DEFINITIONS

**Primary Continuous IV Set** - an IV that is directly inserted into the IV cannula site and IV fluid runs through it constantly.

**Secondary IV Set** - also called piggyback (IVPB) set; attached to the primary set through needleless cannula or stopcock.

**Primary Intermittent IV Set** - an IV that delivers medication at prescribed intervals through an injection/access port with periods of infusion cessation.

**Total Parenteral Nutrition (TPN) Set** - an IV set for delivery of TPN.

**Lipid Emulsion Set** - an IV set for delivery of lipids.

**Blood/Blood Components Set** - an IV set for delivery of blood products.

**Hemodynamic and Arterial Pressure Monitoring Set** - an IV set for invasive pressure monitoring.

**Peripheral short** - an IV that is inserted into a vein with a cannula length of less than 3 inches (7.5 cm); intended for continuous or intermittent infusion lasting less than 1 week duration.

**Peripheral inserted midline** - an IV that is inserted into a vein of the arm with a cannula length of about 8 inches (20 cm) with the cannula tip resting below the axilla; intended for continuous or intermittent infusion lasting 2 to 4 weeks or longer; may be used for some types of hyperosmolar infusions.

**Peripheral inserted central (PICC)** - an IV that is inserted into a vein of the arm with a long cannula length that is tunneled so that the cannula tip rests in the superior vena cava; intended for hyperosmolar IV therapy or IV therapy lasting 1 to 6 weeks or longer.
**Percutaneous CVAD** - also called non-tunneled CVAD; used for short duration (60 days or less); can be single or multilumen; inserted in the subclavian or internal jugular vein with tip resting in the superior vena cava; sutured in place

**Tunneled CVAD (PICC)** - used for long duration (months to 2 years); can be single or multilumen; inserted into the subcutaneous tissue of the chest and tunneled through to the subclavian or internal jugular vein with the tip resting in either the superior vena cava or right atrium; initially sutured; secured by a Dacron cuff in the subcutaneous tissue so sutures are removed after healing takes place.

**Broviac or Hickman** - type of tunneled CVAD; Broviac has smaller lumen and used for children; Hickman has larger lumen and used for adults; has an open ended valve at the tip; has a catheter clamp(s) attached

**Groshong** - type of tunneled CVAD; has a closed end tip with a pressure sensitive two way valve; should never be clamped

**Implanted Port** - also called a vascular access port (VAP) or Port-a-Cath; used for long duration therapy; inserted by MD in the operating room; port itself is inserted into pocket of subcutaneous tissue; catheter tunneled under the skin into the subclavian, internal jugular, or cephalic vein with tip into the superior vena cava; accessed through the skin by a non-coring needle

**TSM** - Transparent Semi-Permeable Membrane (Tegaderm)

**POLICY:**

**SECTION 1: Intravenous Insertion and Site Care, Peripheral - Short**

**Site Selection/Preparation**
1. Appropriate veins of the arm for peripheral short IV insertion are the metacarpal, cephalic, basilic, and median. Site selection for infants may include the scalp and lower extremities.
2. Select the vein that will accommodate the gauge and length of the IV cannula.
3. Select the smallest cannula for the purpose of the patient’s IV therapy.
4. Avoid veins at the antecubital site unless the area is immobilized. Save antecubital veins for blood draws or Peripherally Inserted Central Catheter (PICC) lines if possible.
   a. Caution needs to be taken when accessing veins in the lower extremities in adults due to risk of embolism and thrombophlebitis
   b. The use of arm of a patient with a history of axillary node removal or mastectomy requires physician order.
5. If needed, use a scissors/clippers to remove hair (a razor increases the risk of infection).
6. Local anesthetics used per physician order as needed. Assess the patient for risk of anaphylaxis and allergic reaction prior to use of subcutaneous local anesthetic. Uses the Pre printed Procedural Pain Topical Anesthetic Orders.

**Insertion Steps:**
1. Wash hands and put on gloves.
2. Clean the site, using a back and forth motion (which increase the friction and allows the antiseptic solution to penetrate the lower layers of the epidermis) moving across the insertion site outward (do not cross over the insertion site from either side). Use 2% tincture of chlorhexidine. If patient is allergic to chlorhexidine or is under the age of 2 months use povidone-iodine or alcohol swabs. (If you apply alcohol after povidone-iodine, the alcohol will negate the effect of the iodine. If you use alcohol, you must rub for 30 seconds to achieve effectiveness.)
   a. Chlorhexidine is contraindicated in children under the age of 2 months.
3. Allow the site to air dry completely. Do not blot dry. Povidone-Iodine may take up to 2 minutes to dry completely.
4. Apply a tourniquet 4 to 8 inches (10 to 20cm) above the proposed insertion site.
5. Stabilize the vein by pulling the skin taut opposite the direction of the venipuncture.
6. Puncture the skin with the bevel pointing up at a 15 to 30 degree angle.
7. Never re-use an IV cannula in repeated attempts for insertion.
8. Observe for blood return, lower the catheter until it is almost flush with the skin, and advance another 1/8 to 1/4 inch.

9. Push the cannula off the stylet while keeping the stylet stable. Advance the cannula to the hub. *Never reinsert the stylet into the cannula, since this may cause injury to it and a potential embolism.*

10. Apply pressure above the insertion site and activate the safety device by pressing the activation button. Dispose of stylet in sharps container.

11. Remove tourniquet.

12. Connect IV tubing primed with fluid or attach an injection cap.

**Dressing Application and Maintenance**

1. Secure the IV catheter at the hub in place:
   a. Catheter Securement Device (Preferred):
      ii. Remove the anchoring pad from the pouch and carefully slide pad under the fluid line, with the notch or retainer angled toward the insertion site
      iii. Snap fit the Luer connector to the StatLock pad retainer
      iv. remove paper backing from the left side of the StatLock anchoring pad under the retainer and gently press pad onto skin when using a regular style or Teddy Bear pad, remove the remaining portion of paper backing and press firmly onto skin
   b. Tape method
      ii. Do not cross the tape over the insertion site
      iii. Suggested (traditional) securing procedure:
         iii.i. place narrow strip of tape under hub of catheter with adhesive side up
         iii.ii. cross tabs down along sides of catheter; lightly press cath hub to secure to adhesive side of tape
         iii.iii. place another narrow (1/2 inch) tape over hub in line with the anchor
         iii.iv. greater than 24 hours duration - apply a sterile transparent semi-permeable membrane (TSM) dressing. It is not necessary to change the TSM if it is intact.

2. Securing IV tubing & catheter prevents movement and irritation on the device, reducing mechanical irritation and possible phlebitis or infection. Do not tape completely around arm board as it may cause tourniquet effect and impede venous return.

3. Assess site every 4 hours and prn and change the site every 96 hours (earlier if the site becomes red, painful, swollen, or hard). May preserve site due to availability of veins or difficulty starting site by developing specific plan of care to include, but not be limited to, the following interventions:
   - Change dressing every 96 hours
   - Document Assessment of site every 4 hours
   - IV rounds should be done hourly.
   - Immediate discontinuation of site if any signs or symptoms or patient complaints develop.

**Pediatric Site Assessment & Dressing Changes:**

- assess site every one (1) hours or more frequently as established per the Plan of Care
- dressing change may be deferred until the site is changed

**Discontinuation and Removal**

1. Un-tape, remove the dressing gently.
2. Place pressure with gauze on the site until bleeding has stopped.
3. Pull back gently with the cannula parallel to the skin.
4. Apply a Band-Aid over the site or a pressure dressing if needed.

**Documentation:**

- date, time of insertion and removal
- catheter gauge size and length
- insertion site location
- person who inserted and person who removed
- insertion site appearance (redness, edema, streak formation, palpable cord, pain)

SECTION 2  Intravenous Administration Set Change

Primary Continuous IV Set
1. Change peripheral and central primary IV sets every 96 hours; change immediately if contamination or product integrity is compromised (See below for TPN, Lipid, Blood Products, Hemodynamic Monitoring Sets).
2. Coordinate the set change with the peripheral IV site change and/or the change of a new bag of IV fluid.
3. Change all add-on devices at the time of the set change (extension sets, filters, stopcocks, etc.).
4. Touch contamination should be avoided and sterile technique maintained during set changes.
5. Maintain the system as a closed system.
6. If ports of the primary IV set must be accessed intermittently by inserting and removing needleless cannulas, it must be treated as a Primary Intermittent Set; change the tubing according to the Primary Intermittent Set standards.  (For the administration of multiple piggybacks this can be avoided by the use of a cap attached to the needleless cannula.)

