for dressing change information.
2. Catheter information:
  - Multi-lumen catheters have separate and distinct lumens.
  - Each lumen is a different length and has an individual exit port at a different side of the catheter.
  - Distal lumen of multi-lumen catheters is the only lumen used for CVP monitoring.
  - Incompatible solutions can be infused simultaneously through different lumens achieving therapeutic blood levels without adverse affects.
  - Tunneled catheters are becoming more variable; for example, the Hickman Trifusion Catheter is flushed like the Neostar. The Hickman Trifusion Catheters by Bard are triple-lumen apheresis and central venous devices that are being substituted for our previously used Neostars.
3. If at any time catheter damage is suspected (tear, cut or puncture), immediately apply a clamp close to body at the exit site and proximal to the damaged area. Notify the physician. See section regarding repair.
4. Sheath / Introducer A sheath/introducer is a percutaneously placed single-lumen central venous catheter used for rapid IV infusion and/or for the introduction of a hemodynamic monitoring line. If a hemodynamic monitoring catheter is not threaded through the hemostasis valve, an obturator cap must be in place to prevent air embolism and / or hemorrhage. The sideport may be used for intermittent or continuous infusion as well as for drawing venous blood samples. Removal of a sheath/introducer is the same as for other non-tunneled central venous catheters except the large French size of the sheath may require pressure to be held for a longer period of time post removal.



### D. BIOPATCH®

- Foam dressing with chlorhexidine gluconate (in Chloraprep), an antiseptic agent with antimicrobial and antifungal properties.

- Applied to all non-tunneled central venous catheters, PICCs and midline catheters at exit site for central lines and entrance site for PICCS and midlines to decrease infections (Crnich & Maki, 2002).
- Blue side or grid side is visible (or up) when applied.
- Area around catheter must be covered by Biopatch; slit edges are under catheter and should be together.
- Effective for 7 days; must be in contact with skin; covered with transparent dressing and everything is changed every 7 days or when soiled, wet or loose. Change if blood-soaked.
- Can be pulled off while pulling off transparent dressing; if resistant, use alcohol to loosen BioPatch®.

#### **E. ASPIRATING BLOOD SAMPLES FROM ANY CENTRAL LINE**

##### **GENERAL INFORMATION:**

- Utilize Perry and Potter, 2006: Clinical Nursing Skills and Techniques, pages 930-962, for reference.
- An MD order is not needed to draw off of a central line, non-dialysis line.
- Do not use Vacutainer for blood aspirations from PICCs

**EQUIPMENT LIST:**

- |                 |                               |
|-----------------|-------------------------------|
| 2-3 Vacutainers | Gloves                        |
| 10cc syringes   | Appropriate flushes           |
| Normal Saline   | Tubes for specific blood draw |

**PROCEDURE:**


IMPORTANT STEPS	KEY POINTS
<p>1. Perform hand hygiene Fill one or two 10 mL syringes with normal saline and keep some 10 mL syringes empty for drawbacks and flushes. Put on non-sterile gloves</p>	
<p>Identify your patient using the patient identification policy, and match lab labels to patient. 2. Place patient in comfortable position</p>	
<p>3. a. Stop the IV solutions if line is in use. b. If line is <b>not in use</b>, flush with 10 mL normal saline. c. Clamp off unused ports.</p>	<p>Stop all IV solutions in multi-lumen catheters. Aspirate heparin from dialysis catheters.</p>
<p>4. Expel air from syringe(s) before drawing blood.</p>	
<p>5. Clamp the catheter whenever system is open to air.</p>	<p>Prevents possibility of an air embolism or blood reflux into catheter</p>
<p>6. Cleanse end of catheter with alcohol.</p>	
<p>7. Insert sterile syringe and withdraw, using gentle pressure, appropriate amount of blood for discard (see Table 1, page 3). Clamp catheter, remove syringe and discard in sharps container. This blood is discarded.</p>	<p>If utilizing needleless system, may draw directly through cap. If it is difficult to withdraw blood, have patient change position, or extend arm laterally, vertically, lean patient forward. May need to remove needleless cap. If unable to obtain blood samples from the line, a venipuncture may need to be performed.</p>
<p>How much blood is needed for sample? Amount needed is listed on each tube. Add up amount for each tube and that is total amount of blood needed for drawback.</p>	<p>If present, the lab procedure or technician will determine the amount of sample necessary.</p>
<p>8. Expel air from new syringe and attach to end of catheter or to needleless cap. Pull back blood specimen. Aspirate necessary amount of blood using multiple syringes if needed.</p>	<p>Either draw multiple syringes of blood, clamping catheter whenever syringe is disconnected OR insert Vacutainer and fill blood tubes. There is no need to clamp catheter between Vacutainer tubes or Groshong.</p>
<p>9. Vacutainer may be used; insert into end of needleless cap. Hold Vacutainer upright and lower than the catheter so blood fills tube passively.</p>	
<p>10. Remove syringe or Vacutainer from needleless cap</p>	
<p>11. Flush line with at least 10ml normal saline (20 ml for ports).</p>	
<p>12. Reattach IV line and resume IV infusion; or if line capped, use Table 1 for capping amount.</p>	
<p>13. Open blood transfer device package. Attach blood transfer device to top of blood specimen syringe.</p>	

