



Provincial Health Services Authority

Nursing Practice Reference

Title: CENTRAL VENOUS ACCESS DEVICES (CVAD): CARE AND MAINTENANCE OF PERIPHERALLY INSERTED CENTRAL CATHETERS (PICCs)

Effective Date: November, 2018

Approved:

Sites: ☒ Abbotsford ☒ Prince George ☒ Vancouver
 ☒ Kelowna ☒ Surrey ☒ Victoria

Reason for Directive:

To provide guidelines for the care and maintenance of Peripherally Inserted Central Catheters (PICCs).

These guidelines are used in conjunction with:

[PHSA Hand Hygiene Policy](#)

[BCCA Infection Prevention and Control Manual](#)

[BCCA Infusion Therapy Education program for Registered Nurses -](#)

[I-490 IV therapy: Use of an Infusion Pump with Dose-error Reduction Software](#)

[C-252 Chemotherapeutic agents, administration](#)

[BCCA ST Policy III-20 Prevention and Management of Extravasation of Chemotherapy](#)

[BCCA ST Policy III-80 Assessment of Needle Placement / Catheter Patency in CVC Devices](#)

[VCH-Blood Collection Quick Reference Guide](#)

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- Central Venous Access Devices: Naturopathic Doctor Position Statement
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- Patient handout: Naturopathic Doctor- Use of Central Venous Access Devices
FAQ H:\EVERYONE\nursing\EDUCATION\Central Venous Access Devices -

*cap = Neutral Displacement Needleless Connector

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NOTE for Midline Catheters:

- Midlines are **not** recommended for use at BC CANCER because of the difficulty in detecting infiltration or extravasation, and the risk of complications.
- Midline catheters are **peripheral** infusion devices with the tip terminating in either the basilic, cephalic, or brachial vein, distal to the shoulder. The catheter tip does **not** enter the central vasculature. **If no other vascular access is possible, refer to NPR I-390, Directive 19, page 4 for more information on appropriate and inappropriate infusates.**

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DIRECTIVES:

Clinical Competency Validation:

The Registered Nurse (RN) / student nurse must have completed the BC CANCER Infusion Therapy Education Program for RNs and subsequent skill validation in order to perform **any** procedure on a CVAD.

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Patient Education:

- To include schedule for care and management, role in self-care, signs, symptoms and potential for infection and occlusion and when, how and to whom to report changes.
- Standard BC CANCER materials related to self care of PICCs will be used. Patient Information Handout for PICCs is located in Appendix A.

Definition of PICC: An indwelling central venous catheter that is peripherally inserted into a vein of the central vasculature.

Features:

Single or multi-lumen:

- Each lumen of a multi-lumen PICC is treated as a separate catheter.
- Where possible the largest lumen should be used for blood sampling, and the administration of blood product and viscous fluids.

Valved PICCs:

- A valve is present near the distal tip of the catheter or in the hub of the catheter.
- Clamps will **not** be present on external portion of PICC
- Requires weekly flushing with Normal Saline only, when **not** in use.

Non-Valved PICCs:

- The PICC is open at the distal tip.
- The PICC requires clamping before entry into, or exit out of the system.
- Have external clamps present on external portion of the PICC.
- Requires weekly flushing and heparin lock when **not** in use.

Power Capable PICCs:

- RNs may carry out routine care for any PICCs including identifying a power PICC and accessing for power injection of contrast.
- No special care needs, unless they are being used for diagnostic purposes. Need special tubing to withstand the higher intraluminal pressures generated during power injection.

NB: *If PICC is unfamiliar, contact the manufacturer's clinical support line to determine device care or obtain device policy from the insertion facility.*

Insertion/Removal:

- A physician order is required for a PICC insertion and removal.

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- Only health care professionals who have successfully completed a PICC insertion course may insert PICCs.
- PICCs are usually inserted into the basilic or cephalic veins in the arm. The catheter tip is ideally located within the lower one-third of the Superior Vena Cava (SVC) toward the junction of the SVC and the right atrium. Confirmation of tip placement is done by x-ray **or** ECG at time of catheter insertion.
- A PICC catheter can be removed by a CVAD certified nurse upon physician order. PICCs are usually removed when:
 - Therapy is completed,
 - The catheter's presence could cause complications (e.g. the catheter is malpositioned or damaged), or
 - The patient has developed a catheter-related infection.

NB: No heparin should be administered when PICC removal is foreseen.

Documentation and Reporting:

Type of PICC:

- The first nurse, prior to access is responsible for documenting the following on the ALERT form in the patient record:
 - Date of insertion
 - Internal and external catheter measurements
 - Type of device
 - Valved, or non-valved
 - Need for heparin lock flush solution
 - The source of the information (i.e. operative report or the patient's wallet card).

Documentation of Care:

- All procedures performed on a PICC will be documented using the appropriate documentation forms. Documentation should include, but is not limited to:
 - Condition of the site, type of dressing and catheter stabilization
 - Procedures and interventions performed
 - For multi-lumen PICC, identify the lumen being referred to
 - Patient response including symptoms, side effects or complications
 - Patient and/or caregiver education.

Patient Safety Learning System (PSLS):

- The RN should document and report unresolved obstruction, extravasation, air embolism, infection, catheter damage, and product defect using the **PSLS**.

Infection Prevention and Control:

- Perform hand hygiene per **PHSA Hand Hygiene Policy**. Plan nursing care to minimize access of the PICC. Where possible all procedures, i.e. blood sampling,

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flushing, IV infusion, and connecting elastometric Infusors should be done through the *cap to minimize opening the system.

- The work surface is cleaned with 70% alcohol or disinfecting towelettes intended for use in health care before preparing supplies for any PICC procedure.
- **Sterile Aseptic Technique** will be used for all procedures. In sterile aseptic technique, sterile parts may only contact other sterile parts; contact between sterile and non-sterile parts must be avoided. When it is necessary to touch sterile parts, sterile gloves and procedure mask should be used (e.g. dressing change, removal of PICC, and care of damaged PICC).
- **Single unit** packages must be used.

Skin Preparation:

- Chlorhexidine Gluconate (CHG) 2% with 70% alcohol is the preferred solution for skin antisepsis, but either 2% CHG or alcohol swabs may be used cleanse caps* or tubing connections. Scrub needleless connectors for at least 30 seconds and allow to dry for at least 30 seconds.
- For patients with sensitivities to 2% CHG with 70% alcohol, 2% CHG aqueous may be used instead. Allow to dry at least 2 minutes.
- For patients with sensitivities to 2% CHG aqueous, povidone solution may be used. Allow to dry for at least 2 minutes.