Heparin Infusion Tubing Set Up
1. Needed Supplies & Equipment: Needleless injection cap (Clave connector)
2. Procedure:
   a. Assess vein as described in section 1.
   b. Attach the Needleless injection cap (Clave connector) to the hub of the angio catheter.
   c. Attach the Heparin IV tubing to the Needleless injection cap, and then begin the Heparin infusion.
   d. Change the Needleless injection cap with every new IV start.
3. Documentation: Document in patient record on the IV Medication Administration Record (MAR) in the IV site documentation section that a needleless injection cap was applied.

Secondary IV Set
1. Change all Continuous Secondary Infusion Sets every 96 hours.
   a. A continuous secondary infusion set is defined as one that remains connected to the primary tubing continuously for the 96 hour period.
2. Change Intermittent peripheral and central secondary IV sets every 24 hours; change immediately if contamination or product integrity is compromised.
   a. Only compatible products should be infused through the secondary tubing.  If the patient has multiple secondary medications that are not compatible, label the tubing and use unique tubing for each medication and change sets every 24 hours.
3. Coordinate the secondary set change with the primary set change when possible.
4. Change all add-on devices at the time of the set change.
5. Touch contamination should be avoided and sterile technique maintained during set changes.
6. Once a secondary administration set is detached from the primary administration set, it is considered a Primary Intermittent Set and must be changed according to the Primary Intermittent Set standards.  (For the administration of multiple piggybacks this can be avoided by the use of a cap attached to the needleless cannula.)

Primary Intermittent Set (Piggyback)
1. Change peripheral and central primary intermittent IV sets every 96 hours; change immediately if contamination or product integrity is compromised.
2. Remove all needleless cannulas immediately after use and replace with new sterile needleless cannulas. For systems without removable devices, a compatible sterile covering device should be aseptically attached.
3. Maintain sterility of the administration set and needles/needleless cannulas between infusions.
4. Change all add-on devices at the time of the set change.
5. Touch contamination should be avoided and sterile technique maintained during set changes.
6. If primary intermittent set is discovered without a sterile covering device, the entire tubing set should be changed.

**Total Parenteral Nutrition (TPN) Set**
1. Change TPN administration sets every 24 hours; change immediately if contamination or product integrity is compromised.
2. Change the administration set with the administration of a new bag of TPN solution.
3. Change TPN solutions every 24 hours.
4. Change all add-on devices at the time of the set change.
5. Touch contamination should be avoided and sterile technique maintained during set changes.
6. Maintain the system as a closed system.

**Lipid Emulsion Set**
1. Change Lipid Emulsion administration sets with each new bottle of Lipids; change immediately if contamination or product integrity is compromised.
2. Change all add-on devices at the time of the set change.
3. Touch contamination should be avoided and sterile technique maintained during set changes.
4. Maintain the system as a closed system.

**Blood/Blood Components**
- See the Blood Product Administration policy for details regarding administration set changes.

**Hemodynamic and Arterial Pressure Monitoring**
1. Change the Hemodynamic monitoring set every 96 hours; change immediately if contamination or product integrity is compromised.
2. Hemodynamic monitoring set change should be done at the time a new bag of solution is initiated.
3. Change all add-on devices at the time of the set change.
4. Touch contamination should be avoided and sterile technique maintained during set changes.
5. Maintain the system as a closed system.

**SECTION 3 IV Push Administration and Injection Cap Maintenance Flush**
1. Saline Lock Maintenance:
   a. Using the needleless system flush the injection cap with 2.5 - 5 ml Normal Saline every 12 hours and after each IV Piggy Back or IV Push Medication Administration using the SAS method.
2. IV Push Medication Administration
   a. Use SAS method prior to and following IVP medication administration using a peripheral IV site with an injection cap
   b. SAS Method
      i. Flush with 2.5-5 ml of Normal Saline
      ii. Administer the IV push medication according to the Restrictive List (see above)
      iii. Flush the IV site with 2.5-5 ml of Normal Saline
SECTION 4 IV Primary Intermittent (Piggy Back) Administration Set Up and Maintenance Flush Protocol

1. Supplies:
   a. 250 ml Normal Saline IV bag (implied in the physician order for IV Piggy Back administration)
   b. Primary IV tubing
   c. Secondary IV tubing
   d. Injection Cap
   e. Male Sterile Cap (white end cap for tubing)
   f. 2.5 – 5 ml of Normal Saline

2. Flush the peripheral IV intermittent infusion plug (IV site) with 2.5 - 5 ml of Normal Saline to ensure patency of the site.

3. Set up for the IV Piggy Back using the primary tubing and Normal Saline.

4. Prime the secondary tubing and attach the IV Piggy back medication

5. Administer the IV Piggy Back medication

6. When IV Piggy Back medication is completed flush the primary IV line with 50 ml of Normal saline from the Primary IV bag running the IV pump at 50 ml/hour rate (limit 50 ml) to prevent blousing effect.

7. Disconnect the primary tubing from the intermittent infusion plug after it has been flushed and cover the tubing with a Male Sterile Cap (white end cap for tubing).

8. Flush the peripheral IV site with 2.5 - 5 ml of Normal Saline.

SECTION 5 Central Venous Access Devices (CVAD) Percutaneous and Tunneled - Placement

INSERTION

A. Equipment Needed:
   1. Central Line Tray from Materials Management or ICU
   2. Sterile Heparinized Saline (100 units per ml) for intravenous injection
   3. Sterile Normal Saline for intravenous injection
   4. Luer lock injection cap(s)

B. Steps:
   1. Obtain permit prior to insertion.
   2. Use sterile gloves, clean gown, cap, mask, surgical scrub, and sterile drapes during insertion procedure.
   3. Position the patient in Trendelenburg with a towel roll vertical to the spine between the scapulas for subclavian insertion. If the physician is inserting the CVAD into the jugular vein, position the patient in Trendelenburg with their head turned to the side.
   4. Obtain pre-insertion vital signs.
   5. Assist physician with procedure as needed. Flush the lumens with normal saline prior to insertion.
   6. After the CVAD has been inserted by the physician, apply a sterile dressing using the dressing procedure steps listed in this policy and procedure.
   7. Flush each lumen follow the guidelines in the Lippincott Manual “CVAD Flushing” policy and procedure.
   8. Maintaining positive pressure, close the slide clamp and ensure that the Luer lock injection caps are tight.
   10. Obtain x-ray confirmation that the catheter tip is in the superior vena cava before using the CVAD.
DRESSING CHANGE

A. Equipment Needed:
   1. Sterile gloves, clean gloves, mask
   2. Chloraprep applicator
   3. 70% alcohol swab sticks (NO ACETONE) – 3
   4. Povidone-iodine swab sticks – 3
   5. Sterile transparent semi-permeable membrane (TSM) dressing 4x5

B. Principles:
   1. TSM dressings will be changed on CVADs 48 hours after initial insertion and every 7 days thereafter. Immediately if the integrity of the dressing is compromised.
   2. If a TSM dressing is used and placed over gauze, it must be changed every 48 hours. It is not necessary to use gauze over the insertion site.
   3. Do not use alcohol after povidone-iodine because alcohol negates the effect of the povidone-iodine.
   4. If the patient is allergic to Chloraprep, use povidone-iodine and alcohol. If the patient is also allergic to alcohol or povidone-iodine just use 6 swabs of one of the antimicrobial solutions (alcohol or povidone-iodine).
   5. Use sterile technique, sterile gloves, and mask when changing dressings on CVAD.
   6. Inspect the site and palpate through the TSM dressing daily for tenderness, pain, infiltration, redness, erythema, induration, swelling, drainage, or other signs of infection.
   7. Observe the catheter for migration (pulling out or away) from the original placement.
      a. Measure the length of the catheter from the insertion site (skin) to the bifurcation of the tubing. Document this length in the notes.
      b. Using a piece of tape, label near the injections caps the measured length.
      c. With each dressing change measure and document the length of the external tubing from insertion site to the bifurcation.
      d. Notify the physician if there is > 5cm of tubing that has migrated out from the original insertion.