IMPORTANT STEPS	KEY POINTS
-----------------	------------

14. The order of blood to be transferred into the tubes is below.
15. Insert blood tube into blood transfer device.
16. The vacuum of the tube will disperse the blood from the syringe into the blood tube.
17. Fill the blood tubes to the draw line.
18. Fill all blood tubes in this manner, switching blood tubes when full.
19. When all tubes are filled, label the tubes.
20. Label the tubes with your initials, time, and date. Use the long label.
21. Attach signed label below the rubber stopper on the tuber, covering up the white manufacturers label on the tube.
22. Dispose of your supplies in the proper receptacles.
23. Place blood tubes in specimen bag and send to lab immediately.

**Order of draw or order of filling blood tubes for evacuated tube system (recommended)**

This prevents contamination of syringe with additives from blood tubes.

Order	Test	Tube color
	1 <sup>st</sup>	Blood culture Blue/purple topped bottles
	2 <sup>nd</sup>	Coagulation Blue top
	3 <sup>rd</sup>	Serum Red/yellow top
	4 <sup>th</sup>	Heparin Green top
	5 <sup>th</sup>	EDTA Lavendar/pink top
	6 <sup>th</sup>	K3 EDTA Lavendar/pink top
	7 <sup>th</sup>	Lactic acid Grey top place on ice
	8 <sup>th</sup>	Sodium heparin non-additive Red/black top

See Appendix C for more information.

**F. REPAIR OF CENTRAL LINES**

**POLICY:** An RN may repair tunneled catheters with a physician order. Midline catheters may be repaired.

**GENERAL INFORMATION:**

1. Nontunneled CVCs and implanted ports may not be repaired. They may be replaced.
  - Prevent air from entering the system using a clamp proximal to the tear or break.

- Notify the physician.
- Plan for continued IV infusions if necessary and prepare for removal of damaged device.

2. Tunneled CVCs (Hickman, Broviac and other silastic catheters) and PICCs can be repaired.

**CONSIDERATIONS:**

1. Prevent air from entering the system. Clamp the catheter proximal to the tear or break (between the catheter exit site and tear).
2. Consult with the attending physician regarding completing the repair or having the catheter replaced. There should be at least 2 inches of intact catheter remaining external to the patient in order to make a repair.
3. The repair kit is obtained from Central Supply. You need to provide the following information in order to receive the appropriate kit:
  - Type of catheter (brand)
  - Gauge
  - Number of lumens
4. The kit contains materials and specific instructions for repair, as well as information as to when the catheter may be used again.
5. It is suggested to have a second RN present to assist with the repair.

**G. NON-TUNNELED CVCs (e.g., Arrow) – Removal Procedure:** may be removed by an RN.

**POLICY:**

**1. A physician order is needed to remove a CVC.**

**EQUIPMENT LIST:**

- |   |                   |
|---|-------------------|
| Gloves                                  | Sterile gauze     |
| Suture removal supplies or alcohol pads | Adhesive dressing |

**PROCEDURE:**

IMPORTANT STEPS	KEY POINTS
1. Assist patient to supine position.	
2. Clean procedure; wear gloves (Perucca, 2001)	
3. Remove sutures if present or other securement devices (e.g., StatLock)	If securement device (e.g. StatLock) present, must use alcohol pads to remove
4. Instruct the patient to take in a deep breath and then hold while withdrawing the catheter.	If the patient is on a ventilator, withdraw the catheter during the expiratory cycle.
6. Grasp the catheter with the dominant hand and steadily withdraw the catheter in one continuous motion while stabilizing the site with gauze in the other hand.	The distal end of a multilumen catheter should be removed quickly, since the exposed proximal and medial openings could permit air entry.
7. Apply pressure with sterile gauze over the insertion point until bleeding has stopped.	Apply pressure for a minimum of one minute or until bleeding stops.
8. Cover site with an occlusive dressing.	
9. Instruct patient to notify staff if any bleeding is noted.	
10. Evaluate catheter for length and signs of breakage.	If you suspect that the catheter has been broken, have patient lie still on left side and notify the physician <b>STAT</b> .
11. Document removal and any significant findings.	

**H. PICC CATHETER (PERIPHERALLY INSERTED CENTRAL CATHETER)**

Reference Perry and Potter (2006) Clinical Nursing Skills and Techniques, pages 922-929 to learn about PICCs.

**POLICY:**

1. A physician’s order is necessary for insertion and removal of catheter.
2. Physicians, RNs with demonstrated competency or other caregivers approved by the organization and with demonstrated competency may insert PICC lines.
3. Only RNs may remove PICCs.

**GENERAL INFORMATION:**

PICC is a central venous catheter inserted via the brachial, basilic, or cephalic vein in the antecubital fossa. The catheter is silastic or other non-thrombogenic material. It may stay in place for several months.