Connection Cleansing:

- To cleanse the connection between any PICC, *cap or IV tubing, use the **3-swab-no-touch technique**:
 1. Grasp connection with one swab.
 2. Use second swab to clean from catheter connection up catheter for 10 cm.
 3. Use third swab to clean down IV tubing 10 cm. Discard this swab. (Omit this step if catheter is capped).
 4. Cleanse connection site or *cap vigorously with the first alcohol swab. Discard swab.
 5. Do not drop a connection site once it is cleaned.
- If a catheter extension tubing set is present, it remains in place for the life of the catheter and is considered a permanent part of the line. The extension tubing is **only** removed and replaced in extreme situations that compromise patient safety or line functioning. The new extension tubing is primed and prepared under sterile conditions.
- Do **NOT** apply tape to any PICC connections or junctions as the adhesive can harbor microorganisms.
- PICCs should be removed when no longer necessary to decrease the risk of infection.

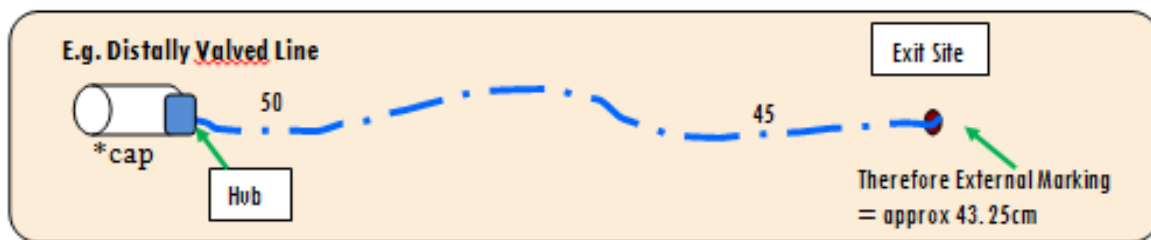
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- Femoral insertion site has increased risk of infection and thrombosis. It is therefore not recommended.
- If a PICC catheter is removed for suspected infection, the tip of the catheter must be placed in a sterile container and sent to the lab for Culture and Sensitivity (C&S) evaluation.

Exit Site Assessment:

It is important to know which style/type of PICC your patient has in order to confirm placement of the catheter in the lower SVC. The PICC line will have markings spaced one centimeter apart that will represent either the length of the PICC from the tip to the exit site, or the length of the PICC from the terminus to the exit site. Refer to the insertion report for the baseline measurement.

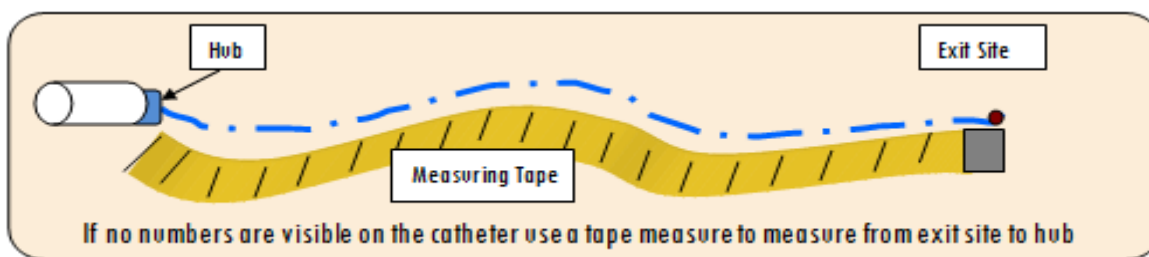
Internal catheter measurement: the length in centimeters from the tip of the PICC to the exit site. This is represented by an external numeric marking on the catheter in some styles of PICCs.



External catheter measurement: the entire visible length of the catheter in centimeters from the identified terminus to the exit site. The identified terminus may be a '0' marking on the catheter in some agencies/organizations, or it may be the hub of the catheter. It is recommended to use the hub as the identified terminus.

Rationale: If no external numeric markings are visible on the catheter, a measuring tape can be used to measure the external catheter measurement from the hub to the exit site.

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- Depending on the style of PICC, note and document the **internal or external catheter measurement** on the patient record and the alert form at the **initial PICC dressing change**. Use the same method of measurement and documentation for all subsequent dressing changes. DO NOT proceed with use until placement is confirmed.
- If on subsequent dressing changes, the internal or external catheter measurement has **changed by more than 2 cm, migrating either in or out**, from the initial documented marking, obtain physicians orders to confirm tip placement by x-ray. If the tip of the catheter remains in the lower 1/3 of the SVC, the new measurement should be recorded on the Alert form and will be the new baseline.

Rationale: The tip of the catheter should be in the lower 1/3 of the SVC which in the average adult measured 7 cm. Migration of up to 2 cm should still leave the catheter tip in the lower 1/3 of the SVC. Migration **outward** of more than 2 cm might indicate that the tip lies outside of the lower 1/3 of the SVC. Migration **inward** of more than 2 cm might indicate the tip is now within the right atrium. Either of these would put the patient at risk for catheter-related complications.

- A PICC line that has migrated out should never be re-advanced as the external portion of the PICC cannot be rendered sterile. Re-advancing the PICC would put the patient at risk for infection.
- Assess the PICC insertion site and vein pathway for redness, tenderness, swelling or drainage at each access and q hourly or dressing change, and if site infection or inflammation is suspected. Use the following **Phlebitis Scale**:

Phlebitis Scale (INS 2011)

Grade	Clinical Criteria
0	No symptoms
1	Erythema at access site with or without pain
2	Pain at access site with erythema and/or edema
3	Pain at access site with erythema and/or edema Streak formation Palpable venous cord

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4	Pain at access site with erythema and/or edema Streak formation Palpable venous cord > 1 inch in length Purulent drainage
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Dressings:

- Sterile aseptic technique will be used for PICC dressing changes.
- The gauze pressure dressing applied at time of insertion will be removed within 24 - 48 hours and replaced with a Transparent Semi-permeable Membrane (TSM) dressing.
- CHG impregnated dressings that may be placed at the time of PICC insertion, can be left in place for up to 7 days, unless wet, soiled or non-occlusive.
- TSM dressings will be changed every 7 days and whenever wet, loose, non-occlusive, blood or drainage is present, or for further assessment if infection or inflammation is suspected.
- Gauze is not routinely used beneath TSM dressings. Gauze dressings may be used for those patients who cannot tolerate an occlusive dressing. Gauze dressings will be changed at least every 48 hours.