C. Steps:
   1. Apply non-sterile gloves and mask.
   2. Remove the old TSM dressing or gauze, being careful not to pull on the catheter and not to touch the skin under the dressing or the catheter exit site.
   3. Remove non-sterile gloves and apply sterile gloves.
   4. Using the Chloraprep applicator, clean in a circular motion starting at the catheter exit site and working outward. Hold the catheter away from the skin during the cleansing process. Go to step #7.
   5. If using alcohol and povidone-iodine instead of Chloraprep, begin with an alcohol swab at the site, clean in a circular motion starting at the catheter exit site and working outward. Repeat this twice with a new swab each time. Swab the area so that it exceeds the size of the TSM dressing. Hold the catheter away from the skin during the cleansing process. The alcohol swab must remain in contact with the skin for 30 seconds to be effective. Allow the alcohol to dry completely.
   6. Using a povidone-iodine swab at the site, cleanse the area in the same manner as with the alcohol swabs. With the third swab, cleanse approximately two inches of the catheter, working away from the catheter exit site. You may now let the catheter rest against the patient’s skin. Allow the povidone-iodine to dry completely.
   7. Apply the TSM dressing so that the site is occlusive. You may need to pinch the TSM dressing around the catheter to achieve occlusiveness. Leave the catheter hub or triple lumens out of the
dressing so the IV tubing can be changed without disturbing the dressing. Do not tape over the TSM dressing. Date the dressing.

INJECTION/ACCESS CAP CHANGE
1. It is the policy at HMC to always use injection/access caps on each of the lumens of the CVAD. This ensures a closed system and allows for necessary flushes.
2. Change injection/access caps with tubing changes according to the Section “Intravenous Administration Set Change” policy. If the CVAD is not being used for anything, change the injection/access caps every 7 days. Anytime that an injection/access cap is removed from a cannula, it should be discarded and a new sterile injection/access cap should be attached.
3. Cleanse the hub/injection cap connection with alcohol swabs, followed by povidone-iodine swabs. Allow to air dry.
4. Close the slide clamp.
5. Remove the old injection/access cap, attach sterile syringe with flush solution according to “CVAD flushing policy and procedure” guidelines, open slide clamp, and flush.
6. After flushing, close slide clamp (if applicable), remove syringe, and immediately apply the new injection/access cap.
   1. If no clamp available ensure that air is not allowed into the device.
   2. Refer to manufacturer guidelines as needed.

TUBING CHANGE
1. See Section 2, “Intravenous Administration Set Change” for frequency of tubing changes.
2. Change the injection/access caps first, following the procedure steps above.
3. Prime the new IV tubing with IV fluids.
4. Always use an electronic infusion device (infusion pump) with central line fluid administration.
5. Prepare the injection/access cap port with alcohol swab, followed by a povidone-iodine swab. Allow it to air dry.
6. Attach the tubing with a needleless cannula on the end to the injection/access cap. Luer lock securely with tape.

BLOOD WITHDRAWAL
1. All infusions being administered through the catheter must be stopped prior to obtaining a blood sample.
2. Swab injection/access cap port with alcohol swab and then with povidone-iodine swab. If the CVAD has multi-lumens, use the most proximal one.
3. Attach 10 ml syringe with a needleless cannula to the injection/access cap port.
4. Open slide clamp.
5. Withdraw 5ml of blood.
   1. If not able to aspirate blood, may need to flush with 10 ml of sterile preservative free 0.9% normal saline.
6. Remove the syringe and discard it along with the blood.
7. Attach a new 10ml syringe with a needleless cannula, and withdraw the amount of blood needed for sample.
8. Remove blood sample syringe, attach a new syringe with correct flush and a needleless cannula, and flush according to “CVAD flushing policy and procedure” guidelines.
9. Close the slide clamp.
10. For Groshong catheters flush with 10-20 ml of sterile preservative free 0.9% normal saline using the push pause or pulse method.

CLEARING OCCLUSIONS/DECLOTTING
1. Performed only by a Physician or RNs with appropriate training. See Section 8.

**REMOVAL**

A. Equipment Needed:
   1. Suture removal kit
   2. Chlorhexidine (if patient is allergic to chlorhexidine use alcohol & povidone-iodine instead)
   3. 2x2 sterile gauze or band aid
   4. Betadine ointment
   5. Mask, clean gloves, sterile gloves

B. Principles:
   1. All tunneled CVAD (includes Hickman, Broviac, and Groshong) must be removed by a physician.
   2. A staff RN that has been deemed competent at HMC may remove a percutaneous CVAD (PICC) with a physician’s order.
   3. Verify need for a blood culture or catheter tip culture prior to removal.
   4. Inspect CVAD catheter tip for intactness after removal and document.
   5. After the CVAD is removed, change the dressing over the site every 24 hours until it is healed.
   6. Document removal time and site condition until healed.

C. Steps:
   1. Put on clean gloves and mask. Remove old TSM dressing being careful not to tug too hard on catheter.
   2. Apply sterile gloves.
   3. Clean catheter exit exactly as described in the dressing change steps listed in this policy and procedure.
   4. Remove sutures with suture removal kit scissors.
   5. Have patient perform the Valsalva maneuver or if unable to place the patient in Trendelenburg and have him or her forcibly exhale.
   6. Gently pull to remove the catheter during exhalation of the patient.
   7. Apply pressure to the site with sterile gauze 2 x 2 dressing with triple antibiotic ointment (if no allergy) on it.
   8. Secure the dressing with tape.

**SECTION 6: CVAD Implanted/Vascular Access Ports (VAP)**

1. A physician order must be obtained prior to using a patient’s indwelling VAP.
2. Venous VAPs are the only ones that can be used for intravenous fluid administration. All others (epidural, arterial, peritoneal) are to be used for medications specific to their site or intended use. Staff Registered Nurses (RN) may access venous VAPs **only** and **not** epidural, arterial, or peritoneal ports.
3. Heparinized saline (100 units of Heparin per ml) flushing is required according to the amounts listed in the CVAD Flushing policy and repeated below except for Groshong Venous Ports which require Normal Saline flushing only (no heparin).

<table>
<thead>
<tr>
<th>CVAD Type</th>
<th>Flush per Lumen</th>
<th>Frequency</th>
<th>Syringe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPLANTED VENOUS PORT</td>
<td>5 ml Saline</td>
<td>Before and after each dose of medication</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td>5 ml Heparinized Saline</td>
<td>After each use</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td>5 ml Heparinized Saline</td>
<td>When not in use - every month</td>
<td>10 ml</td>
</tr>
</tbody>
</table>

RETURN TO INDEX
4. All VAPs are accessed with a Huber needle with pigtail (a non-coring needle that comes with attached extension tubing and clamp). Change the Huber needle every 7 days if being used for constant administration of fluids. Change the Huber needle with each administration if being used for intermittent administration of fluids. The Huber needle is left in place if daily access is needed.

5. A dressing is not required for the VAP unless it is being accessed.

6. The transparent semipermeable membrane (TSM) dressing over the VAP should be changed every 7 days with the Huber needle if it is being accessed.

7. Aseptic technique must be used when accessing a VAP.

8. Caution should be used not to ever leave the needle open to air to prevent an air embolism.

ACCESSING THE VAP

A. Equipment Needed:
   1. Pair sterile gloves
   2. 20-22ga R angle non-coring Huber needle (20g R angle Huber for blood transfusions)
   3. Chlorhexidine (or alcohol and povidone-iodine)
   4. Tegaderm 4 x 5
   5. 2 10 ml syringes of 0.9% preservative free sterile normal saline
   6. Sterile 2 x 2
   7. Micropore tape

B. Steps:
   1. Using a chlorhexidine swab at the site, clean in a circular motion starting at the center of the port and working outward over a 4-5 inch diameter. Repeat for a total of three times with a new swab each time.
   2. If the patient is allergic to chlorhexidine use alcohol & povidone-iodine.
      a. The alcohol swab must remain in contact with the skin for 30 seconds to be effective. Allow the alcohol to dry completely.
      b. Using a povidone-iodine swab at the site, cleanse the area in the same manner as with the alcohol swabs. Repeat this two more times with the other povidone-iodine swabs. Allow the povidone-iodine to dry completely.
   3. Draw up saline in a 10ml syringe.
   4. Prepare Huber needle by attaching saline filled 10 ml syringe and flushing pigtail with saline.
   5. Put on sterile gloves.
   6. Palpate the area over the port to locate the septum.
   7. Anchor the port by placing your fingers in either side.
8. Insert the Huber needle perpendicular into the center of the port and push it slowly but firmly through the skin and portal septum until it hits the bottom of the chamber. You will feel the needle tap the metal plate. Do not rock or tilt the needle.

9. Aspirate for blood return to confirm patency; flush with attached 10 ml saline-filled syringe. If you are unable to aspirate blood, it may be an indication that the catheter is lodged against the vessel wall. Ask the patient to raise arms, perform the Valsalva maneuver, cough, or change position to free the catheter. If this does not prove successful, remove the needle and repeat the procedure from step #1 with a new Huber needle.

10. If you detect swelling around injection site, unusual resistance to flush or patient reports pain at site, remove the needle and notify the physician.

11. Clamp the pigtail tubing to maintain positive pressure. Remove the 10 ml syringe.

12. If the needle does not lie flush with the skin, place a sterile sponge under the needle hub to stabilize and secure with sterile tape over the hub and sponge. If a gauze dressing is used under the TSM dressing, you must change the dressing every 48 hours.