PICC catheter sizes, volumes, and flow rates (generally):

French	Gauge	Gravity Drip	Prime Volume
1.9 – 2.0	23	--	0.04 ml
2.8 – 3.0	20	100 – 240 ml/hr	0.11 – 0.33 ml
3.8 – 4.0	18	150 – 700 ml/hr	0.2 – 0.4 ml
4.8 – 5.0	16	200-1100 ml/hr	0.3 – 0.5 ml

**REMOVAL OF A PICC LINE**

**EQUIPMENT:**

- 4x4 gauze
- Tape
- Gloves
- Suture removal supplies or alcohol pads

**PROCEDURE:**

IMPORTANT STEPS	KEY POINTS
1. Place the patient’s arm perpendicular to their body to minimize bends in the catheter.	
2. Remove the occlusive dressing,  Remove Steri-Strips, sutures, or other securement device (e.g. StatLock)	If securement device (e.g. StatLock) present, must use alcohol pads to remove
3. Place a sterile gauze over the site (do not apply pressure).	
4. Instruct the patient to take a deep breath and hold it as you gently pull the catheter out, 2-3 inches at a time. If resistance occurs during removal, <b>DO NOT FORCE removal.</b>	Venospasm may cause this resistance.
a. Wait 30 minutes and try again	
b. Apply heat to the upper arm, axilla, and hand	
c. Flush the catheter gently with 10 mL 0.9% NaCl	
d. Try relaxation techniques, have the patient drink warm liquids	
e. If all the above fail, notify the physician who will consult an interventional radiologist	
5. Apply pressure with the sterile gauze on the insertion site (once the catheter is removed) until the bleeding stops.	
6. Cover the site with 4x4 occlusive gauze pressure dressing and tape securely.	

IMPORTANT STEPS	KEY POINTS
7. Inspect the catheter tip for a ragged edge or tear, or other signs of breakage.	If you suspect that the catheter has been broken, have the patient lie still on their left side, notify the physician <b>STAT</b> .
8. Document procedure and any significant findings in the patient record.	

**I. TUNNELED CVC (eg, Hickman®, Groshong®, Broviac®, Raaf®, Leonard®): Policy and General Information**

Reference Perry and Potter (2006). Clinical Nursing Skills and Techniques (6<sup>th</sup> ed.), pages 951-964.

**POLICY:**

1. Newly-placed catheter may be used after insertion following verification of catheter tip placement in superior vena cava by chest x-ray or fluoroscopy (Weinstein, 2006).

**GENERAL INFORMATION:**

The catheter can be used for infusion immediately after placement or can be capped with heparin. A chest x-ray is not needed if the catheter was placed with fluoroscopy.

Any IV solution, medication, or blood product may be infused through any lumen of these catheters.

Blood samples may be drawn from either lumen of a dual lumen catheter. Treat each line as a separate catheter when carrying out procedures. Discard drawback if there is any unintended drug in the line.

If resistance is met when flushing, stop and assess. Check to see that the catheter is not pinched or kinked, change patient’s position, roll patient on left side, raise or reposition the patient’s right arm, have patient deep breathe and cough.

**Hickman, Broviac, and Raaf** have open tips at the catheter ends. They require heparin to maintain patency when not in use. The **Groshong** has a closed tip with a side valve stopping any backflow of blood when positive pressure is used for capping. Capping the Groshong is done with saline only.

**Removal:** only by a physician.

**J. IMPLANTED VASCULAR ACCESS DEVICES (implanted ports) (eg, Mediport®, Omega®, Slim-port® ):**

Please reference Clinical Nursing Skills and Techniques (6<sup>th</sup> ed.) (Perry & Potter, 2006, pages 951-962) for complete information on port description, accessing and flushing the port, dressing changes and removing Huber needle.

**GENERAL INFORMATION:**

Ports are accessed with a non-coring (Huber) needle usually no longer than one inch. Huber needles are required to prevent coring (inserting a hole) in the septum.

Power Port: Only available as a single port.

- Same flushing procedure as a Mediport.
- Advantage: It avoids a patient being stuck for a peripheral line when getting a CAT scan with contrast. This single lumen port is able to accommodate the high-pressure CAT scan injection of the contrast. The Mediport is not.
- Nursing implications: The Power Lock Needle that usually accompanies the catheter should be put in place when the patient obtains a cat scan with contrast. It is important to inform Radiology that the patient has a Power Port.

Frequent intermittent flushing with heparin may influence the patient’s anticoagulant status.

- Frequent capping may require change in capping solutions to minimize the amount of heparin administered.

- Consult with physician for any changes in heparin concentration or using normal saline flush during the time of frequent intermittent capping.

Notify physician if an occluded port is suspected or subcutaneous leaking of fluid from port is suspected. Do not force flushing/capping solution into the catheter.

If you are unfamiliar with this procedure, please call a nurse from one of the oncology units or cancer clinics, or an experienced nurse.

Only a physician may remove a port.