Infusion Equipment:

- Any solutions infusing into a PICC will be changed every 24 hours (unless patient is an outpatient on a continuous infusion).
- All solutions will be infused through a pump. Exceptions: The administration of blood and blood products and when patients can be continually monitored during infusions that do not contain medications.
- All IV tubings will be changed every 96 hours, except for tubing used for intermittent infusions and lipid tubing which will be changed every 24 hours.
- The *cap: neutral displacement needleless connector, which creates a closed intravenous system will remain attached to the PICC at all times. The *cap should be discarded and replaced with a new *cap in the following circumstances:
 - Routine *cap change at least every 7 days
 - *Cap is removed for any reason
 - Blood or debris within the *cap
 - *Cap septum shows poor integrity from multiple use, cracks, leaks or other defects.
 - Replacement of positive or negative displacement cap.

Preventing Air Embolism:

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- Luer-lock IV equipment will be used for all PICCs.
- Extension tubings will be clamped at all times when a PICC is not in use.
- Never use metal forceps to loosen a tight connection. Doing so may crack the connection, putting the patient at risk for a damaged PICC, air embolism, and infection.
- Never clamp the catheter portion of a PICC. This can cause permanent damage to the catheter.

Maintaining Patency:

- All PICCs shall be flushed with 20 ml Normal Saline:
 - Prior to each use to assess PICC function, and
 - After each use (blood draw or infusion) to clear the catheter of blood, and to prevent contact between incompatible medications.
 - In conjunction with weekly *cap and dressing changes.
- For **valved** PICCs
 - Each lumen will be flushed with 20 ml Normal Saline **at least** every 7 days.
- For **Non-valved** PICCs:
 - Each lumen will be flushed with 20 mL Normal Saline, followed by 5 mL Heparin (10 U/mL), **at least** every 7 days.
- After using a lumen in a **multi-lumen** catheter:
 - DO flush any un-used lumens in Non-Valved catheters to flush out any blood reflux.
 - It is not necessary to flush un-used lumens in Valved catheters since the valve should prevent blood reflux.
- Caps are changed weekly.
- Flush using a **pulsatile technique**. This technique removes built-up residue, medication, and fibrin from the walls of the catheter.
- **Positive pressure flushing technique** is used to prevent back flow of blood into the tip of the catheter and subsequent clot formation. This is achieved by:
 - Clamping the non-valved catheter while still injecting the last 0.5 ml of flush or heparin lock solution, **or**
 - For valved catheters, keeping slight pressure on the plunger before disconnecting syringe.
- To prevent rupture **NEVER** use excessive force when flushing PICCs. The **smallest** sized syringe that is safe for **DIRECT** connection to a PICC is a 10 ml syringe.

NB: For side arm administration of low- volume biohazardous drugs refer to C-252.

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PICC Damage:

Catheter damage increases the risk for catheter fracture and embolization, air emboli, extravasation, bleeding, occlusion and infection.

Signs of potential catheter damage include:

- Small holes, cuts or tears to the external portion of the catheter.
- Leaking or wetness under the dressing during infusion or flushing.
- If the damage is under the skin there may be swelling.

Immediately upon discovery that the catheter is cut, punctured, or leaking, the catheter should be:

- Clamped proximally to damaged area, i.e. between the patient and the leak. Use an existing clamp or add a clamp.
- **Alternatively**, the catheter can be folded (between the patient and the leak) and sealed with sterile gauze and adhesive dressing, to prevent air embolism or bleeding from the device.
- Label the damaged catheter with “DO NOT USE” while waiting for repair or removal to be performed.
- Notify physician immediately to obtain orders for repair, exchange or removal of PICC and contact host hospital Infusion Program (where available).

NB: Repair can only be performed by a certified PICC inserter or designate.

- The goal to reinsert a new CVAD should be a collaborative decision among physician, nurse and patient based on patient factors and need for ongoing central vascular access.

PROCEDURES:

Routine Flush, Lock and Cap Change -

Supplies:

- Surface disinfectant
- Non-sterile gloves
- For each lumen:
 - 2-3 Alcohol or 2% CHG swabs in 70% alcohol
 - 1 x 20 ml syringe of Normal Saline
 - 1 x 10 ml syringe or equivalent 10ml barrel-sized syringe of 5 mL Heparin (10 units/mL) (for non- valved PICCs only, *If needed*)
 - *cap

Procedure:

1. Clean work surface. Perform hand hygiene.

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2. Prepare supplies.
3. Don gloves.
4. Clamp catheter if clamps are present.
5. Grasp the connection between the cap and PICC with one swab.
6. Use second swab to clean from PICC connection up catheter for 10 cm.
7. Cleanse PICC connection with first swab. Allow to dry.
8. Disconnect *cap from PICC and connect new *cap. Scrub the cap with antiseptic swab and allow to dry.
9. Connect syringe of Normal Saline to *cap, aspirate blood to confirm patency and flush line with 20 mLs of NS using pulsatile and positive pressure techniques. Discard syringe.
10. For non-valved PICCs only, inject Heparin flush solution through *cap. Discard syringe.
11. Repeat steps 4-8 for each lumen to be capped and flushed.
12. Remove gloves and perform hand hygiene.

Initiating an Infusion -

Supplies:

- Surface disinfectant
- Non-sterile gloves
- Alcohol or 2% CHG in 70% alcohol swabs
- 1 x 20 ml syringe of Normal Saline
- Primed IV tubing

Procedure:

1. Clean work surface. Perform hand hygiene. Don gloves.
2. Cleanse *cap surface with antiseptic swab, allow to dry.
3. Confirm PICC patency with 20 mL Normal Saline syringe if not already done. Clamp line (if present).
4. Connect primed IV tubing to *cap.

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5. Initiate infusion. Ensure that the solution flows to gravity, and that there is no swelling around PICC.
6. Adjust IV or program infusion pump as ordered.
7. Secure tubing to patient's arm with tape.
8. Remove gloves and perform hand hygiene.

Completing an Infusion -

Supplies:

- Surface disinfectant
- Non-sterile gloves
- 3 alcohol or 2% CHG in 70% alcohol swabs
- 1 x 20 ml syringe Normal Saline
- 1 x 10 ml syringe or equivalent 10ml barrel-sized syringe of 5 mL Heparin (10 units/mL) (for **non-valved** PICCs only)

Procedure:

1. Clean work surface. Perform hand hygiene. Don gloves.
2. Cleanse the connection between the PICC *cap and IV tubing using the **3-swab-no-touch technique**.
3. Disconnect the tubing from the cap*, attach syringe of Normal Saline. Flush PICC with 20 mls Normal Saline using pulsatile technique.
4. Remove saline syringe from *cap and discard.
5. For non-valved PICCs only, inject Heparin flush solution through *cap finishing with positive pressure technique. Discard syringe.
6. Remove gloves and perform hand hygiene.