13. Apply TSM dressing over the site and a portion of the pigtail tubing, making sure to leave the attached clamp and end cap free of the dressing.

14. Loop the tubing and tape onto the skin so that the capped end is above the level of the needle insertion site. This will prevent stress at the needle site and blood back up.

15. After this is done, you will either need to follow the infusing procedure steps listed below or flush with Heparinized saline or plain 0.9% preservative free normal saline as per manufacturers recommendations.
   a. Follow the same procedure for dual lumen ports.

**INFUSING THROUGH THE VAP**

1. Make sure the pigtail tubing of the Huber needle is clamped.
2. Remove the end cap from the pigtail tubing.
3. Flush with 10 ml of normal saline. Clamp the pigtail tubing.
4. Attach the prepared IV solution tubing to the pigtail tubing.
5. Unclamp and begin infusion.
6. Always use an IV pump to infuse through the VAP.

**BLOOD DRAWING**

1. Remove the end cap and attach a 10ml syringe to the pigtail tubing.
2. Open the clamp and withdraw 5 ml of blood.
3. Clamp the pigtail tubing and discard the syringe with blood.
4. Attach a new 10 ml syringe to the pigtail tubing. (20ml syringe for multiple test or PT/INR)
5. Open the clamp and withdraw the amount of blood that is needed for tests.
6. Clamp the pigtail tubing and remove the blood specimen.
7. Attach a 10 ml syringe filled with Normal Saline.
8. Open the clamp and flush the VAP with the Normal Saline.
9. Clamp the pigtail tubing and remove the syringe.
10. Attach a 10 ml syringe with 5 ml of Heparinized Saline flush or plain 0.9% sterile preservative free normal saline - refer to manufacturer's recommendations.
11. Flush the VAP using push-pause-push or pulse method.
12. Clamp the pigtail tubing and remove syringe.
13. Attach a new end cap to the pigtail tubing.

**MAINTAINING VAP ACCESS FOR OUTPATIENT INTERMITTENT INFUSION**

1. Outpatients with physician order for daily intermittent infusions may have the option of leaving VAP accessed with non-coring needle for a maximum of 7 days.
2. The following factors should be considered prior to making a decision to maintain access on an outpatient basis:
   a. The activity level of the patient outside of the hospital. VAP needles can be easily dislodged from the VAP septum but still remain under the skin. The VAP will need adequate support and dressing to withstand physical activities and clothing changes.
   b. Patient ability to care for accessed VAP at home.
3. Obtain physician order to maintain access for outpatient use.
4. Follow steps # 8 - 15 of section “Accessing the VAP” before each intermittent infusion.
5. Dressing changes will be done according to policy.
6. Educate patient on the following:
   a. Home care of accessed VAP.
   b. Need to return to Huron Medical Center for flushing and discontinuation of access if intermittent infusions are discontinued, or if needle becomes dislodged.
   c. Who to call with questions. The Patient Care Manager on duty will be the contact person.

**REMOVING HUBER NEEDLE**

1. Close the clamp on the pigtail tubing.
2. Remove the intravenous tubing attached to the pigtail tubing of the Huber needle.
3. Attach a 10 ml syringe filled with Normal Saline to the pigtail tubing.
4. Unclamp the pigtail tubing and flush the VAP. Close the clamp.
5. Remove the empty syringe. Attach a 10ml syringe with 5ml of Heparinized Saline (100 units per ml).
6. Stabilize the needle while removing the dressing.
7. Have the patient hold the skin around the port down.
8. Open the clamp and flush with 4 of the 5ml of Heparinized saline.
9. While pushing in the last 1ml of Heparinized saline, withdraw the needle, maintaining positive pressure on the syringe at all times to prevent backflow of blood.

**SECTION 7: CVAD – Flushing Protocol**

1. The lowest possible concentration of heparin will be used for flushing CVADs. At Huron Medical Center (HMC) the dosage of heparinized saline is 100 units heparin per 1ml to be used for adult patients with CVADs unless otherwise stated.
2. In general, the volume of the flush should be equal to the volume capacity of the cannula and add-on devices times two.
3. The smaller the syringe size that is used, the greater the pressure that is generated in the cannula and add-on devices two.
4. If resistance is met when flushing, no further attempts should be made since it may result in the dislodgment of a clot into the vascular system and/or a rupture of the catheter.
5. The SASH (i.e., saline, administration, saline, heparin) procedure is used for medication administration since some medications/solutions are incompatible with heparin. SASH is a flushing procedure using saline prior to and after administration of medications/solutions incompatible with heparin and followed by a final flush of heparinized saline solution.
   
   \[
   \begin{align*}
   S &= \text{Flush with } 2.5 - 5 \text{ ml of Normal Saline} \\
   A &= \text{Administer the medication} \\
   S &= \text{Flush } 2.5 - 5 \text{ ml of Normal Saline} \\
   H &= \text{Flush with heparinized saline}
   \end{align*}
   \]
Heparinized Saline always refers to 100 units of heparin per 1 ml unless otherwise stated.

<table>
<thead>
<tr>
<th>CVAD Type</th>
<th>Flush per Lumen</th>
<th>Frequency</th>
<th>Syringe Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUBCLAVIAN</td>
<td>5 ml Saline</td>
<td>Before and after each dose medication</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After withdrawal of blood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 ml Heparinized Saline</td>
<td>Every 12 hours and after each use</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When not in use - every 24 hours</td>
<td></td>
</tr>
<tr>
<td>HICKMAN</td>
<td>5 ml Saline</td>
<td>Before and after each dose of medication</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After withdrawal of blood</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 ml Heparinized Saline</td>
<td>Every 24 hours and after each use</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When not in use - every day</td>
<td></td>
</tr>
<tr>
<td>GROSHONG</td>
<td>5 ml Saline</td>
<td>After each dose of medication</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When not in use - every 7 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 ml Saline</td>
<td>After blood draw</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td>20 ml Saline</td>
<td>After TPN</td>
<td>20 ml</td>
</tr>
<tr>
<td>Implanted venous Port</td>
<td>10 ml Saline</td>
<td>Before and after each dose of medication</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td>5 ml Heparinized Saline</td>
<td>After each use</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td>5 ml Heparinized Saline</td>
<td>When not in use - every month</td>
<td>10 ml</td>
</tr>
<tr>
<td>PICC</td>
<td>5 ml Saline</td>
<td>Before and after each dose of medication</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After blood withdrawal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 ml Saline</td>
<td>After TPN</td>
<td>20 ml</td>
</tr>
<tr>
<td></td>
<td>5 ml Heparinized Saline</td>
<td>Every 12 hours and after each use</td>
<td>10 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When not in use - every 12 hours</td>
<td></td>
</tr>
</tbody>
</table>

**SECTION 8: CVAD - Clearing Occlusions**

1. A physician’s order is required to declot a CVAD.
2. Only the following staff may declot a CVAD at Huron Medical Center: Physician, Certified Registered Nurse Anesthetist (CRNA), RN with Peripherally Inserted Central Catheter (PICC) insertion training or completed a CVAD competency.
3. Contraindications for using thrombolytic agents to restore CVAD patency are patients with: atrial fibrillation, active internal bleeding, history of cerebral vascular accident (CVA), intracranial neoplasm, aneurysm, arteriovenous malformation, known bleeding disorders, recent trauma, recent cardiopulmonary resuscitation, systolic blood pressure greater than 200, diastolic blood pressure greater than 110, intracranial or intraspinal surgery within the last 2 months.
4. The volume of the thrombolytic agent instilled should be approximately the same amount as the volume of the catheter to assure that the agent is retained in the catheter and not instilled into the bloodstream.
5. When the declotting procedure does not result in a patent CVAD, the RN will notify the physician to obtain a repeat order of the declotting procedure or removal of the catheter.
6. Perform all manipulations as a direct connection and not through an injection cap.