#### **K. SHEARED, CUT OR RUPTURED CVC OR SUSPECTED CATHETER EMBOLISM ((Perdue, 2001)**

1. If at any time catheter damage is suspected (tear, cut or puncture), immediately apply a clamp close to body at the exit site and proximal to the damaged area. Notify the physician. See section regarding repair.
2. If a CVC has been cut or sheared off and embolized into the vascular system:
  - a. If a catheter in extremity: put a tourniquet around the affected limb proximal to the catheter insertion site.
  - b. Put patient on bed rest; may lower head of bed.
  - c. Notify the physician STAT
  - d. Monitor patient for signs of distress or cardiac arrest
  - e. A chest radiograph may be ordered
3. Suspected catheter embolism:  
Observe patient for cyanosis, chest pain, hypotension, increased central venous pressure, tachycardia, fainting, or loss of consciousness.

#### **V. DE-CLOTTING CENTRAL LINES (CVCs): (NON-TUNNELED, TUNNELED AND IMPLANTED VASCULAR ACCESS DEVICES [PORTS]) and MIDLINES**

##### **POLICY:**

1. Only RNs may perform this procedure.
2. The removal of clots uses Alteplase (r-tPa) *dose escalation protocol (see procedure below.)* Requires a physician order.
3. Vital signs are assessed before and after this procedure.
4. ***None of the drug is to be administered to the patient. Only the specified amount of drug is to be used to surround and dissolve the clot. If required, follow the Alteplase with 0.9% sodium chloride to fill the remaining volume of the catheter.***
5. If no information is available on actual length of catheter, *use no more than 1ml of fibrinolytic agent.*
6. If the catheter is a Dual Lumen Hickman or Raaf, the fibrinolytic agent should be instilled only into that lumen which seems to be clotted. The other lumen may be capped or used for infusion of solutions.
7. If attempt fails, a physician order must be obtained to begin the entire process again.

##### **GENERAL INFORMATION:**

It should be determined that the occlusion is caused by clotting of the catheter prior to performing this procedure. Other causes of occlusion such as clamped or crimped IV line or tubing, tight sutures around catheter, or drug precipitate in line should be ruled out. Fibrinolytic agents are not effective in such cases.

**EQUIPMENT:**

- Gloves
- Sterile needle
- Alcohol wipe
- 10 ml syringe (empty) (2)
- Blue plastic catheter clamp (for use with silicone plastic type catheters)
- Drug from pharmacy: Alteplase (r-tPa) 1 mg/ml drawn up into a 3ml syringe
- 10 ml syringe containing 10ml sterile NS
- Luer Lock injection cap (2)

**PROCEDURE:**

IMPORTANT STEPS	KEY POINTS
1. Apply clean gloves.	
2. Disconnect IV tubing or cap from catheter.	
3. Swab catheter hub with alcohol.	
4. Attach empty 10ml syringe to hub of catheter.	
5. Draw back gently on plunger to aspirate blood from catheter. If no blood is obtained, the catheter is occluded, then proceed to Step 7.	To determine occlusion of catheter. If blood is obtained, the line is patent.
6. If patent, reattach IV tubing to catheter or attach injection cap and flush central line.	
7. Notify physician that catheter is occluded.	Other causes of occlusion (e.g., drug precipitate, kink in tubing) should be ruled out.
8. Obtain order for use of Alteplase to declot the catheter.	
9. Obtain Alteplase from pharmacy (1mg/ml)	Only the specified amount of drug is to be used to surround and dissolve the clot. If required, follow the Alteplase with 0.9% sodium chloride to fill the remaining volume of the catheter.
10. Disconnect the IV tubing or cap at the catheter hub.	<b>REMEMBER:</b> any time the catheter hub is open to air the line must be clamped. If clamping is not possible, instruct patient to exhale and then hold breath during the time that the catheter is open.
11. Recheck catheter as in Steps 5 and 6.	
12. Proceed with the declotting procedure if no blood return obtained.	
13. Attach the 3 ml syringe filled with 0.5 mL of Alteplase (r-tPa) (1mg/mL)	
14. Inject the drug <b>SLOWLY</b> and gently into the catheter. If required, follow the Alteplase with 0.9% sodium chloride to fill the remaining volume of the catheter.	<b>NEVER</b> forcefully push on the syringe. Excessive pressure should be avoided when injecting a fibrinolytic drug into the catheter (such force could cause rupture of the catheter or expulsion of the clot into circulation). Injecting the drug slowly, the catheter can expand, allowing the drug to surround the clot.
15. Attach a Luer Lock injection cap to the catheter and wait 60 minutes.	
16. Draw back <b>gently</b> on an empty 10ml syringe to attempt to aspirate the drug and residual clot with the attached syringe.	The residual clot is aspirated from the catheter along with the drug.
<u>If blood is aspirated proceed to Step 26.</u> Complete the following Steps 17-20 if blood <u>cannot</u> be aspirated.	