Drawing Blood Specimen -

Supplies:

- Surface disinfectant
- Non-sterile gloves
- 1-4 Alcohol or 2% CHG in 70% alcohol swabs
- 2 x 20 ml syringes Normal Saline

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- Vacutainer or needleless blood transfer device if using syringe method.
- Appropriate blood collection tubes or 10 mL syringes if using Syringe Method
- 1 x 6 mL tube for discard
- 1 x 10 mL syringe or equivalent 10mL barrel-sized syringe of 5 mL Heparin (10 units/mL) (for non-valved PICCs only)
- *cap (if need to change it)
- Sterile dead-end cap (if capping an infusion)

Procedure:

1. Clean work surface. Perform hand hygiene. Don gloves.
2. Ensure all PICC lumens are clamped (if clamps are present) and infusions are stopped prior to obtaining blood samples. Where a PICC has multiple lumens, the blood should be drawn from the larger / distal lumen. Exception: single lumen catheter being used exclusively for TPN, in this case blood work should be collected peripherally.
3. If no infusion is present, **proceed to step 6**. If an IV infusion is present, **proceed to steps 4**.
4. Cleanse the connection between the PICC *cap and IV tubing using the **3-swab-no-touch technique**.
5. Disconnect the tubing from the *cap; place a dead-end cap on the IV tubing if it will be re-attached.
6. Cleanse *cap surface with antiseptic swab, allow to dry. Attach syringe of Normal Saline to PICC*cap. Flush PICC with 20 mLs Normal Saline to prevent contamination of sample with infusate. **Option:** Pull back on plunger to obtain 5-6 mLs of blood for discard sample. Discard syringe.

EXCEPTION: Prior to drawing **blood cultures**, **do NOT flush the PICC or discard** the first draw as this sample is used for culture. Therefore cultures should be drawn **first** before drawing other blood specimens (draw aerobic sample 1st).

7. Luer lock the vacutainer onto *cap.
8. Obtain discard sample (UNLESS drawing blood cultures, or previously drawn via syringe). Press tube (5-6 mL) onto vacutainer needle, open clamp if clamp present, and allow tube to fill.

NB: If tube does not fill, proceed with **Standard Trouble Shooting Process**, may need to draw blood by **Syringe Method**.

9. Clamp tubing if clamps present. Remove tube and discard.
10. Repeat until all desired blood samples are obtained, clamping between samples.

NB: *In order to avoid contamination from substances in collection tubes. Draw the blood specimens in the order recommended by your Regional Laboratory Medicine Guidelines. [VCH-Blood Collection Quick Reference Guide](#)*

11. Remove vacutainer and discard.
12. Connect syringe of Normal Saline to *cap, flush briskly using pulsatile and positive pressure techniques.
13. Disconnect syringe from *cap, and discard.
14. For non-valved PICCs only, inject Heparin lock solution through *cap finishing with positive pressure technique. Discard syringe.
15. Go to next procedure, or remove gloves and perform hand hygiene.

Drawing Blood by Syringe Method - continuing from step 6 above

7. Attach a 10 mL syringe or larger, open clamp if clamp present, and pull back syringe plunger slowly. For valved catheters pause for a few seconds to allow the valve to open. Gently aspirate 5-6 mL blood for discard (no discard for cultures).
8. Clamp tubing if clamps present. Remove and discard syringe.
9. Attach another syringe(s) and collect enough blood for needed samples, clamping between syringes.
10. Connect syringe of Normal Saline to *cap, flush briskly using pulsatile and positive pressure techniques.
11. Transfer blood to appropriate tubes using a needleless blood transfer device.
12. Disconnect syringe from *cap, and discard.
13. For non-valved PICCs only, inject Heparin lock solution through *cap finishing with positive pressure technique. Discard syringe.
14. Go to next procedure, or remove gloves and perform hand hygiene.

Dressing Change -

Supplies:

- Surface disinfectant

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- Procedure mask
- Non-sterile gloves
- Sterile gloves
- Sterile dressing tray
- Sterile cotton-tipped applicators (as needed to remove excess drainage/crusting)
- 2% CHG in 70% alcohol swabs x 5 or swabsticks x 3 (or more, if removable wings present)
- No sting barrier (optional)
- Securement device
- 1-2 10 cm x 14 cm TSM dressing

Procedure:

1. Clean work surface using the disinfectant wipe. Perform hand hygiene.
2. Position patient in comfortable position, ensuring site is accessible.
3. Perform hand hygiene. Don mask.
4. Prepare sterile tray and supplies.
5. Don non-sterile gloves.
6. Assess insertion site for redness, tenderness, swelling or drainage.
7. Note all visible external marking/length of the catheter from exit site.
8. Remove dressing, beginning at PICC hub and gently peeling dressing toward the insertion site. **If present**, remove CHG impregnated dressing by wetting the patch with a CHG swabstick. Remove and discard securement device.
9. Remove and discard gloves.
10. Perform hand hygiene. Place sterile drape under arm.
11. Don sterile gloves.
12. Remove removable wings (if present).
13. Lift catheter with sterile gauze. Assess integrity of skin beneath dressing. Inspect the catheter site. If there is any sign of infection, swab the site for C&S and notify the physician.

NB: Exercise extreme caution not to dislodge catheter.

14. While still holding on to the catheter, cleanse the exit site using a CHG swab by placing the swab over the exit site and using a back and forth motion with **gentle**

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friction for 30 seconds. Next, cleanse the top and underside of the catheter, starting at the exit site. Use extreme caution not to pull on the catheter.

Rationale for Friction Rub Technique: *The application of friction allows the solution to penetrate the lower layers of the epidermis thus killing a greater number of skin organisms.*

15. Continue holding the catheter, and starting at the exit site and working outwards, cleanse skin with CHG swab using a back-and-forth motion with **gentle friction** for 30 sec. Ensure the prepped site will be the size of the dressing (approximately 10 cm radius). Each time you return to the exit site, use new swab **or** flip to unused side of swabstick. Gently remove any crusting. Soak crusting to allow for non-traumatic removal.
16. Continuing to **hold** catheter with gauze, allow to dry thoroughly.
17. Cleanse wings with CHG swab. Allow to dry.
18. Re-apply removable wings by squeezing the wings together so that it splits open. Place wings on catheter. Ensure that catheter is within the channel under the wings.