**A. Equipment:**
- Cathflo Activase (Alteplase) 2mg in 2 mL
• Clean gloves
• 10ml Luer-Lock syringes
• Povidone-iodine swab

B. Steps:
  a. Preparation of the Solution
    a. Reconstitute Cathflo Activase to a final concentration of 1mg/mL
    b. Aseptically withdraw 2.2 mL of Sterile Water for Injection, USP (diluents is not provided). Do not use Bacteriostatic Water for Injection.
    c. Mix by gently swirling until the contents are completely dissolved. Complete dissolution should occur within 3 minutes. DO NOT SHAKE. The reconstituted preparation results in a colorless to pale yellow transparent solution containing 1mg/mL Cathflo Activase at a pH of approximately 7.3.
    d. DO NOT ADD ANY OTHER MEDICATION TO SOLUTIONS CONTAINING CATHFLO ACTIVASE.
  b. Instillation of Solution into the Catheter
    a. Inspect the product prior to administration for foreign matter and discoloration.
    b. Withdraw 2 mL (2 mg) of solution from the reconstituted vial.
    c. If declotting an implanted port, change the non-coring needle according to implanted port policy and procedure guidelines before attempting to declot. If declotting a PICC line, keep the arm below the level of the patient’s heart during the declotting procedure.
    d. Swab the connection site of the port with an alcohol swab.
    e. Make sure the slide clamp is closed on the PICC, VAP, or CVAD.
    f. Attach the 3 way stopcock to the connection site, making sure the stopcock is in the off position to the PICC, VAP, or CVAD:
      i. PICC - catheter hub (remove any end cap present)
      ii. VAP - pigtail tubing (remove end cap)
      iii. CVAD - catheter hub (remove any end cap present)
    g. Swab one port of the stopcock with an alcohol swab and attach an empty 10ml syringe.
    h. Swab the other port of the stopcock and attach the syringe filled with Cathflo Activase. Turn the stopcock off to the syringe that contains Cathflo Activase and open it to the empty 10ml syringe. Gently aspirate the empty 10ml syringe until the plunger is pulled back to the 8 - 9ml mark. When the plunger reaches 8 - 9ml mark, turn the stopcock off to the aspirated syringe and open to the syringe containing Cathflo Activase. This will automatically draw the Cathflo Activase into the PICC, VAP, or CVAD catheter.
    i. After 30 minutes of dwell time, assess catheter function by attempting to aspirate blood. If blood is noted, aspirate 3 – 5ml of waste and discard, then flush the line according to policy and procedure. If the catheter is functional, go to Step g. If the catheter is not functional, go to Step f.
    j. After 120 minutes of dwell time, assess catheter function by attempting to aspirate blood and catheter contents. If blood is noted, aspirate 3 – 5ml of waste and discard, then flush the line according to policy and procedure.
    k. If the catheter is functional, go to Step j. If the catheter is not functional, go to Step l.
    l. If catheter function is not restored after one dose of Cathflo Activase, a second dose of equal amount may be instilled. Do so by repeating the procedure beginning with Step a under preparation of the solution.
m. Repeat as needed for each occluded lumen of the catheter
n. Call the physician if unable to restore patency.

SECTION 9: Peripherally Inserted Central Catheter (PICC)

Only registered nurses who have completed the appropriate education program and maintained competencies or credentialed physicians may insert PICC lines. Evidence of this qualification will be maintained in the personnel files. Qualified RNs may perform this procedure without physician supervision with a physician’s written order for PICC line insertion. A physician must be consulted for the following:

1. Complications arising during insertion (cardiac arrhythmias, excessive bleeding, chest pain, respiratory distress)
2. Unsuccessful catheter insertion (Refer to PICC Quality Monitoring section below)

PICC Service:

1. PICC placement will be performed only for patients 18 years and older.
2. PICC line insertions are routinely provided Monday through Friday, 10:00 a.m. to 3:00 p.m. depending on availability of Certified PICC Nurse, and/or PICC Physician champion, and Ultrasound technician. Insertion of PICC lines prior to and proceeding this time frame are based on availability of the personal competent in PICC line insertion to insert the line and the availability of the Radiologist to interpret the chest x-ray for tip confirmation.
3. If Radiologist is not available to interpret x-ray the film may be read by another in house physician (i.e. Hospitalist, Attending, ED Physician, Surgeon).
   i) The radiograph must show the catheter tip of the PICC lies distal of the SVC/Cavoatrial junction, +2cm/-2cm of the distal SVC to be approved for use by the PICC nurse (FDA guidelines).
4. The Radiologist will read the chest x-ray as soon as possible, (within 24 hours).
5. After PICC placement is completed and successful the patient is given post procedure instructions for PICC line care by a registered nurse, if the patient is to be discharged home.
5a. For Patients remaining hospitalized, the care instructions will be provided upon discharge.
10. Assess patient for implanted defibrillator and/or pacemaker. If the pacemaker/defibrillator has been placed within past 1 year, the PICC line needs to be inserted on opposite arm or contact the cardiologist who placed device for approval of insertion. If the pacemaker/defibrillator has been inserted greater than 1 year ago, this extremity for PICC line insertion can be utilized if needed.
11. Ultrasound technicians will provide ultrasound services for the PICC insertion. This will assist the clinician to visualize a vein and provide direction to assist in placing a needle into the intended vessel.

Key Points:

a. Patient and family education - pre-insertion education with the patient and/or family will be scheduled to explain sterility, asepsis, purpose of the line, the procedure for placement, and follow-up plan (hand out patient guide).

b. To schedule PICC insertion, call the nursing supervisor or Nursing Director with the patient’s name & date of birth and physician’s specific order for placement.

c. Follow-up chest x-rays will be done to verify tip placement on all placements.
d. Routine follow-up will be done as described in the procedures for sterile dressing changes.

**PICC Indications:**
2. Lack of short term peripheral venous access.
3. Infusion of hyperosmolar solutions.
4. Infusion of vesicant/irritant drugs.
5. Long term IV therapy in the home, hospital, or clinical setting.
6. Administration of blood or blood products.
7. Infusion of intermittent drug therapy.
8. Use of continuous ambulatory drug pumps.
11. Geographic location - if sent home with a PICC in place must be in an area that can service PICC’s.
12. Antecubital veins intact.

**PICC Advantages:**
1. Elimination of risk associated with insertions in the neck and chest region.
2. Potential reduction of catheter sepsis.
3. Decrease in pain and discomfort associated with frequent venipuncture.
4. Preservation of the peripheral vascular system of the upper extremities.
5. Cost and time efficient.
6. Appropriate for home placement and home IV therapy.
7. Reliable vascular access throughout the course of therapy.

**Needed Supplies & Equipment:**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>In PICC Kit</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topical Anesthetic Ointment</td>
<td>1 silastic radiopaque catheter</td>
<td>stainless steel scissors</td>
</tr>
<tr>
<td>Tourniquet</td>
<td>2 tape measures, sterile/non-sterile</td>
<td>syringe with 18g needle</td>
</tr>
<tr>
<td>Face Mask</td>
<td>1 cannula introducer w/ peel-away sheath</td>
<td>skin prep, alcohol prep</td>
</tr>
<tr>
<td>pr Sterile Gloves</td>
<td>1 Biopatch antimicrobial dressing</td>
<td>T-set</td>
</tr>
<tr>
<td>Extension set</td>
<td>1 transparent dressing w/ high moisture permeability</td>
<td>4x4 gauze</td>
</tr>
<tr>
<td>Normal Saline 5ml</td>
<td>3 betadine swab sticks</td>
<td>injection port</td>
</tr>
<tr>
<td>Cap</td>
<td>3 2x2 gauze pads</td>
<td>Steri-strips</td>
</tr>
<tr>
<td>Sterile Gown</td>
<td>fenestrated drape w/ tape</td>
<td>Educational Material</td>
</tr>
<tr>
<td>Heparin 100 units 3ml</td>
<td>plain drape and towel</td>
<td></td>
</tr>
</tbody>
</table>