IMPORTANT STEPS	KEY POINTS
<p>17. IF BLOOD NOT ASPIRATED:                      Attempt to aspirate the first Alteplase (r-tPa) dose, discard it and instill 1mL of Alteplase 1mg/mL.</p> <p>If required, follow Alteplase with 0.9% sodium chloride to fill the remaining volume of the catheter.</p> <p>18. Attach a Luer Lock injection cap to the catheter and wait an additional <i>60 minutes</i>.</p> <p>19. Remove injection cap.</p> <p>20. Attach empty 10ml syringe. Draw back gently on an empty 10ml syringe to attempt to aspirate the drug and residual clot with the attached syringe.  <u>If blood is aspirated proceed to Step 26.</u> Complete the Steps 21-25 if blood <u>cannot</u> be aspirated.</p> <p>21. IF BLOOD IS NOT ASPIRATED:                      Attempt to aspirate the first Alteplase (r-tPa) dose, discard it and instill 2mL of Alteplase 1mg/mL.</p> <p>If required, follow Alteplase with 0.9% sodium chloride to fill the remaining volume of the catheter.</p> <p>22. Attach a Luer Lock injection cap to the catheter and wait an additional 60 minutes.</p> <p>23. Remove injection cap.</p> <p>24. Attach empty 10ml syringe. Draw back gently on an empty 10ml syringe to attempt to aspirate the drug and residual clot with the attached syringe.  <u>If blood is aspirated proceed to Step 26.</u></p> <p>25. Notify the physician if catheter remains occluded.</p>	<p>If blood cannot be aspirated, a partial clot may remain.</p>
<p><b>Once the blood <u>can</u> be aspirated:</b></p> <p>26. Aspirate clot into 10 ml syringe.</p> <p>27. Disconnect 10 ml syringe.</p> <p>28. Attach an empty 10ml syringe.</p> <p>29. Withdraw 5-10 ml of blood.</p> <p>30. Remove blood filled syringe and discard.</p> <p>31. Connect syringe containing 10ml normal saline.</p> <p>32. Flush catheter gently with 10ml normal saline.</p>	<p>REMEMBER: any time the catheter hub is open to air the line must be clamped. If clamping is not possible, instruct patient to exhale and then hold breath during the time that the catheter is open.</p> <p>Assures patency and removes residual drug and clot from catheter.</p> <p><b>This blood SHOULD NOT be returned to patient as it probably contains drug and a partial clot.</b></p> <p>REMEMBER: any time the catheter hub is open to air the line must be clamped. If clamping is not possible, instruct patient to exhale and then hold breath during the time that the catheter is open.</p>

IMPORTANT STEPS	KEY POINTS
33. Remove syringe from catheter.  34. Reconnect IV tubing or replace injection cap and flush with appropriate solution.	

## VI. CULTURING FOR SUSPECTED IV CATHETER-RELATED INFECTION

### POLICY:

1. A physician's order is necessary to obtain blood cultures if a systemic infection from the IV catheter is suspected.
2. RNs or other caregivers approved by the organization and with demonstrated competency may perform this procedure.
3. Culturing of peripheral and central IV catheters upon removal from the patient is mandatory when a systemic infection is suspected; when there is a purulence or cellulitis at the insertion site; or if the following are present: erythema, tenderness, warmth or palpable thrombosed vein.
4. The IV insertion site must also be cultured when purulent drainage is evident. The culture must be collected prior to removal of the catheter.
5. The insertion site is cleansed with alcohol and allowed to air dry **prior** to removing and culturing catheter tip.
6. If the IV solution is suspected of contamination, the entire IV fluid system (bag, solution, administration set and catheter/needle) must be discontinued and sent for culture. **DO NOT** take the system apart.
7. The pharmacist and the infection control nurse must be notified of a suspected sepsis from a contaminated IV solution. Blood cultures may be obtained from new IV system with physician order.
8. STAT peripheral blood cultures should be drawn from 2 separate sites. This shall be done as soon as possible during/after the patient's reaction (i.e. while febrile). Do not obtain cultures via IV system unless with physician order. Blood cultures must be drawn prior to initiating a new IV system or any antimicrobial therapy.

### GENERAL INFORMATION:

- When an infection is suspected at the IV site of any catheter, change the IV catheter and tubing; change infusate only if suspected for infection.
- This procedure includes all forms of culturing (insertion sites, catheters/needles and IV fluid systems). However, it is only necessary to culture the suspected source of infection.
- Blood cultures may be drawn when an IV line is present and there is suspected sepsis, a fever of undetermined origin, or suspected contamination of IV fluid. Blood cultures must be drawn from two independent sites.