Rationale: *Wings may pinch catheter if not fully in the channel.*

19. Secure the catheter using one of the following methods:
 - i. Apply Steri-strips® to secure wings. Tuck Steri-strips® under wings and catheter so that catheter is supported off skin, but secure. Create a loose loop with the catheter so it is not twisted or kinked under the dressing.
 - NB:*** *Wrapping Steri-strips® around catheter is NOT recommended. This may increase the risk of dislodging catheter during the dressing change*
OR
 - ii. Apply No sting barrier (if using). Secure catheter with stabilization device/securement dressing.
20. Apply sterile dressing to site. Do not stretch dressing over skin. Apply dressing ensuring that PICC hub and extension-tubing connection are entirely covered by the dressing.
21. Remove gloves and perform hand hygiene.

MANAGEMENT OF POTENTIAL PICC OCCLUSION: PARTIAL AND COMPLETE

Standard Trouble-Shooting Process -

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NB: *If issues with repeated occlusion, consider increasing flushing frequency based on nursing assessment and patient factors. Discuss with physician.*

If unable to aspirate blood from Single or Multilumen PICCs:

1. Check tubing and catheter for closed clamps, kinks and areas of constriction. It may be necessary to remove the dressing and/or Steri-strips® to aspirate blood.
2. Have patient take a deep breath, cough, raise and lower arms and change position (e.g. lie supine). Try again to aspirate blood.
3. If unsuccessful, remove the *cap and directly connect the Normal Saline syringe to the hub of the PICC; re-attempt flushing.
4. If still unable to draw blood, attempt to flush catheter with 20 mL Normal Saline and then aspirate using push-pull method. Repeat step 2.
5. At this point, determine if the line has partial or complete occlusion.

Partial Occlusion:

- The line is partially occluded if you have applied the Standard Trouble-Shooting Process and can flush with Normal Saline without any difficulty, but are still unable to aspirate blood **OR** you can aspirate blood, but the line does not flush briskly (sluggish).
- If a lumen appears to be sluggish it is recommended the lumen be treated.

Complete Occlusion:

- The line is completely occluded if you have applied the Standard Trouble-Shooting Process and **but can neither infuse fluids nor aspirate blood**.
- If there is resistance to injection, STOP. To prevent rupture NEVER use excessive force when attempting to flush PICCs.

Occlusion in Multilumen PICC:

- Patent lumens can be used to infuse any type of medications, while waiting for the treated lumen to clear.
- If more than one lumen is occluded, it is recommend that one lumen at a time be treated and cleared.

Management of Occluded PICC with Alteplase -

PICCs occluded for >24 hours increase the patient's risk of infection. Treat blocked PICCs AS SOON AS POSSIBLE!

- *Cap PICC and obtain order for thrombolytic Alteplase: 2 mg Alteplase in 2 mL for each occluded lumen; repeat x 1 if needed. Maximum dose is 4mg/day.

Supplies:

- Surface disinfectant
- Non-sterile gloves
- Alcohol or 2% CHG in 70% alcohol swabs
- TSM dressing
- For each occluded lumen:
 - 1 x 20 ml syringe Normal Saline
 - 2 mg Alteplase in 2 mL (in a 10 mL syringe)

*cap = Neutral Displacement Needleless Connector

➤ *cap

Procedure:

1. Clean work surface. Perform hand hygiene and don gloves.
2. Scrub surface of *cap with cleansing swab. Or scrub connection and remove *cap if suspected factor in occlusion.
3. Attach 20 ml syringe Normal Saline.
4. Pull back on syringe to assess for blood return.
5. If blood return **is** spontaneous, there is no need for Alteplase – carry on with procedures.
6. If blood return **is not** spontaneous, remove syringe and **initiate Alteplase procedure** below.
7. Attach 10 mL syringe with 2 mg/2 mL Alteplase.
8. **For partial occlusion** instill 2mg (in 2 mL) Alteplase to PICC.
9. **For complete occlusion** instill 2 mg (in 2 mL) Alteplase using a gentle push-pull action:
 - Keeping the syringe upright (plunger at the top and PICC-syringe connection below), pull plunger back by 2 mL and release slowly.
 - Repeat several times to let Alteplase reach thrombotic occlusion.
 - **Do not** use excessive force to inject Alteplase.
10. Discard syringe and add *cap if not already present.
11. Apply label to line “DO NOT USE” with time of instillation (e.g. Alteplase @ 10:00).
12. Allow Alteplase to remain in catheter for **30-120 minutes**.

NB: *It is safe to leave Alteplase in line for 24-72 hours, if check cannot be completed after 120 minutes.*

After 30 -120 minutes:

Supplies:

- Surface disinfectant

*cap = Neutral Displacement Needleless Connector

- Non-sterile gloves
- For each occluded lumen:
 - 1 x 20 ml syringe Normal Saline
 - 1 x 20 ml syringe Normal Saline (dispose of 10 ml Saline to make room for discard)
 - Alcohol or 2% CHG in 70% alcohol swabs

Procedure:

13. Clean work surface. Perform hand hygiene and don gloves.
14. Scrub *cap with cleansing swab.
15. Attach 20 ml syringe of 10 mls Normal Saline.
16. Pull back on syringe to assess for blood return.
17. If blood return **is spontaneous**, withdraw 5 mL blood and discard. Use 2nd Saline syringe to flush with 20 mL Normal Saline and carry on with other procedures.
18. If blood return is **NOT** spontaneous after 30 minutes, allow the same Alteplase dose to remain in the line.
19. After a total of 120 minutes Alteplase dwell time, **REPEAT steps** 13-18.
20. If blood return is not spontaneous after 120 minutes, obtain 2nd syringe of Alteplase and **REPEAT** the Alteplase procedure in its entirety.

NB: IF THE LUMEN IS STILL OCCLUDED AFTER 2 ATTEMPTS AT USING ALTEPLASE, Refer to BCCA ST Policy III-80

Removing A PICC -

Supplies:

- Surface disinfectant
- Non-sterile gloves
- Procedure mask
- Sterile gloves
- Sterile dressing tray
- 2% CHG in 70% alcohol swabs x 5 or swabsticks x 3
- C & S container (obtain tip culture for C & S only if catheter is being removed due to suspected infection)
- Sterile scissors to cut catheter tip if culturing
- Sterile **petroleum** based dressing
- TSM dressing

*cap = Neutral Displacement Needleless Connector

Procedure:

1. Clean work surface. Perform hand hygiene.
2. Position patient so that the **exit site is below the level of the right atrium**. This can often be achieved in recumbent, comfortably with arm outstretched.
3. Patient should be aware to relax, not to cough, talk, or inspire deeply during the removal procedure. Educate patient in Valsalva's maneuver during removal procedure.
4. Perform hand hygiene.
5. Prepare dressing tray with all supplies.
6. Don mask and non-sterile gloves.
7. Remove dressing and assess insertion site.
8. Perform hand hygiene and place drape under arm with PICC.
9. Don sterile gloves.
10. Cleanse site as if performing dressing change.