**Procedure:**
1. Obtain patient’s informed consent.
2. A discussion with the nurse should be scheduled prior to insertion to prepare the patient and family for the line placement and the proposed therapies.
3. Select an appropriate vein by placing the tourniquet firmly around the upper arm near the axilla. The basilic vein is the most suitable for cannulation because of its more direct anatomical placement to the central venous system. After selecting the vein, release the tourniquet, leaving it in place under the arm. Measure one-half way up the upper arm with non-sterile tape for circumference for baseline (for future reference when questioning infiltration) and document this.
4. Place topical anesthetic cream on site to be used, following directions for use suggested by manufacturer.
5. Establish working area and sterile field.
6. Measure the distance from the insertion site to the proposed termination of the catheter tip with non-sterile tape.
   - Superior vena cava placement - measure from the point of insertion along the proposed vein, trace to the third intercostal space at the right side of sternum.
   - Subclavian/axillary placement - measure from point of insertion along the proposed vein, trace to the sternal notch and subtract one inch.
7. Position patient for insertion with arm extended at a 40 degree angle from the body.
8. Remove topical anesthetic ointment (wipe clean).
9. Vigorously prep the insertion site from the mid-upper arm to mid-lower arm. Use a using a back and forth motion (which increase the friction and allows the antiseptic solution to penetrate the lower layers of the epidermis) moving across the insertion site outward (do not cross over the insertion site from either side) for each swab stick. Use chlorhexidine one minute per each swab stick (air dry two minutes).
10. Don a face mask, gown, cap, & sterile gloves. Place non-fenestrated sterile drape under arm to be cannulated. Maintaining a sterile field:
   - Place only sterile items within the sterile field.
   - Areas outside the drape are considered non-sterile.
   - Remember the 2 inch margin.
   - Open and dispense items onto the sterile field without contaminating them.
   - Do not allow unsterile hands to reach across the sterile field or touch sterile items.
   - When in doubt about whether something is sterile, consider it not sterile.
11. Using sterile technique, prime the extension set with 0.9% normal saline and connect the injection cap.
12. Carefully place a fenestrated drape over the prepared site, leaving the insertion site exposed.
    Assemble equipment:
    a. Measure and cut catheter to pre-measured distance with beveled edge after pulling guide wire back (if using guide wire).
    b. Establish patency with guide wire or normal saline flush.
    c. If using guide wire, pull back guide wire above pre-measured length of catheter and bend end over (this prevents guide wire from getting ahead of catheter). Assemble equipment.
    d. Place next to insertion site (sterile).
13. Reapply the tourniquet firmly around upper arm at the axilla.
14. Remove gloves and discard.
15. Don second pair of sterile gloves (have second RN rinse gloves with sterile water as needed, should be powder free).
16. Blot insertion site of excess solution with sterile 4x4, if needed.
17. Option - inject an intradermal bleb at the venipuncture site with 0.1-0.2ml of 1% xylocaine (take care not to inject into vein).
18. Catheter Insertion:
   1. Perform venipuncture. Enter skin 1cm below proposed entrance site of the distended vessel.
   2. Upon gaining flashback of blood, without changing the position of the needle, advance the introducer sheath sufficiently to be certain that the tip is well within the vein. It is not necessary to introduce the entire sheath into the vein.
   3. Release tourniquet.
   4. Carefully withdraw the needle while holding the plastic introducer stationary.
   5. Immediately apply finger pressure on the accessed vein just beyond the distal end of the introducer sheath to minimize blood loss.
6. With forceps provided, grasp distal end of catheter approximately 1cm from the end and advance through introducer approximately 4-5 inches (handling catheter with forceps provided will minimize the potential for mechanical phlebitis post insertion).

7. Advance the catheter, slowly, through the introducer to the appropriate measured distance. During antecubital access, when the tip reaches deltoid area, turn the patient’s head toward selected site, with chin down on chest, so as to pinch off external jugular vein.

8. Apply gentle pressure to the insertion site to stabilize the catheter and carefully withdraw the introducer until it is free from the venipuncture site.

9. Grasp the tabs of the introducer sheath and bend them away from one another to initiate the splitting of the sheath. In a smooth motion, pull the tabs apart, away from the catheter, until the sheath splits down its entire length.

10. If a guide wire is used it should stay in place for better visualization on X-ray of the PICC placement.
   a. Use of the PICC must be postponed until X-ray confirms appropriate catheter location.
   b. After confirmation of catheter location is completed
      i. The guide wire may be removed
      ii. Attach a syringe to the hub of the catheter and aspirate for a blood return.
      iii. After blood return confirmed flush or attach primed tubing and initiate IV at K.V.O.
         1. If catheter is to be used intermittently, flush with 5ml of NS followed by 5ml heparinized solution 100units/ml.
      iv. Apply gentle pressure to reduce the amount of drainage at the insertion site.
      v. Secure site with Stat Lock or Chevron anchoring as described above

19. Attach the flushed luer loc extension set to the catheter hub.

20. Using a 10ml syringe filled with 5ml of normal saline, aspirate blood and flush catheter to check for patency.

21. Heparinize with 3ml of Heparin 100units/ml.

22. Apply sterile 2x2 dressing (to wick drainage) and secure as per care and maintenance policy covering insertion site and wings to hub. May use skin prep for extra security.

23. Dispose of all equipment appropriately.

**Documentation:**
Document on patient record time and date of procedure, catheter size and length (both internal and external length in cm), catheter patency post-insertion and chest x-ray results if indicated, problems during insertion, patient status (assess cardiopulmonary status & excessive bleeding), upper extremity circumference Intravenous Therapy Record and flushing (flush with 3ml NS, then 3ml heparin 100units/ml) in the Medication Administration Record.

**Site/Dressing Care and Maintenance:**

<table>
<thead>
<tr>
<th>Equipment:</th>
<th>Note: Daily upper arm circumference needs to be measured and documented.</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chlorohexadine</td>
<td></td>
</tr>
<tr>
<td>• skin prep</td>
<td></td>
</tr>
<tr>
<td>• large transparent occlusive dressing</td>
<td></td>
</tr>
<tr>
<td>• mask</td>
<td></td>
</tr>
<tr>
<td>• sterile gloves (2pr)</td>
<td></td>
</tr>
<tr>
<td>• StatLock adhesive security device or alternate securing method</td>
<td></td>
</tr>
<tr>
<td>• patient’s tape measure from PICC kit at bedside</td>
<td></td>
</tr>
</tbody>
</table>
Procedure:

Application and Change:
1. Don clean gloves and remove the old dressing and chevroned steri-strips or stat lock if used, maintaining the sterility of the catheter (an alcohol wipe may help to remove chevroned steri-strip). Remove transparent dressing from catheter, peeling toward insertion site while securing the end of the catheter at hub. Continue to peel toward the insertion site parallel to the skin. Remove gloves.
2. Put on sterile gloves.
3. Cleanse site with chlorhexidine, one minute each swab stick, using circular movement starting at exit site and move outward.
   a. Chlorhexidine gluconate is the recommended antiseptic to be used. DO NOT USE alcohol or alcohol containing antiseptics as this can damage the polyurethane material over a period of repeated use.
4. Allow to dry.
5. Apply skin prep for extra security, avoiding insertion site.
6. Apply Chlorhexiadine (or small amount of betadine at insertion site if allergic to Chlorhexadine).
7. Measure length of catheter in cm, external to site to maintain sterility. Change sterile gloves.
8. Secure catheter using Stat lock or Chevron procedure
9. Apply occlusive dressing, making sure to cover insertion site wings of catheter and T-connector, leaving out only injection cap.
10. Apply chevroned steri-strip over bio-occlusive dressing.
11. Apply StatLock to secure the hub/catheter connection.
12. Change luer lock male adaptor (injection cap) if with tubing change; change t-connector only if not under dressing.
13. Document procedure in patient record, including assessment of site and length of catheter external to insertion site.
14. A small note may be made at site indicating time/date of site care.
15. Document daily circumference of upper extremity.

Dressing Change Intervals
1. The initial dressing should consist of a sterile 2x2 over the catheter exit site and a transparent occlusive dressing over the gauze.
2. The dressing should cover the exit site and wings up to but not including the hub.
3. The dressing should be changed using sterile technique 24 hours after the insertion.
   a. Assess the insertion site and upper forearm during the sterile dressing change. If no oozing/bleeding, apply occlusive (TSM) dressing.
   b. Assess the external length of the catheter to determine if migration of the catheter has occurred. There are centimeter (cm) markings on the catheter.
      i. If there is a change of external catheter length of more than 1 cm, contact the Physician or PICC nurse, a chest x-ray may be indicated to determine appropriate placement.
4. Do not re-apply a sterile 2x2 (so site can be observed).
5. Use transparent occlusive dressing after the first dressing change, subsequent dressing changes to be every 96 hours during hospitalization using sterile technique.
6. PRN dressing changes should be done if there is any moisture present under the dressing or an indication that the dressing is not adhering properly.
7. Patients who are discharged with a PICC line must be instructed on the need for dressing changes every 7 days.

Assessing for Blocked Catheter/Clearing a Blocked Catheter
1. Check entire IV tubing and delivery system for kinks and malfunctions. Check that the dressing is not occluding the catheter.
2. Inspect the tubing and the catheter for signs of particulate matter (i.e., crystals, precipitation, etc.).
3. If no particles are seen, gently aspirate with a 3-5ml syringe (never use a tuberculin syringe). If a good blood return, continue to aspirate to 1ml of blood and discard. Flush with 1ml heparinized 100units/ml NS using a push/pause method.