### EQUIPMENT:

- Sterile disposable instrument tray (if sutures present: have one tray to remove sutures, then need new sterile scissors to cut catheter tip)
- 4" x 4" sterile gauze sponges
- Appropriate lab requisitions
- Plastic specimen bags
- Sterile gloves
- Alcohol swabs
- Patient Identification Label
- Sterile specimen container
- Culture swab

PROCEDURE:

IMPORTANT STEPS	KEY POINTS
<b>Culturing IV Insertion Site:</b>	
<ol style="list-style-type: none"> <li>1. Wipe culture swab across insertion site. Be sure to include purulent drainage.</li> <li>2. Replace culture swab in its protective sleeve.</li> <li>3. Label culture swab per lab policy.</li> <li>4. Send culture swab in plastic biohazard specimen bag to laboratory with appropriate requisitions.</li> </ol>	
<b>Culturing IV Catheters/Needles:</b>	
<ol style="list-style-type: none"> <li>1. Cleanse skin around insertion site with alcohol. Allow to dry.</li> <li>2. Open sterile disposable instrument tray.</li> <li>3. Open sterile specimen container, maintaining sterility.</li> <li>4. Don sterile gloves.</li> <li>5. If stabilizing sutures are present, remove using tip of sterile scissors.</li> </ol>	<p>Be sure to complete culturing insertion site prior to this step, if appropriate.</p>
<ol style="list-style-type: none"> <li>6. Withdraw the catheter/needle with sterile forceps.</li> <li>7. <b>Central IV catheters:</b> <ol style="list-style-type: none"> <li>a. Cut the tip of the catheter (5cm or approximately 2 inches) with sterile scissors and place in sterile specimen container labeled “distal portion.” Maintain sterile technique.</li> <li>b. Cover the insertion site with sterile gauze and apply pressure until the bleeding stops.</li> <li>c. Dress site with sterile gauze, folded in quarters and tape tightly to apply pressure to site.</li> </ol> </li> </ol>	<p>Keep the external portion of the catheter/needle directed upward, away from skin surface to avoid contamination of the tip.</p> <p>Do not use scissors that were used to remove sutures. Use new pair of sterile scissors.</p> <p>To avoid contamination, you may need a second person to assist you with applying pressure while you prepare the IV catheter/needle for culture.</p>
<ol style="list-style-type: none"> <li>8. <b>Peripheral IV catheters/needles:</b> <ol style="list-style-type: none"> <li>a. Disconnect catheter/needle from IV tubing at hub, using sterile hemostat/forceps.</li> <li>b. Place entire catheter/needle into sterile specimen container.</li> <li>c. Label specimen per lab policy.</li> <li>d. Dress site with 4”x4” gauze, folded in quarters and tape tightly to apply pressure to site.</li> </ol> </li> </ol>	
<ol style="list-style-type: none"> <li>9. Send labeled container(s) in plastic biohazard specimen bag to laboratory with appropriate requisitions.</li> </ol>	

IMPORTANT STEPS	KEY POINTS
<p><b>Culturing IV Fluid Systems:</b></p> <ol style="list-style-type: none"> <li>1. Discontinue the IV fluid system entirely. Remove the cap (if present), catheter/needle from the patient. <b>DO NOT</b> disconnect IV tubing from IV fluid container or catheter/needle.</li> <li>2. Immediately notify the pharmacist and the infection control.</li> <li>3. Package entire IV fluid system in plastic biohazard specimen bag and save for Pharmacy. Use caution if needles are present.</li> <li>4. Obtain STAT peripheral blood cultures from 2 separate sites. This shall be done as soon as possible during/after the patient's reaction (i.e. while febrile).</li> </ol>	<p><b>This is the single most important step in the culturing procedure.</b></p> <p>Ideally, <b>DO NOT</b> obtain blood cultures through the IV system which is suspected of contamination. Blood cultures must be drawn prior to initiating a new IV system or any antimicrobial therapy.</p>

**VII. VASCULAR ACCESS LINES FOR ALTERNATE ROUTE: HEMODIALYSIS/APHERESIS**

**GENERAL INFORMATION:**

ONLY DIALYSIS or PHERESIS-TRAINED NURSES MAY ACCESS or FLUSH THESE CATHETERS, unless with physician order.

Some dialysis catheters may have a **3<sup>rd</sup> lumen**: this is considered a central line.

- **3<sup>rd</sup> lumen:** is clear or medial on catheter
- Flush and blood withdraw per CVC short term;
- May also be used for infusion and blood withdraw.

A. Mahurkar-Vascular catheters:

1. Large bore catheters designed to access the venous and arterial systems.
2. Capped with high dose heparin.
3. Removal: May be removed by a nurse.

B. The Perm-cath, with central lumen and vas-cath, are subclavian catheters with a Y-type end. Thus, it has two available ports and can be attached to both the arterial and venous blood lines in hemodialysis. They are surgically implanted, tunneled catheters designed for extended use.

- The cannula and Y-piece are joined by silastic rubber, which can develop cuts or tears easily. **DO NOT** allow any sharp edges or objects to come in contact with the tube. Clamp carefully using plastic toothless clamps.
- Must be removed by a physician.

**VIII. POSITIVE PRESSURE DEVICES: MINIMIZES FLUID BACK FLOW INTO THE CATHETER AND HELPS TO MAINTAIN CATHETER PATENCY**

1. Many devices are available, e.g., FLOLINK (Baxter) and Posiflow (Becton Dickenson).
2. A positive pressure IV access end cap will be used for all IV catheters: central lines, midline catheters, PICCs and peripheral catheters.
3. Properties:
  - Non-latex, Non-DEHP material.
  - High flow rate (Avg. 10.4 liters per hour)
4. **Disconnect the syringe first, then clamp the catheter or extension set.** And, the catheter or extension set must be clamped when changing the end cap or when the cap is removed.