Rationale: *This prevents contamination if there is difficulty removing PICC and it needs to remain in place.*

11. The patient will perform a Valsalva maneuver, i.e. exhale and bear down as the catheter is being slowly and gently pulled. Apply gauze to insertion site, with dominant hand grasp the catheter (not the hub) and gently pull the catheter straight out parallel to the vein. Pull out short segments of catheter (3-5 cm), pause, and continue in this manner until PICC is fully removed.

NB: *If Valsalva's maneuver is contraindicated, have patient exhale during the procedure.*

If resistance is encountered DO NOT attempt to remove the catheter. Try to:

- Re-position patient with arm perpendicular to body to minimize bends in catheter.
- Inject saline into the catheter while slowly removing the catheter.
- Protect site with dressing.
- Apply warm moist heat over the catheter tract for 30 minutes to decrease resistance related to venospasm.
- If still unable to remove catheter, contact physician.

12. Cover site with sterile 2x2 gauze and apply firm pressure for 5 minutes, or until hemostasis is achieved. Remove gauze and apply a sterile occlusive **petroleum** based dressing, cover with a TSM dressing.
13. Instruct patient to:
 - Monitor site for bleeding for 24 hours.
 - Apply pressure again for bleeding.
 - Dressing may be removed after **at least** 24 hours if oozing has stopped.
 - Monitor and report any signs of prolonged bleeding/ infection.
14. Assess integrity of removed catheter, ensure entire catheter is removed. If infection is suspected, use sterile scissors to cut 1" of catheter tip into sterile container and send for C & S. Take care to prevent contamination. If catheter appears defective, save in plastic bag for further investigation.
15. Document: Date and time of removal, condition of site, condition of the catheter and length, reason for device removal, nursing interventions during removal, type of dressing, patient response, and patient education.

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APPENDIX A

Patient Information Handout

Peripherally Inserted Central Venous Catheter (PICC)

Introduction

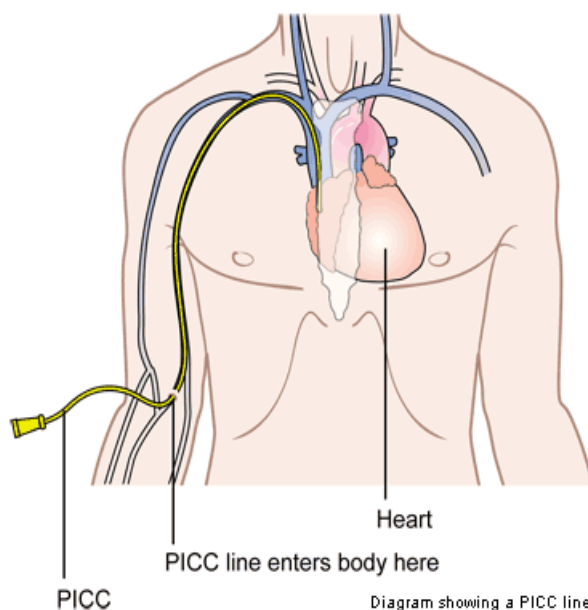
You and your doctor have chosen to have a Peripherally Inserted Central Venous Catheter (PICC) based on your treatment. Since the PICC can be left in place for long periods of time (weeks, months, years), it is important that you are aware of what it is and how to take care of it. The PICC can be used to receive IV therapy (i.e. chemotherapy), take blood work, and in some cases receive contrast dye when having a scan procedure. The PICC is meant to provide safe access for your treatment and prevent repeated needle sticks to your hand and arm veins.

What is a PICC?

A PICC is a central venous catheter made from a soft, flexible material. The catheter has a winged portion to help it attach to the skin and it may have a clamp. If your PICC has a clamp, it should be closed at all times. A needleless injection cap is attached to the hub end of the catheter. The needleless injection cap allows the infusion of fluids into the PICC and prevents blood from backing up into the catheter. The PICC is inserted into a large vein located below or above the bend of your elbow with a portion remaining on the outside so that it can be accessed for your treatment. The tip of the PICC is placed in a vein connected to your heart.

What Will it Look Like?

A short part of the PICC is outside your body on your arm. It is always covered with a clear dressing.



*cap = Neutral Displacement Needleless Connector

How is the PICC Inserted?

A PICC insertion can be an inpatient or outpatient procedure. It is performed by trained and qualified health care professionals such as certified registered nurses and physicians. The entire procedure will be explained to you prior to the procedure starting.

It is very important that a sterile area be made for the procedure. The nurse/doctor will wear a sterile gown, gloves and mask. The area around the vein selected will be cleaned with a special cleaning solution and then a sterile drape applied.

A small amount of local freezing is injected into the insertion site, usually just above or below the bend in your arm. An ultrasound probe is used to locate the vein.

Once inserted the tip is positioned in an area of high blood flow near the heart to allow for better mixing of your IV medications.

What will happen once the PICC is in place?

An ECG or chest x-ray may be taken after the PICC is inserted to check the exact position of the catheter tip. After the position is confirmed you can go home. You will be asked to return to the clinic the next day to have the dressing changed. It is not unusual to have some blood oozing from the insertion site, but this usually stops after 24 hours.

What Care does my PICC require?

A weekly dressing change, line flush and cap change are necessary. You will be informed of the specific arrangements for this care.

Can I bathe or swim?

The dressing and PICC insertion site should be kept dry. You can bathe or be in a pool as long as you keep your PICC arm out of the water. If your dressing accidentally gets wet and loose, it needs to be changed immediately. When showering you can cover the area with plastic wrap.

Important Reminders:

- Do not allow anyone to take your blood pressure on the arm that has the PICC in it. This is to avoid damaging the PICC.
- Do not allow anyone to take blood samples from the arm that has the PICC in it. This is to prevent damaging the catheter.
- Apply low heat (such as a heating pad on low setting) to your upper arm, above the PICC as much as you can during the first 2-3 days after it has been inserted. This increases the blood flow around the catheter and allows the body to adjust to the PICC.

What problems should I look out for?

*cap = Neutral Displacement Needleless Connector

The following is a list of potential problems which may occur with your PICC and some recommended solutions.