Blood Specimen Collection
1. PICC lines may be used to obtain blood specimens. A physician order is needed so obtain physician's order to draw blood from PICC line by attending physician.
2. Do not draw blood from PICC lumens with Heparin infusions or Total Parenteral Nutrition.
3. A PICC line is accessed only by licensed Registered Nurses, PICC physician champion, or PICC Certified Nurse.
4. Explain the procedure to the patient, and place the patient in supine position with the head slightly elevated.
5. Laboratory personal may assist nursing with blood draw per PICC's by: handling appropriate supplies, transferring blood to specimen tubes, and labeling tubes. Place blood tubes after labeling into biohazard bag
6. Gather equipment:
   a. Gloves
   b. Alcohol pad
   c. 1-10 ml syringe
   d. 3-10ml NS flushes (10ml NS flush before blood draw and 20ml after blood draw)
   e. Patient label(s)
   f. Appropriate Blood tube(s) based upon physicians orders
   g. Blood transport device
   h. Biohazard bag
7. Verify lab order
8. Check two patient identifiers, before drawing specimen
9. Don gloves
10. Select proximal port, if more than one lumen
11. Place all infusions on hold
12. Cleanse the selected port/hub using a scrubbing action-using pressure and friction for 30 seconds with alcohol. Allow to air dry. Do not fan or blow dry
13. Do not remove Clave connector to obtain specimen
14. Attach a 10ml NS syringe to catheter Clave or extension set (Never use a syringe smaller than 10ml)
15. Flush catheter to check for patency
16. Draw back plunger 1-2 ml, pausing 2 seconds to allow catheter valve to open, and blood to come into catheter
17. Draw off 5 ml with the 10ml syringe and discard (waste).
18. If unable to withdraw blood, reposition patient to side lying one side then the other or have the patient cough; catheter may be laying against wall of vessel
19. Attach an empty 10 ml syringe to Clave or extension tubing
20. Again, draw back 0.25ml to 0.5ml to allow valve to open. When blood enters the tubing draw amount needed for the laboratory specimen; do not exert undue pressure to insure that hemolysis is avoided.

21. Provide blood filled syringe to laboratory personal or lay syringe on working surface area

22. Flush the PICC catheter with 20ml Normal Saline, utilize the push/pause method

23. Transfer blood using blood transfer device into blood tubes

24. Label, initial/date specimen tubes and place into biohazard bag for transport to laboratory

25. Restart previous infusions placed on hold

26. Document in patient's medical record

**Tubing and Injection Caps**

1. An extension set is added to all PICC lines. This will move the mechanical motion of starting and stopping the IV away from the insertion site. Change tubing at times indicated for standard IV tubing of every 96 hours. TPN, lipids, blood administration tubing changes as per policy stated above.

**Flushing Technique**

1. PICC line not in use (capped with an intermitted infusion plug) should be flushed BID using 10 ml syringe filled with 2.5 - 5 ml NS, followed by 5ml heparin 100units/ml in a 10 ml syringe.
   a. Unless the manufacturer of the PICC calls for only Saline.

2. The frequency of flush may need to be adjusted according to patient activity - more active patients will need more frequent flushes.

3. Syringe size - Do not use less than 3ml syringe.

4. If no blood returns with aspiration, catheter may be gently irrigated with 1ml of heparinized NS.
   Note: a slight amount of resistance during irrigation is normal, due to the small diameter of the catheter - never force irrigation when severe resistance is encountered because of the danger of dislodging a clot or rupturing the catheter.

If still unable to aspirate or irrigate, a physician’s order will be needed for a de-clotting agent such Cathflo Activase. Contact nurse deemed competent to de-clot the line.

**ALERTS**

Report to physician signs or symptoms of possible complications or deviations from pre-insertion baseline assessment which consist of swelling of neck/face, pain in shoulder, arm, or chest; questionable placements, dislodgement, or patency of catheter; infection (pain, fever, chills, increased WBC's, redness, purulent drainage, or warmth to insertion site); air embolism (hypotension, tachycardia, cyanosis, dyspnea, change in level of consciousness); dislodgement (pain in ear or neck, swelling at insertion site, and/or fluid collection under transparent dressing); and excessive bleeding from insertion site.

Blood pressure cuffs or tourniquets should not be applied over the site of the PICC but may be placed distal to the catheter's location.

**Documentation**

Nursing assessment to include assessing the insertion site, equipment, and tubing at beginning of each shift and every 2 hours for: site free of redness, warmth, swelling, pain, or drainage; tubing and connections are luer locked and secure; dressing is dry and intact; tubing free of tension, kinks, or blood.

Registered Nurses caring for patient's PICC line will be responsible to document on patient's electronic medical record the external length of catheter from distal end of tapered part of PICC to insertion site daily.
The arm circumference of PICC line will be recorded daily and measured 2 cm above the insertion site. If greater than 2 cm increase, contact the physician or PICC Certified Nurse.

Blood Administration and Sampling
1. A large PICC line should be used (3.0-4.0 french) as it gives more consistent results for sampling or administration of blood products.
2. For blood sampling technique, waste first 5 ml of blood, obtain sample, then flush with a 10 ml syringe filled with 5 ml Normal Saline and 5 ml heparin 100 units/ml.

Infusion Pumps
1. Infusion pumps are to be used with PICC lines.

SECTION 8: CVAD - Clearing Occlusions

PICC Complications Post Insertion:

<table>
<thead>
<tr>
<th>Complication</th>
<th>Sign/Symptom</th>
<th>Nursing Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Emboli</td>
<td>Shortness of breath, confusion or unresponsiveness, pallor, tachycardia, arrhythmia, chest pain</td>
<td>Turn patient on left side and place in a Trendelenburg position, monitor vital signs, notify physician, reassure patient</td>
</tr>
<tr>
<td>Thrombosis</td>
<td>Swelling of the cannulated arm distal to the exit site, head and neck vein distension on the cannulated side, cyanosis of the skin in the affected extremity, distended veins of the chest well - if advanced, may cause shortness of breath or respiratory distress.</td>
<td>Comprehensive nursing assessment to detect early signs/symptoms, loss of blood return upon aspiration may indicate early thrombosis, notify physician. Note: if symptoms persist, catheter may need to be removed.</td>
</tr>
<tr>
<td>Infections</td>
<td>Fever, chills, diaphoresis, redness, tenderness, pain at exit site, edema in extremity, elevated WBC’s, hypotension, shock.</td>
<td>Strict aseptic technique on insertion and during any manipulation of the catheter, tubing, and dressing. Proper care of the catheter and skin will help to prevent infections. Catheter-related infection is rare in the use of PICC lines. If the patient develops a fever, the catheter is generally left in place while the source of the fever is determined. Cultures should be drawn peripherally as well as from the PIC line. If catheter sepsis is strongly suspected and all other potential sources are ruled out, the catheter may be removed, tip sent for culture advance directive/durable power of attorney sensitivity. Documented catheter sepsis require that the following be present: a septic patient, a specific organism cultured from the blood, the same organism culture from the catheter tip, no other potential source for that organism, resolution of the septic picture upon removal of the catheter.</td>
</tr>
<tr>
<td>Occluded Catheter</td>
<td>Inability to flush or aspirate blood from catheter.</td>
<td>Proper flushing technique, instillation of de-clotting agent as prescribed, use of infusion device, education of care giver for proper handling and trouble-shooting.</td>
</tr>
<tr>
<td>Malpositioned Catheter</td>
<td>No blood return upon aspiration, edema of chest wall or neck, leaking at exit site, pain, sluggish infusion.</td>
<td>Check for blood return, obtain order for chest x-ray, notify MD, catheter removal may be necessary.</td>
</tr>
<tr>
<td>Leaking Catheter</td>
<td>Leaking at exit site, leaking at hub of</td>
<td>Avoid the use of sharp instruments and scissors</td>
</tr>
</tbody>
</table>
catheter or any portion of catheter exposed. near catheter, check all connections of catheter, t-connec-
tor, and tubing, gently flush catheter to ascertain location of leak if possible, notify physician.