5. Practice considerations:
  - Do not use needles or blunt cannula to access.
  - Do not clamp extension prior to detaching syringe.
  - Avoid excessive force during Luer-slip attachment.
  
6. Procedure to attach end cap:
  - a. Remove end cap from packaging
  - b. Attach to catheter hub or extension set
  - c. Prime the extension set, including the end cap; flick to remove bubbles.
  - d. Swab surface with 70% alcohol prep prior to first and every use.
  - e. Attach a syringe or primed IV set
  - f. Firmly push Luer tip and rotate until a secure connection is made.

**IX. SECUREMENT DEVICES**

1. Securement device or catheter stabilization device are an external apparatus to secure the catheter, for example, tape or clamps (e.g., StatLock).
  
2. Use with all central venous catheters, PICCs and midlines. May be used for all catheters, however.

Equipment:	New securement device Alcohol prep pads	Tape
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IMPORTANT STEPS	KEY POINTS
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<b>Tape</b> catheter securely distally to attached securement device	This prevents the catheter from dislodging or withdrawing from insertion site.
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**DISENGAGE:**

Gently lift plastic doors one side at a time or disengage catheter from device. Carefully remove catheter from retainer.	Catheter is secure with tape at this point.
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**DISSOLVE: Must use alcohol to remove pad.**

Apply a generous amount of alcohol to loosen edge of pad.  
Gently stroke undersurface of pad with alcohol to DISSOLVE the adhesive as pad slowly lifts away from the skin.  
Do not pull or force pad for removal.

**PREP:**

Prepare the targeted securement site with alcohol to degrease the skin and to remove Betadine, if present.

Apply SKIN PREP solution for enhanced adherence and skin protection.

ALLOW TO DRY “PAPER DRY” (10-15 seconds).

**SECURE securement device (StatLock) to catheter**

**Press securement device with catheter on skin and ensure firm adherence.**

**Remove tape from catheter.**

Securement devices should be monitored daily and replaced when clinically indicated, at least every 7 days.

**X. KEEP OPEN RATE**

Any order for a keep open rate (TKO, KO or KVO rate - To Keep Open, Keep Open or Keep Vein Open) will be run at 10 ml per hour unless otherwise specified in the order (Aurora Health Care collaboration).

**COLLABORATION:**

*Clinical Information Services, Infection Control, Pharmacy, Laboratory*

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**APPENDIX A: POTENTIAL COMPLICATIONS OF CENTRAL VENOUS CATHETERS**

Complications	Signs/Symptoms	Treatment
<p>A. <b>EMBOLUS-CATHETER, THROMBUS, AIR.</b> An embolus can be caused by catheter shearing; dislodgment of a thrombus, air drawn into circulation during tubing disconnection.</p>	<p>Dyspnea, tachycardia, hypotension, cyanosis.</p>	<p><b>EMERGENCY SITUATION</b></p> <ul style="list-style-type: none"> <li>• For a catheter embolus, apply tourniquet to upper arm.</li> <li>• For thrombus, anticoagulants and thrombolytic agents are ordered.</li> <li>• For air embolus, position patient on left side in Trendelenburg position and give patient oxygen.</li> </ul> <p>Notify physician STAT</p>
<p>B. <b>MECHANICAL PHLEBITIS</b> at the insertion site is very common during the first week after insertion. Redness at the IV site usually appears within the first 48 hours after insertion and may last the first week. The incidence is between 12.5-23%.</p>	<p>Redness along the catheter line without induration, warmth, tenderness, or inflammation. The clinical signs will occur anywhere between the insertion site and the catheter tip location. Other complications (infection, infiltration, or loss of catheter integrity) should be ruled out.</p>	<ol style="list-style-type: none"> <li>a. Warm moist compresses for 60 minutes TID to the affected area for 72 hours.</li> <li>b. Rest and elevation of the extremity.</li> <li>c. MD prescription for PO anti-inflammatory drugs, unless contraindicated.</li> </ol> <p>For mechanical phlebitis, the catheter may continue to be used for IV therapy. <b>OBSERVE FOR IMPROVEMENT WITHIN THE FIRST 24 HOURS.</b> Continue heat application until complete resolution occurs, usually within 72 hours.</p> <p>Restrict to mild arm activity.</p>
<p>C. <b>CATHETER-RELATED INFECTIONS</b> result from contamination during insertion and/or maintenance; seeding from another site; migration of microorganisms along catheter.</p>	<p>Elevated temperature, drainage from site, pain, warmth, redness, chills.</p>	<p>Blood culture from catheter and a peripheral site; remove catheter; warm moist compresses.</p>
<p>D. <b>THROMBOSIS</b> may be caused by malposition of catheter, intima damaged on insertion, irritating drugs; venous stasis, increased blood viscosity.</p>	<p>Edema of the entire extremity, upper chest and neck; tenderness in affected extremity; inability to aspirate blood and/or infuse through the catheter; discoloration of extremity.</p>	<p>Venogram to establish diagnosis; fibrinolytics, anticoagulants; elevate extremity.</p>
<p>E. <b>CATHETER OCCLUSION</b> may occur as a result of clot or precipitate formation; catheter tip positioned against vein wall or valve; kinked catheter; fibrin sleeve; improper flushing, activity.</p>	<p>Inability to infuse and/or aspirate.</p>	<p>Repositioning the patient or Abbokinase instillation for clot with MD order.</p>
<p>F. <b>CATHETER TIP MIGRATION</b> can happen because of coughing,, vomiting or excessive activity.</p>	<p>Referred pain in jaw, ear or teeth, distended veins on side of malposition; flushing or sense of fullness in head during rapid infusions.</p>	<p>Begins with x-ray verification per MD order.</p>
<p>G. <b>DAMAGED CATHETER</b> causes: small syringe used with excessive force; use of pins or scissors near catheter; needle puncture; hemostat use.</p>	<p>Fluid leak from catheter; ruptured catheter; “pop” sound heard while flushing; burning or pain with flush or infusion.</p>	<p>Notify MD if internally ruptured. Remove catheter. If damage is external, clamp catheter proximal to tear; apply sterile dressing over tear. Repair if possible.</p>