Problem	What you will see or feel	What to do	How to avoid it
BLEEDING	<ul style="list-style-type: none"> Excessive oozing or bleeding from insertion site (minimal bleeding for first 24 hours is expected) 	<ul style="list-style-type: none"> Apply pressure, call the telephone nurse line or 811 (Health Link BC) after clinic hours 	<ul style="list-style-type: none"> Avoid carrying anything heavy and avoid strenuous physical exercise for the first 24 hours
Mechanical Phlebitis	<ul style="list-style-type: none"> Tenderness/pain, hardening of vein, swelling, redness/warmth, along the vein path. This usually occurs during the first 5-10 days 	<ul style="list-style-type: none"> Call the telephone nurse line or 811 (Health Link BC) after clinic hours If tenderness does not resolve, apply moist heat (warm wet towel in a plastic bag) 20 minutes on and 20 minutes off Keep continuous low heat to upper arm with PICC for at least the first 2-3 days as much as possible Elevate and rest your arm 	<ul style="list-style-type: none"> Frequent observation Use heat per instructions Regularly and frequently squeeze your hand into a fist (you can use a soft ball for this)
PLUGGED PICC	<ul style="list-style-type: none"> Unable to flush or aspirate using normal pressure 	<ul style="list-style-type: none"> Change position of arm DO NOT USE EXTRA PRESSURE Call contact phone number The PICC will need to be unplugged by medical personal 	<ul style="list-style-type: none"> Flush PICC once a week Make sure PICC is flushed following any blood work or use Flush line if any backflow of blood in PICC

Problem	What you will see or feel	What to do	How to avoid it
ACCIDENTAL REMOVAL OF PICC	<ul style="list-style-type: none"> catheter partly or completely dislodged catheter out further than it previously had been discomfort when flushing catheter 	<ul style="list-style-type: none"> cover with occlusive tape Call the telephone nurse line or 811 (Health Link BC) after clinic hours 	<ul style="list-style-type: none"> always secure catheter well avoid tugging or pulling at catheter
BREAK IN PICC	<ul style="list-style-type: none"> Leaking Pain during infusion 	<ul style="list-style-type: none"> Bend the end of the catheter over and apply a sterile dressing Call the telephone nurse line or 811 (Health Link BC) after clinic hours 	<ul style="list-style-type: none"> Never use excessive force when flushing Never use a syringe smaller than 10 cc Never have scissors near the PICC Always make sure PICC is securely taped
INFECTION	<p>You may have:</p> <ul style="list-style-type: none"> Fever or chills Temperature above 38° C (101° F) Flu-like feeling, lack of energy Redness, swelling and/or drainage (pus) at catheter site 	<ul style="list-style-type: none"> Call the telephone nurse line. Outside of clinic hours call the Medical Oncologist on call or your local emergency department Antibiotics or other treatments may be ordered 	<ul style="list-style-type: none"> Always wash hands before any PICC care Ensure occlusive dressing remains intact Keep supplies clean and dry Arrange for nurse to change dressing, if wet
AIR IN PICC	<ul style="list-style-type: none"> You may have shortness of breath, chest pain, light headedness, fast heart beat 	<ul style="list-style-type: none"> This is an EMERGENCY Lie down on your left side Call an ambulance (911) and go to the nearest Emergency Department 	<ul style="list-style-type: none"> Use careful and proper flushing technique

Problem	What you will see or feel	What to do	How to avoid it
THROMBO EMBOLISM (breaking off of a blood clot from inside the catheter)	<ul style="list-style-type: none"> • Swelling of arm, shoulder, neck or face • Distended arm or neck veins • Pain • Arm turns bluish when not elevated 	<ul style="list-style-type: none"> • This is an EMERGENCY • Lie down on your left side • Call an ambulance (911) and go to the nearest Emergency Department 	<ul style="list-style-type: none"> • Flush catheter once a week • Do not use force to flush • Maintain adequate hydration • Encourage normal movement of extremity

APPENDIX B

Post-Insertion PICC Care
First 24 Hours

Immediately following insertion, the patient should be monitored for the following complications and the appropriate prevention techniques and nursing interventions should be utilized.

OBSERVATION/ ASSESSMENT	POSSIBLE CAUSES	NURSING INTERVENTIONS
BLEEDING <ul style="list-style-type: none"> Moderate Bleeding or Oozing 	<ul style="list-style-type: none"> Large size of introducer Vigorous physical activity Traumatic insertion Patient may have coagulopathies, thrombocytopenia or be on anticoagulants 	Prevention: <ul style="list-style-type: none"> Instruct patient to minimize activity (in 1st 24 hours). Apply pressure to the site after placement, especially with decreased platelet count or coagulopathies. Intervention/Guidelines: <ul style="list-style-type: none"> Utilize pressure dressing for the first 24 hours, then change to a transparent dressing per Nursing policy C-86. Change the dressing if it becomes saturated.
ECCHYMOSIS OR BRUISING	<ul style="list-style-type: none"> Vein trauma. Patient may have coagulopathies, thrombocytopenia or be on anticoagulants 	<ul style="list-style-type: none"> Monitor for changes. If bruising increases, arrange assessment by PICC nurse.
PAIN <ul style="list-style-type: none"> Mild to Moderate Pain at Insertion Site 	<ul style="list-style-type: none"> Traumatic vein access 	<ul style="list-style-type: none"> Apply low continuous heat. Arrange assessment by PICC nurse if no relief after 24 hours. If not contraindicated by medical condition, Tylenol may be taken for pain relief.

APPENDIX C

Post-Insertion PICC Care

AFTER the First 24 Hours

OBSERVATION/ ASSESSMENT	POSSIBLE CAUSES	NURSING INTERVENTIONS
MECHANICAL PHLEBITIS CATHETER/VEIN PATH <ul style="list-style-type: none"> • Tenderness/pain • Redness/Warmth • Venous cord • Swelling 	<ul style="list-style-type: none"> • Inflammation of vein caused by body's response to a foreign material. Not an infectious process • Primarily occurs during first week (i.e., 3-7 days). 	<p>Prevention:</p> <ul style="list-style-type: none"> • Do not baby the arm. Recommend that patient regularly squeeze hand into a fist (may use a soft ball for this). <p>Intervention/Guidelines:</p> <ul style="list-style-type: none"> • Teach patient frequent observation, for tenderness. • At the first sign of tenderness, apply moist heat (warm wet towel in a plastic bag), 20 minutes on and 20 minutes off. • If tenderness does not resolve, apply continuous low heat. • Rate phlebitis according to scale provided in NPRM C-86, pg. 6. • Grade 2 or less: Apply continuous low heat for 2-3 days. Elevate extremity, encourage mild exercise. Arrange for phone follow-up at 24-48 hrs to assess decreasing symptoms. • Grade 3 or more requires q24h visual monitoring.
PAIN DURING INFUSION	<ul style="list-style-type: none"> • Damaged or torn catheter from too small a syringe used • Vasospasm <p>See Mechanical Phlebitis above</p>	<ul style="list-style-type: none"> • Determine location of pain • Notify physician <p>X-ray with contrast media may be required</p>