<table>
<thead>
<tr>
<th>Ruptured Catheter</th>
<th>Bleeding at exit site, bleeding at area of rupture, pain.</th>
<th>Assess integrity of the catheter - if rupture or tear occurs externally, clamp the catheter and notify the physician; catheter replacement or repair will be necessary.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phlebitis*</td>
<td>Pain or tenderness at exit site, erythema, drainage, swelling, heat upon palpation, palpable venous cord, fever.</td>
<td>Use prophylactic measure post insertion to reduce risks (i.e., warm, moist heat to exit site, elevation of affected extremity and passive ROM q3hr for 30 minutes each for the first 24 hours.</td>
</tr>
</tbody>
</table>

*The following tool is widely used to evaluate phlebitis:

<table>
<thead>
<tr>
<th>Severity</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No pain at IV site, no erythema, induration, or palpable venous cord.</td>
</tr>
<tr>
<td>1+</td>
<td>Painful IV site, no erythema, swelling, induration or palpable cord.</td>
</tr>
<tr>
<td>2+</td>
<td>Painful IV site, with erythema or some degree of swelling or both. No induration or palpable cord.</td>
</tr>
<tr>
<td>3+</td>
<td>Painful IV site with erythema, swelling, induration and palpable venous cord less than three inches above IV site.</td>
</tr>
<tr>
<td>4+</td>
<td>Painful IV site, erythema, swelling, induration and palpable cord greater than three inches above the IV site.</td>
</tr>
<tr>
<td>5+</td>
<td>Frank vein thrombosis along with all signs of 4+ phlebitis</td>
</tr>
</tbody>
</table>

*Indications for Removal*
1. Removal may be determined by:
2. Patient condition and diagnosis
3. Type and duration of therapy
4. Determination of infectious or inflammatory process (consider culturing the catheter and blood)
5. Malposition
6. Device failure-catheter damage or broken and can't be repaired
7. Occlusion
8. No longer indicated
9. The catheter has broken and cannot be repaired.
10. A single lumen catheter was placed and needs to be changed to a dual lumen catheter due to patient need arise.
11. Drug precipitation or other obstruction has occurred and the patency cannot be restored.
12. Patient has no other accessible vein.
13. PICC catheter has been inadvertently pulled out several inches so that tip is no longer in superior vena cava (SVC) and infusion characteristics require tip in SVC.

*Contraindications to catheter exchange include:*
1. Any suspected or known infection of catheter exit site.
2. Known thrombosis
3. Phlebitis of cannulated vein
4. Contamination of the broken PICC or midline has occurred or suspected

Discontinuing, Culturing Tip:

<table>
<thead>
<tr>
<th>Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sterile gloves</td>
</tr>
<tr>
<td>• Betadine</td>
</tr>
<tr>
<td>• Sterile towel</td>
</tr>
<tr>
<td>• Sterile 2x2 gauze</td>
</tr>
<tr>
<td>• Betadine ointment</td>
</tr>
<tr>
<td>• Sterile specimen cup with proper labeling (if culturing tip)</td>
</tr>
<tr>
<td>• Sterile scissors (if culturing tip)</td>
</tr>
</tbody>
</table>

**Note:** Must have a physician order to culture tip.

**Procedure:**
1. Rest the patient’s arm on flat surface.
2. Remove catheter dressing.
3. Prep a 5cm area around catheter exit site.
4. Wearing sterile gloves, place a sterile towel under the patient’s arm.
5. Have sterile specimen container labeled and open for deposit of catheter tip, if applicable.
7. Cut one inch of catheter tip off and place in specimen cup, if applicable and ordered.
8. Immediately apply betadine ointment to the wound and apply sterile dressing.
9. After PICC removed, the dressing should be changed and the skin integrity assessed every 24 hours until the site is epithelialized.

**Note:** If any resistance is met while pulling the catheter, secure catheter with tape and place a sterile dressing over the site. Notify physician.

**Key Points:**
- Indications for discontinuing PICC Line:
  - Post insertion phlebitis - beyond grade 3 (redness, pain, palpable cord 3 inches above the site)
  - Excessive bleeding
  - Sepsis: discontinue and culture tip
  - Significant swelling: 3-4cm above baseline measurement

**Documentation:**
Documentation of site condition, catheter condition and length (verify same as insertion), document if tip of cath is beveled, arm circumference and the patient’s tolerance of procedure to be entered in the Nurses Notes.

**Orders**
If the tip is to be cultured, enter an order into the computer system for the culture and enter the collection date, time and nurses initials.

**Patient Charges:**
1. Charges are entered through the computer system
2. Each insertion is charged a quantity of 1 (one) regardless of the success of the insertion.
3. Other panel charge options should be charged in the quantity of the supplies used regardless of insertion success.

Discharge
1. All patients who have PICC lines inserted during hospitalization will have discharge education and instructions regarding care and maintenance of their PICC line.

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SECTION 10: Renal Shunts/Hemodialysis Catheters

1. Blood should not be drawn using patient’s Renal Shunts/Hemodialysis Catheter at HMC (except by a physician for life threatening situations when peripheral access is unobtainable.
2. Renal Shunts/Hemodialysis Catheter are that patient’s lifeline, access is restricted to dialysis and for life-threatening purposes only.
   o Sepsis is a frequently associated complication with these catheters. Medication and solution infusions also hold the risk of sepsis, but the main complication for infusions is the lower flow of infusion that pre-disposes the large bore catheter to clotting. (The dialysis machines run at very high flow (250-500 mL/min) as opposed to the low flow of infusions.)
   o Some patients have very poor to non-existent veins though and phlebotomy is a challenge. If the patient has a poor understanding of how critical and risk prone that catheter is, it is difficult for them to understand why the blood can’t be taken from there when their labs are drawn that way during dialysis.
   o Thoroughly educate the patient on the signs and symptoms of infection and sepsis including fever, chills, redness or swelling at the catheter site, pain or pressure at the catheter site, drainage or pus at the access site. They are to seek immediate medical treatment if any symptoms occur.
   o No peripheral IV’s or phlebotomies are to be performed in the extremity that has the shunt or AV graft.

SECTION 11: Intraosseous Access Device

1. Indications:
   a. Severe illness or injury requiring immediate drugs or fluids when IV access is impossible or unlikely to be successful.

2. Contraindications:
   a. Available secure line
   b. Lower extremity deformity of the same bone as the insertion site

3. Equipment:
   a. 14 to 16 gauge Intraosseous needle.
   b. Alcohol swab for cleansing skin/site.
   c. IV fluid
   d. IV tubing
   e. 10 cc luer lock syringe
   f. Stop Cock (optional)
4. Appropriate Insertion sites include:
   a. Proximal humerus, sternum, distal femur, humeral head, radius, ulna, pelvis, clavicle.
   b. Sites to avoid include previously used IO sites or where previously attempted, fractures at or above site, where bone surgery had previously been performed, presence of infection, evidence of local

5. Procedure:
   a. Review orders.
   b. Verify patient's identity using two independent identifiers, not including patient's room number or bed number.
   c. When possible explain the procedure to the patient/family.
      i. If not possible prior to insertion, explain rationale after the procedure.
   d. Place the patient in supine position.
   e. Perform Hand hygiene
   f. Don Gloves
   g. Select Insertion site
      i. Put a small towel roll under the knee for tibial site.
   h. Prepare the skin over the insertion site by removing gross soil (if present) using soap and H2O, pat dry, swab with chlorahexidine in a circular motion beginning in the center and working outward.
      i. May use alcohol swab if chlorahexidine allergy is present.
   i. Remove excess hair from the intended insertion site with clippers or scissors, if necessary.
   j. Repeat with second chlorhexadine swab using circular motion beginning in the center and working outward.
   k. Administer local anesthesia if patient is conscious and per Physician order.
      i. Subcutaneously at the insertion site.
   l. Use the flat surface of the proximal medial tibia, medial to the tibial tuberosity on the flat side of the bone. (see figure A)
m. Introduce the Intraosseous needle into the skin directed away from the growth plate or pointing toward the foot.

n. Pierce the bony cortex with a firm, twisting motion. Use a back and forth twisting motion to enter the marrow space. Do not push hard on the needle. A "pop" may be felt as the needle passes through the bony cortex and into the marrow cavity.
   i. Insert the IO Needle gently; too much force may push the needle all the way through the bone and into the soft tissues.

o. Remove the stylet and connect the 10 cc luer lock syringe and aspirate marrow contents. Keep any bone marrow aspirate for glucose check or for other ordered tests. There are instances when the marrow cannot be aspirated.

p. Correct placement is confirmed by infusing 5-10 ml of preservative free 0.9% normal saline that should enter by free flow without resistance.

q. Attach the IV line to the hub, or to the stopcock, and infuse fluids or drugs directly into the intraosseous space.

r. Secure the needle to the overlying skin with tape.
s. Apply sterile dressing.
t. Label the site with the date and time of insertion and initials of the nurse initiating the device.

u. Discard used supplies in the appropriate receptacles.
v. Remove gloves and perform hand hygiene.
w. Document procedure in the patient's permanent medical record.
6. Care and Maintenance
   a. The dwell time of an intraosseous device should be limited to no longer than 24 hours. Assessment should be made to replace the device within that time frame.
   b. Monitor the site for signs of complications such as:
      i. Improper access device placement or dislodgement leading to infiltration or extravasation
      ii. Access device obstruction
      iii. Embolization of fat and bony fragments.
      iv. Bone damage
      v. Compartment syndrome.
   c. 

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HMC does not consider any single reference to establish the standard; however, the following references were utilized:


Weaver, J., RN, MSN – Clinical & Patient Education Department, St. Joseph Regional Medical Center, South Bend, Indiana.
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