**Appendix B: Intradermal Normal Saline For IV Insertion**

**Purpose/Outcome:** Reduce pain during venipuncture

**Scope/Supportive Data:**

1. RNs may perform this procedure if they are familiar with the technique.
2. This technique is contraindicated for patients on antabuse therapy, as there may be a reaction to the alcohol preservative in normal saline solution.
3. Utilization of this technique is optional, but recommended, and may be indicated when:
  - a. Using the large bore needle (20 gauge or larger)
  - b. The patient is a child/young adult (skin tougher, making entry more difficult).
  - c. The veins are deep.
4. It is not recommended for use when:
  - a. Veins are small and thin
  - b. Patient has fragile, thin skin

**Procedure:**

Equipment

- Bacteriostatic normal saline bottle
- Tuberculin syringe with 27 gauge needle
- Exam gloves
- Alcohol wipes

IMPORTANT STEPS	KEY POINTS
1. Explain procedure to allay anxiety.	Anxiety can trigger vasoconstriction, making venipuncture more difficult
2. Use tuberculin syringe with 27 gauge needle to draw up 0.1 – 0.2 ml bacteriostatic normal saline using aseptic technique.	
3. Swab area to be injected with alcohol.	
4. Apply gloves.	
5. Inject the normal saline into the epidermis using a 5 to 15 degree angle of insertion and to a depth of approximately 3mm.	To desensitize the site prior to venipuncture.
6. Inject normal saline slowly forming a wheal under the skin. Discard syringe in needle box.	Inject normal saline beside or over the vein; do not inject into the vein.
7. Perform the venipuncture inserting the catheter through the intradema wheal insertion.	The wheal tends to shrink quickly.

**References**

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### Appendix C: Order of Draw or Order of Filling Tubes for Evacuated Tube System (Recommended)

**Principles:**

1. The order of draw during venipuncture is important so additives from one tube do not contaminate the specimen in subsequent tubes. Problems can occur when blood is collected into a tube containing an additive just before a non-additive tube. Problems can also occur with contamination between different additive tubes.
2. Do not shake the tubes. Mix gently, inverting the tube 10 times to ensure thorough mixing. If not properly mixed, fine clots may form in tubes containing anticoagulants that may seriously interfere with all testing.

Blood Tubes / Color	Additive	Order / Remarks
<b>Blood Culture</b> Blue/purple topped bottles		<b>Fill 1<sup>st</sup></b>
<b>Coagulation</b> Blue top	109M (3.2%) Sodium Citrate	<b>2<sup>nd</sup></b> Coagulation Tests
<b>Serum</b> Red/yellow top	Clot Activator Gel Serum Separator	<b>3<sup>rd</sup></b> Serum Chemistry Profiles  NOTE: Clot activator should be mixed by inverting the specimen which facilitates complete clotting
<b>Heparin</b> Green top	Lithium Heparin Lithium Heparin Gel Sodium Heparin	<b>4<sup>th</sup></b> Plasma Chemistry Profiles  NOTE: Lithium Heparin prevents clotting by tube inversions
<b>EDTA</b> Lavendar/pink top	K <sub>3</sub> EDTA K <sub>2</sub> EDTA	<b>5<sup>th</sup></b> EDTA for whole blood hematology determinations  Lead Testing
<b>K<sub>3</sub> EDTA</b> Lavendar/pink top	Potassium Oxalate  Sodium Fluoride	<b>6<sup>th</sup></b> Blood Bank
<b>Lactic acid</b> Grey top place on ice		<b>7<sup>th</sup></b>
<b>Other Tubes</b>		
<b>Sodium Heparin Non-Additive</b> Red/black top		<b>8<sup>th</sup></b> Trace Elements

Adapted from Greiner Bio-One, 4238 Capital Drive, Monroe, NC 28110. Phone: 888-286-3883  
Email: info@us.vacette.com