Post-Insertion PICC Care

*cap = Neutral Displacement Needleless Connector

AFTER the First 24 Hours (continued)

OBSERVATION/ ASSESSMENT	POSSIBLE CAUSES	NURSING INTERVENTIONS
INFECTION/SEPSIS <ul style="list-style-type: none"> • Fever/chills • Redness, drainage and swelling at site • Pain/tenderness at site • Tachypnea or hypotension 	<ul style="list-style-type: none"> • Immunosuppression. • Failure to maintain aseptic, sterile technique in catheter case. • Contaminated catheter • Fibrin sheath • TPN, steroid therapy 	<p>Prevention:</p> <ul style="list-style-type: none"> • Do not leave any crusting at insertions site during routine dressing changes <p>Intervention/Guidelines:</p> <ul style="list-style-type: none"> • Notify physician. • Blood cultures to be drawn. • Swab exit site. • Catheter removal followed by culture of tip. • Antibiotics. • Investigate other causes/sites of infection
CELLULITIS <ul style="list-style-type: none"> • Warmth • Swelling • Redness • Pain/tenderness • Doesn't follow course of vein • Spreads in diffuse circular manner • Extends beyond limits of dressing 	<ul style="list-style-type: none"> • A localized exit site infection. • Due to contamination of site. 	<ul style="list-style-type: none"> • Notify physician. • Cellulitis responds well to oral antibiotics or increased site care and may not require removal of catheter (up to discretion of physician). • If catheter removed, it must be cultured
THROMBOPHLEBITIS <ul style="list-style-type: none"> • Edema of arm, shoulder, neck/face • Distended arm or neck veins • Pain of arm, shoulder, neck • Arm turns dusky colour when in dependent position. 	<ul style="list-style-type: none"> • Deep vein thrombosis of the subclavian vein due to: <ul style="list-style-type: none"> - Obstruction of blood flow, - Injury to intima wall vein, - Increased blood - Viscosity due to dehydration. 	<ul style="list-style-type: none"> • Notify physician. • Verify with venogram. • Use of anticoagulant therapy. • Remove catheter.

Post-Insertion PICC Care

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AFTER the First 24 Hours (continued)

OBSERVATION/ ASSESSMENT	POSSIBLE CAUSES	NURSING INTERVENTIONS
SKIN REACTION <ul style="list-style-type: none"> • Redness • Pruritis • Encompassed by dressing 	<ul style="list-style-type: none"> • Related to sensitivity to dressing or cleansing solution 	Prevention: <ul style="list-style-type: none"> • Do not use tinted chlorhexidine as the dye is associated with skin reactions.
Intervention/Guidelines: <ul style="list-style-type: none"> • To prevent skin irritation or burn, allow cleansing solution to dry completely before applying dressing; 30-60 seconds for 2% CHG in 70% alcohol, 2 minutes for 2% aqueous CHG or iodine solutions. • Managing skin reactions requires some creative thinking; the principles you are trying to maintain are: <ol style="list-style-type: none"> 1. Reduce the bacterial count on the skin. Chlorhexidine is the most effective agent and 2% CHG is the preferred solution. 2. Cover the insertion site with a barrier. TSM dressings may be used. Maintain the integrity of the skin around the insertion site. Do NOT stretch the dressing to apply; peel back gently to remove. Avoid the use of adhesives on damaged skin. • When the skin around the insertion site becomes itchy and/or reddened under the dressing do a patch test on the patient's chest. This will distinguish between sensitivity to alcohol, CHG, and/or TSM dressing. Apply: <ul style="list-style-type: none"> ➤ 70% alcohol on one patch ➤ aqueous 2% CHG on a 2nd patch, and ➤ TSM dressing on a 3rd patch. • Check site in 24 hours. • If the patient is sensitive to alcohol, then switch cleansing solution to aqueous 2% CHG • If the patient is sensitive to CHG (will show sensitivity to aqueous 2% CHG), change the cleansing solution to povidone iodine. • If the patient is sensitive to the TSM dressing, change the dressing to alternate TSM. If unable to tolerate any TSM dressings, change to gauze dressing and change every 48 hours. • If the skin becomes irritated, cleanse with appropriate agent, apply a no-sting barrier, and make the dressing over the insertion site as small as possible. Consider dressing with gauze and cling. Assess q24-48 hours. 		

Post-Insertion PICC Care

AFTER the First 24 Hours (continued)

OBSERVATION/ ASSESSMENT	POSSIBLE CAUSES	NURSING INTERVENTIONS
BLOCKED CATHETER <ul style="list-style-type: none"> • Unable to flush catheter or aspirate blood from catheter 	<ul style="list-style-type: none"> • Drug precipitate. • Fibrin Sheath. • Blood clot in catheter due to blood reflux in catheter due to improper flushing, vomiting, coughing, heavy lifting or strenuous exercise. • Catheter tip or valve against vessel wall. 	<ul style="list-style-type: none"> • Assess cause, reposition patient. • For fibrin sheath, make arrangements with PICC nurse to declot according to C-86.
CATHETER MIGRATION <ul style="list-style-type: none"> • Increased length of external catheter • Lack of blood return • Swelling in chest or neck during infusion • Pain or discomfort during infusion • Leaking at catheter exit site 	<ul style="list-style-type: none"> • Severe coughing or vomiting. • Physically active patient. • Catheter not securely anchored. 	<p>Prevention:</p> <ul style="list-style-type: none"> • Secure anchoring of catheter with Steri-strips. • Teach patient to observe external length of catheter and report changes <p>Intervention/Guidelines:</p> <ul style="list-style-type: none"> • Assess cause • Notify physician • X-ray for placement • Remove catheter if necessary
AIR EMBOLISM <ul style="list-style-type: none"> • Chest pain • Dyspnea • Pallor • Light headedness • Tachycardia/hypotension • Confusion 	<ul style="list-style-type: none"> • Air enters circulatory system and travels to right ventricle through the vena cava • Open tubing while patient vomiting or coughing. • Air accidentally injected due to improper priming of lines. 	<p>Prevention:</p> <ul style="list-style-type: none"> • Do procedures through *cap to decrease opening the system <p>Intervention/Guidelines:</p> <ul style="list-style-type: none"> • Turn patient on left side in trendelenburg position • Notify physician. • Do vital signs. • O₂ as per Doctor's Orders.

*cap = Neutral Displacement Needleless Connector